

Wolfreton
SCHOOL AND SIXTH FORM COLLEGE



THE CONSORTIUM
ACADEMY TRUST

Year 9 Knowledge Booklet 2024/25

Excellence, Endeavour, Respect

THE WOLFRETON WAY

What are Knowledge Organisers? Knowledge Organisers are revision materials containing the key information that you need to know, in order to be successful in your assessments. They are designed in a way to help you store key bits of information together and help you to visualise the layout of the page, which in turn helps you to memorise the information better. Knowledge organisers are a summary of everything you have learned in your lessons. The Knowledge Organisers will show you the exact facts, dates, events, characters, concepts and precise definitions that we need you to remember for that topic.

How to use Knowledge Organisers?

To use the Knowledge Organisers well, you should:

- Spend time (approximately 15 minutes) reading one topic within one subject of the knowledge organiser.
- You can rewrite some key notes, write on flashcards or draw mind maps to help you pull out key information.
- You can read your knowledge organisers aloud (this helps some people to remember more easily)
- You can read one section, cover up that section, and then test yourself. You can then check to see how much you have remembered. This is called 'Look, say, cover, write, check'.
- Regularly re-read and review (even when you think you know it!)



What is self-quizzing?

Research about study tells us that one of the most effective techniques for revision is to self-test. We know that this is what the most successful students do! When most students think about tests, they don't particularly like the idea. They associate testing with long, difficult exams sat in a classroom or in the exam hall. However, self-testing for revision should not be like this at all. It should be relatively quick and simple, and it isn't a big deal if you get a question wrong.

How to self-quiz?

To self-quiz effectively you will need the following:

1. Knowledge organisers (all in this book) and any other revision materials you may have
2. A blue/black pen and a red pen
3. A note book for self quizzing
















You should complete all of your self-quizzing in a notebook, as guided by your subject teacher. Ensure that you complete all subjects and all topics over time – not just the subjects you enjoy the most or find easiest! Practice makes perfect!

Step by Step Self Quizzing







Look at a small section from the knowledge organiser.

1. Read aloud for 2 or 3 minutes
2. Cover up part of your knowledge organiser
3. Write it out from memory (in a black pen)
4. Self-check and correct any spelling mistakes, missing bits or mistakes (in a red pen).

Art - Year 9 Food in Art

<p>Knowledge on food in Art</p> 	<p>Top 10 Food in Art paintings</p> 	<p>Who is artist Wayne Thiebaud</p> 	<p>Teacher demo – cake drawing with a slice</p> 	<p>1992 Liquorice Allsorts advert</p> 	<p>Who is illustrator May Van Milligen</p> 
<p>Still life history - Fish</p> 	<p>Who is artist Yusei Nagashima</p> 	<p>Cezanne – Peaches and Pears</p> 	<p>Teacher demo – Cezanne watercolour</p> 	<p>Claes Oldenburg - The Store</p> 	<p>Teacher demo – foil burger in 10</p> 
<p>Teacher demo – Mod roc cake slice</p> 	<p>Who is artist Sarah Graham</p> 	<p>Drawing a foil sweet</p> 			

Art - Year 9 Post Impressionism, Fauvism And Expressionism

<p>Knowledge - Post Impressionism in 7 minutes</p> 	<p>Mark making with Van Gogh</p> 	<p>Wheatfield with Crows by Van Gogh</p> 	<p>Fauvism in 4 minutes</p> 	<p>10 Amazing Facts about French Painter Henri Matisse</p> 	<p>Expressionism in 8 Minutes: The Most Disturbing Art Ever?</p> 
<p>The Scream by Edvard Munch -The Mystery Explained</p> 	<p>How the Scream became an icon</p> 	<p>Teacher demo of the scream in oil pastel</p> 	<p>Anxiety by Edvard Munch · 1894</p> 	<p>10 facts about Kandinsky</p> 	<p>Kandinsky animation of music</p> 
<p>The chaotic brilliance of artist Jean-Michel Basquiat</p> 	<p>Teacher demo Jean-Michel Basquiat painting</p> 				

Computing Knowledge Organiser

Internet Safety Knowledge Organiser



What are the risks?

Here are some of the risks and dangers to look out for:

- **Privacy** – your personal information could be seen by anyone, anywhere. It could be viewed by friends, family and strangers.
- **Permanency** – once something is posted it can stay online for a long time, even when comments or photos are deleted.
- **Grooming** – there are people who try to talk with children and young people online in an attempt to have sexual contact. This is against the law.
- **Identity fraud** – people can gather enough information about a person to steal their identity. They can use this to do illegal things like steal your money or commit crimes under your name. It could also be used to create fake profiles to ruin someone's reputation or to bully others.
- **Trolling** – this is when someone misuses social websites to **cause conflict or harm** to an individual or group.
- **Catfishing** – a person can pretend to be someone they're not by stealing a profile or creating a fake one. They can use this profile to trick people over a long period of time.

Helpful hints to stay safe online

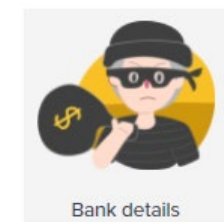
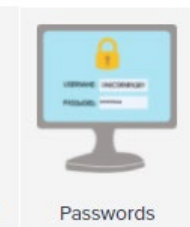
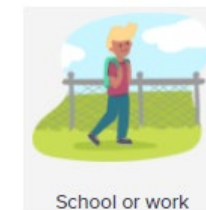
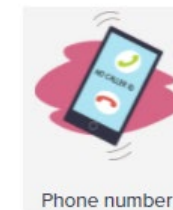
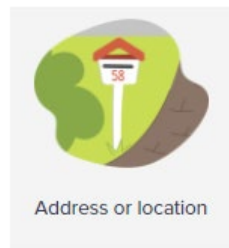
There are a few simple things you can do to keep safe online:

- **Be careful of requests** – only accept 'friend' requests from people you know in real life. This reduces the chance of getting into an unsafe situation.
- **Block anyone you've had contact with that was negative or unsafe** – this stops them from having contact with you and from seeing your profile.
- **Think before you upload and share photos** – post photos that show you and your friends in a positive way. Once it's uploaded, it's no longer private and could be viewed by friends, family, teachers and strangers.

Helpful hints to stay safe online

- **Be mindful of what you write to others** – you never know who will read these comments and how they might interpret them.
- **Think carefully about sharing links to other sites** – the content could be embarrassing, upsetting or hurtful to others.
- **Keep your online friends online** – never agree to meet someone you've only known online on your own. Take one of your parents with you and meet in a public place. If they are who they say they are, they'll be happy to do this.
- **Think about your privacy** – avoid sharing personal information online that could be misused by someone in real life. Check your privacy settings and make sure your account is secure.
- **Protect your identity** – pick a username that isn't your real name and a profile picture that doesn't show any personal information.
- **Sexting** – keep **sexting laws** in mind when taking photos and sending or receiving images.

It is important not to share your:



Computing Knowledge Organiser

Knowledge Organiser Year 9

Easy GUI Programming

`\n` puts a new line inside the string

To Open Python:

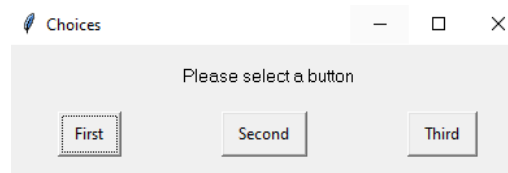
- Select Start
- Type in Python on the computer
- Select: IDLE Python
- Once the program has opened, go to File > New Window.
- Then in the New Window, go to File > Save As. Save your work in the appropriate folder.

CLI – Command Line Interface (An app that requires the user to type in commands in order to complete a task)
GUI – Graphic User Interface (An app that uses a graphical shell in order to allow the user to carry out tasks)

Variable: is used to store and update data we might want to use. It stores in the computer memory. It is like storing data in a box and labelling that box. The box is the variable, and the label is the variable name. Name, in the below example is the variable.

```
from easygui import *
name = enterbox("What is your name?")
msgbox("Hello " + name + "how are you?")
```

Button Box – is designed to allow the user to choose an option from a given choice. This normally involves more than one option.



Writing comments in your program:

Comments start with a # symbol and the writing will appear in **Red**, this will not affect the way your program is run.
#Program name: MyFirstPython.py

Adding an image:

Make sure you save your image as a gif file, and choose a sensible name.
 "Dog.gif"

YNBox - Allows the user to choose a Yes / No answer.

```
from easygui import *
option=ynbox("Do you like dogs?", "Title", ("Yes", "No"))
if option==1 :
    print("You like dogs!")
else :
    print ("You do not like dogs!")
```

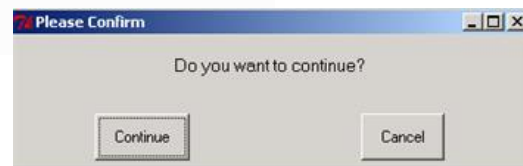
Setting up a Button Box

Create a list of the buttons you want. Let's say we want three buttons - 'First', 'Second' and 'Third'
 Create an empty list in Python:
 button_list = []
 'Append' each button as below:
 button_list.append("First")
 button_list.append("Second")
 button_list.append("Third")

Then set up the question and add an image:
 selection = buttonbox("Please select an option", "Question",
 button_list, "bttf.gif")
 msgbox("You chose:" + selection)

MSGBox – displays a message and offers an OK button. You can send whatever message you want, along with whatever title you want.

```
msg = "Do you want to continue?"
title = "Please Confirm"
if cbox(msg, title): # show a Continue/Cancel dialog
    pass # user chose Continue
else: # user chose Cancel
    sys.exit(0)
```



Data Types:

Integer – Whole number e.g. 10
 Float / Decimal – Number with a decimal point
 String – Collection of numbers, letters, text and symbols
 Byte – Whole number ranging from 0 - 255

A **Variable** is a value or piece of data which can change, that is stored in RAM and given a name like "age" or "homework".

Computing Knowledge Organiser

92 Python EasyGUI Knowledge Organiser 2

Procedure (Sub Routine)

What is a Procedure?

A procedure is a method of breaking a program down. It is like a chapter in a book. A procedure is a section of a program that can be called over and over again.

The advantage to using procedures is that you can write a piece of code once and use it as many times as you like.

You call your procedure in the main program

Let's look at an example

Message Box

A message box is a Window that:

- Displays text to the screen
- Contains an OK button for the user to click and interact with

Code:

```
from easygui import *
msgbox("Hello World!")
```

Output:



Now lets take a look at you using a message box.

What is a Variable?

- A variable is a piece of data that can change, hence the name variable.
- Variables are stored in the computer's Random Access Memory (RAM)
- Variables are given a name to identify them like age, name, title, weight and so on...
- Variables are volatile as they are stored in RAM and are lost as soon as the power is switched off.
- Variables have different types such as:
 - String
 - Integer
 - Float
 - Char

What are the different Variable Types?

Variables can have different types. They have different types to store different things. Let's take a look at that now:

Data Type	Explanation	Example
Integer	Whole Number	90, 3, 100
Float / Real	Number with a decimal point	64.73, 1010.987
Char	Single character	J, F, D etc...
String	Collection of text, letters, numbers or symbols	"Adam", "Helen" etc... "Pass123"
Boolean	Stores the result of a decision	Yes or No True or False

Enter Box

A enter box is a Window that:

- Displays text to the screen (Could be to ask a question!)
- Contains an OK and Cancel button for the user to click and interact with
- Allows the user to type in text using the keyboard

Code:

```
def task1():
    name = enterbox("Please enter your name")
    msgbox("You entered the name " + name)
```

Output:



Now lets take a look at you using a enter box together with task 3 and have some guided practice.

What is Selection?

- Selection is the ability of a computer to make a decision given a range of inputs
- For example we could look at deciding whether or not an umbrella is needed given state of the weather!
- To do this we would use an IF Statement
- We also have to use == (Double Equals). This means comparatively equals

ButtonBox Example

The **title** stores the title of the ButtonBox that appears at the top of the screen and is enclosed inside of speech marks as it is a string

Selection is a variable that stores what button the user selects.

Example Code

```
options = ["Option0", "Option1"]
title = "ButtonBox Example"
selection = buttonbox("Select an option", title, options)
```

The IF statements ask whether option0 or 1 has been pressed. It basically compares what is stored in the variable selection with option[0] in the list which is?...

```
if selection == options[0]:
    msgbox("You selected Option 0!")
if selection == options[1]:
    msgbox("You selected Option 1!")
```

How does selection work?

```
from easygui import *
def task1():
    weather = enterbox("What is the weather outside?")
    if weather == "Raining":
        msgbox("It is raining and you NEED an umbrella!")
    else:
        msgbox("You do NOT need an umbrella!")
```

What is the name of the variable that stores the state of the weather?

- Don't forget the from easygui import *
- Lets write the first task in a procedure called task1
- Let's use an enterbox to allow the user to type the information in!
- We ask the question is it raining and then output a msgbox saying an umbrella is needed
- ELSE we output a msgbox saying you don't need an umbrella.

Computing Knowledge Organiser - Data and Algorithms

Binary

Why binary?

- Binary is needed to represent data and programme instructions as this is the way computers work.
- Processors contain billions of transistors which are connected together to form circuits.
- There are only two states - on and off.
- Numbers, text, graphics and sound are all represented in the same way, as a series of 1s and 0s. The program instructions that the processor is following allow it to interpret them in a different way (it is given some context).

Binary Systems

Binary

- Binary is a number system based on two digits: 1 and 0. It is BASE TWO.
- The numbers used to calculate a binary number increase in multiples of 2 which can also be represented using powers

128	64	32	16	8	4	2	1
2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0

Denary

- Every digital has a value TEN TIMES greater to the one on the right.

10^3	10^2	10^1	10^0
7	2	3	1
Thousands	Hundreds	Tens	Units

Binary Conversations - Binary to Denary

128	64	32	16	8	4	2	1
2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
1	0	0	1	0	1	1	0
1×128	+		1×16	+	$1 \times 4 + 1 \times 2$		= 150

Binary Conversations - Denary to Binary

63 would be... 0011 1111 in 8-bit binary

128	64	32	16	8	4	2	1
2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
0	0	1	1	1	1	1	1

Decimal	Binary
0	0
1	1
2	10
3	11
4	100
5	101
6	110
7	111
8	1000
9	1001

Decimal	Binary
10	1010
11	1011
12	1100
13	1101
14	1110
15	1111
16	10000
17	10001
18	10010
19	10011

Handy tip:

Binary numbers are always odd if the right most bit is 1. If it is even, the right most is always 0.

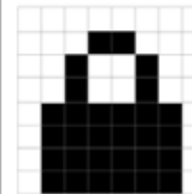
$1001 = 9$ $1100 = 12$

There are only 10 types of people in the world: Those who understand binary and those who don't.

Abstraction

Computers have to simplify things to recreate them. This is something called abstraction.

The most important details are kept and the rest is stripped away.



Computing Knowledge Organiser - Data and Algorithms

Images and Text

Representing Data - ASCII

ASCII is a character encoding standard for electronic communication. **ASCII** codes represent text in computers, telecommunications equipment, and other devices.

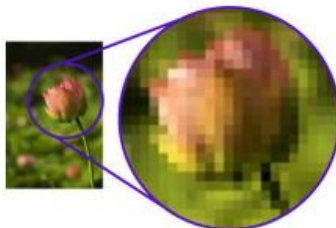
Originally ASCII consisted of 7 bits so 128 characters could be represented. All symbols, characters, uppercase, lowercase and control actions (e.g. backspace, shift and return key) all have ASCII representation.

Uppercase letters run 65 (A) to 90 (Z) and lower case letters run from 97 (a) to 122 (z). Please see the table below for some examples.

Decimal	Binary	Character	Decimal	Binary	Character	Decimal	Binary	Character
32	00100000	space	64	01000000	@	96	01100000	`
33	00100001	!	65	01000001	A	97	01100001	a
34	00100010	"	66	01000010	B	98	01100010	b
35	00100011	#	67	01000011	C	99	01100011	c
36	00100100	\$	68	01000100	D	100	01100100	d
37	00100101	%	69	01000101	E	101	01100101	e
38	00100110	&	70	01000110	F	102	01100110	f
39	00100111	'	71	01000111	G	103	01100111	g
40	00101000	(72	01001000	H	104	01101000	h
41	00101001)	73	01001001	I	105	01101001	i
42	00101010	*	74	01001010	J	106	01101010	j
43	00101011	+	75	01001011	K	107	01101011	k

Representing Data - ASCII

To a computer a string is just a stream of binary codes that represent a number of characters. Programming languages (such as Python) have functions that will return the denary equivalent when entered into the computer system.



Representing images - file types.

- **BMP** - Bitmap images
- **JPG** - Joint Photographic Experts Group (the creators)
- **GIF** - Graphics Interchange Format (used with bitmaps)
- **PNG** - Portable network graphic
- **TIFF** - Tagged image file format



Representing images - Bitmap Images (Pixels)

- Bitmap images are made up of **PIXEL**s or **PIXELS**. A pixel is the smallest identifiable area of a graphic image
- You may have heard of different things, such as screen resolution, being measured in PPI (pixels per inch). It is the number of picture elements in a square inch.
- Each pixel is a single colour and is given a binary value which represents that colour e.g. **11000000** might equal Red. A pixel's colour can be changed by changing this value and is represented with a bit pattern

Representing images - Bitmap Images (Resolution)

- Resolution is the concentration of pixels within a specific area. The area is defined by the image width and height in pixels e.g. 3264 (W) x 2448 (H)
- The more pixels per inch, the better the screen resolution. The higher the resolution, the better the graphics and the graphics are then easier on the eye (reducing eye strain and other health problems)



Representing images - Colour Depth

The colour depth of an image is measured in bits. Colour depth is the number of bits used to encode the colour of each pixel. The number of bits indicates how many colours are available for each pixel. In the black and white image, only two colours are needed. This means it has a colour depth of 1 bit. Grey is made up of black and white so needs 2 bits.

00	White	1 bit used is 2^1	There are 256 variations of each primary colour contributing to 16,777,216 colours ($256 \times 256 \times 256$)
01	Light grey	3 bit used is 2^3	
10	Dark grey	8 bit used is 2^8	
11	Black		

Representing images - Calculating file sizes

File sizes for a bitmap image are calculated by finding the total number of pixels and multiplying that by the numbers of bits used to represent each pixel.

Formula:

Number of pixels x Colour Depth

$2,000,000 \times 24 = 48,000,000$ bits (6,000,000 bytes/ 6MB)

OR:

$4288 (W) \times 2848 (H) \times 24$ (bit)

The formula used will depend on the information given to you.

Computing Knowledge Organiser - Data and Algorithms

Representing Data - Sound

Sounds must be converted into a digital form in order to be stored and processed by a computer.

Analogue recording representing the continuous change in air pressure caused by sound waves (as you speak, sing etc. into the microphone for example).

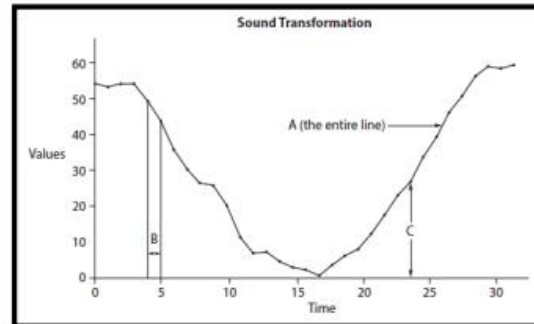
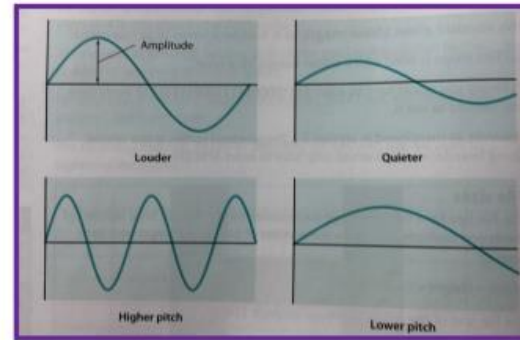
It is called an analogue recording because the change in voltage exactly mirrors the change in air pressure

Representing Data - Sound

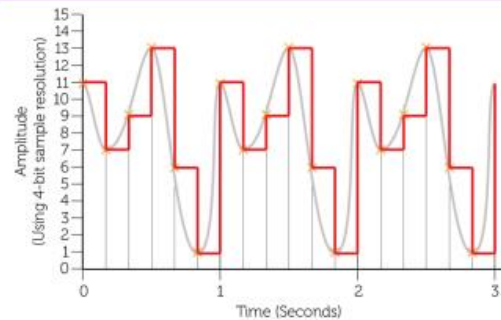
Computers do not represent data in an analogue way; computers are **digital** and their transistors are either on or off (binary and circuits!) so sound data needs to be in streams of 1s and 0s.

Continuous change cannot be represented in a digital stream and so we have to take 'snap shots' or 'samples' of the sound wave.

The more samples you take, the more accurate the reading. This said, the more samples you take the more data which is produced and therefore more computer resources are required (storage, processing etc)



- A - The sound wave
- B - The interval between samples
- C - Amplitude (volume of the sound)



Fidelity of the recording is influenced by two factors:

Sample Rate: the number of samples taken per second

Bit depth or **sample precision:** One important detail is the dynamic range of the sound - the range of the volume in the music

One sample per second = 1 Hz. The example above shows 6 samples per second ... 6Hz



Sound



Representing Data - Sound

To calculate the size of a sound file you will need:

Sample rate per second / bit depth / duration (length) of recording / number of channels (mono = one channel and stereo = two channels)

Formula (in bits): samples rate x bit depth x duration (seconds) x number of channels

Worked example

Samples per second: 44,100 / Bits: 16 / Duration 2.5 minutes / Channels: 2

$44,100 \times 16 \times 150 \times 2 = 211,680,000$ bits (+8 into bytes = 26,460,000 bytes)

Data Storage

- All data consists of bits (1 or 0).
- Decimal (denary) is base 10 / binary is base 2 / hex is base 16

Unit	Symbol	Decimal prefix (base 10)	Binary prefix (base 2)	Size
Kilobyte	KB	10^3	2^{10}	1,000 Bytes
Megabyte	MB	10^6	2^{20}	1,000,000 bytes (or 1,000 Kilobytes)
Gigabyte	GB	10^9	2^{30}	1,000,000,000 bytes (or 1,000 Megabytes)
Terabyte	TB	10^{12}	2^{40}	1,000,000,000,000 (or 1,000 Gigabytes)

Consolidation of Learning tasks

1. List file sizes in ascending order starting with 'bit'
2. Describe a pixel, colour / bit depth and ASCII
3. An image is described as being 640 x 480. It has a bit depth of 24 calculate the file size
4. Describe the steps needed to convert the binary number 11101110 into denary and a hexadecimal number and show the results
5. Explain why some digital images are clearer and display more detail than others
6. Describe how sound is digitised
7. What is ASCII

Computing Knowledge Organiser - Data and Algorithms

Bubble Sort: A sort algorithm that compares each pair of values and swaps if they are in the wrong order. One full run of the list is a pass. If a swap is made, the whole list must be checked again. If no swaps are made on a pass, then it is in order and can stop.

Merge Sort: The list is repeatedly split into half. Once the list cannot be split anymore (items are in single lists) then they are merged back into order.

Linear Search: A way of searching for data by looking at each item one at a time. This is done in the order of the list (i.e. start to finish). If the item is found the search stops.

2D Linear Search: The same process as a linear search but working with 2D lists. The inner list is searched (usually in a specific column).

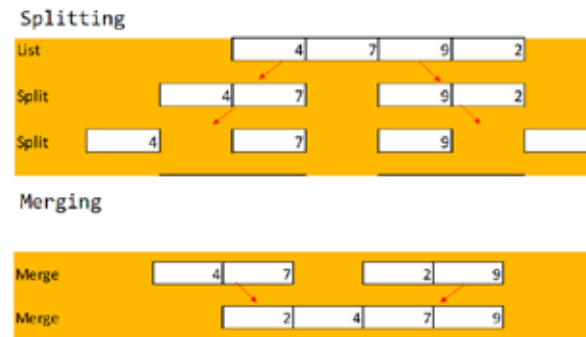
Efficiency: How quickly the algorithm can complete a task. Some algorithms are faster than others. Less efficient means slower but it can still be reliable.

Searching and Sorting Algorithms

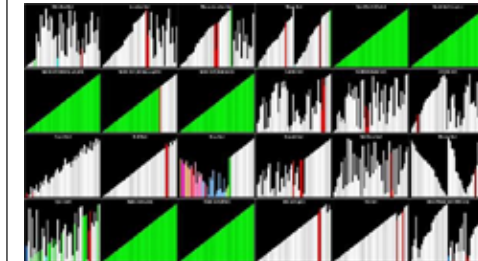
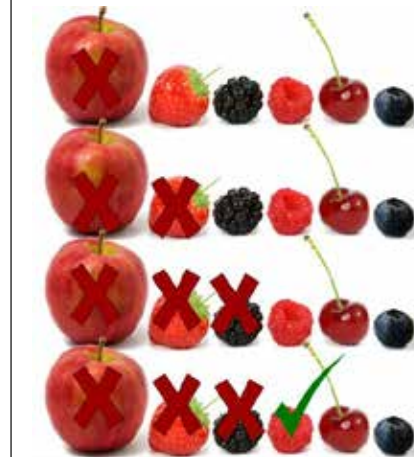
Bubble Sort



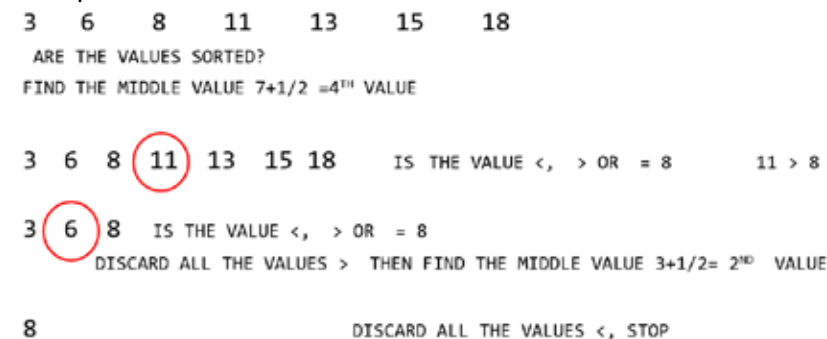
Merge Sort



Linear Search



Binary Search - Find 8



Computing Knowledge Organiser

94 Web Development and Cyber Security Knowledge Organiser

Summary

A **network** is created when more than one device is connected together.
 A network can be a small collection of computers connected within a building (e.g. a school, business or home) or it can be a wide collection of computers connected around the world.
The main purpose of networking is to share data between computers.
 A file has to be broken up into small chunks of data known as **data packets** in order to be transmitted over a network. The data is then re-built once it reaches the destination computer.
Protocols are used to control how data is transmitted across networks. They are a set of rules for how messages are turned into data packets and sent across networks.
Bandwidth measures the amount of data that can transfer through a communications channel over a given period of time. It is measured in decimal units of bits per second. For example, Bps, Kbps or Mbps.

Key Vocabulary

File server	A networked computer that provides shared storage, it can be accessed by workstations on the same network.
Input device	Input devices, like a keyboard, allow us to put raw data in a computer which it processes to produce outputs.
LAN	Local Area Network covers a small area such as one site or building, e.g. a school or a college.
Licence	A legal agreement between the company who published the software and the end user covering areas such as copyright.
Network	A network is a number of computers linked together to allow the sharing of resources.
Output device	A device used to output data or information from a computer, e.g. a monitor or printer.
Server	A computer that holds data to be shared with other computers. A web server stores and shares websites.
WAN	Wide Area Network covers a large geographical area. Most WANs are made from several LANs connected together.
Workstation	A computer connected to a network.
DNS	Domain Name Server—converts a web address
IP Address	An addressing system used to assign a computer

LANs and WANs

A school network is usually a **LAN**. LANs are often connected to WANs, for example a school network could be connected to the internet. **WANs** can be connected together using the internet, leased lines or satellite links.

Advantages of networks

- ◆ Sharing devices such as printers saves money.
- ◆ Site (software) licences are likely to be cheaper than buying several standalone licences.
- ◆ Files can easily be shared between users.
- ◆ Network users can communicate by email and instant messenger.
- ◆ Security is good - users cannot see other users' files unlike on stand-alone machines.
- ◆ Data is easy to backup as all the data is stored on the file server.

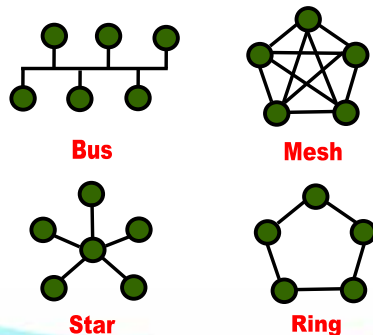
Disadvantages of networks

- ◆ Purchasing the network cabling and file servers can be expensive.
- ◆ Managing a large network is complicated, requires training and a network manager usually needs to be employed.
- ◆ If the file server breaks down the files on the file server become inaccessible. Email might still work if it is on a separate server. The computers can still be used but are isolated.
- ◆ Viruses can spread to other computers throughout a computer network.
- ◆ There is a danger of hacking, particularly with wide area networks. Security procedures are needed to prevent such abuse, e.g. a firewall.

Internet and WWW

The internet is the network of connected computers that the web works on, as well as what emails and files travel across. The internet is the network of connected computers that the web works on, as well as what emails and files travel across. The WWW does not work without the Internet.

Topologies



94 - Web Development and Cyber Security

HTML and CSS Knowledge Organiser

Keywords & Facts

Key word	Meaning
HTML	HyperText Markup Language is the default language used on the WWW to create web pages.
Tag	A tag is used to show how the web page will be displayed, they are used to structure the web page.
Head	The Head contains 'Meta Data' or information about the web page, e.g. the title.
Body	The Body contains all of the necessary information to display the web page.
Structure of a web page	The structure of a web page is defined by the tags—see below.

Standard HTML Structure:

```
<HTML>
<head>
<title></title>
<style></style>
</head>
<body>

</body>
</HTML>
```

Useful places to go for help:

W3 Schools:
www.w3schools.com
Hex colour picker e.g.
www.w3schools.com/colors/colors_picker.asp

CSS Rules

- Inline—the CSS is in the body tag
- Internal—the CSS is in the <style> section in the head
- External—the CSS is in a separate file

Example Internal Rules Structure

```
body {
background-color: #d0e4fe;
}
h1 {
color: orange;
text-align: center;
}
p {
font-family: "Times New Roman";
font-size: 20px;
}
```

Key word	Meaning
<p> 	<p>Used for paragraphs</p> - creates a line break
 <u> <i>	 Bold <u> <u>Underline</u> </u>
Hyperlinks	Used to link one HTML page to another. Click on it to open. link text
Images	Used to add a picture. The picture must be stored with the web page.
Background colours HTML	<body bgcolor="red"> Use link below to find more colours.

CSS Rules

Example Internal Rules Structure

```
background: #000000;
background-image: url("picture.jpg");
background-repeat: repeat-x;
width: 100px;
width: 50%;
height: 100px;
border: 1px solid #000000; /* width, style and colour */
border: 2px dashed #ffffff;
float: left;
float: right;
margin: 0px;
padding: 0px;
```

Text properties

```
text-align: center; text-align: left;
font-family: "Times New Roman", Times, serif;
font-style: italic;
font-weight: bold;
font-size: 16px;
text-decoration: underline;
text-decoration: blink;
color: #ffffff;
```

Computing Knowledge Organiser

Film or video —a series of moving images showing an event or story, usually with sound.

Media types :

Film—a thin flexible strip of plastic or other material coated with light-sensitive emulsion for exposure in a camera, used to produce photographs or motion pictures.

Video tape—Videotape is magnetic tape used for storing video and usually sound in addition. Can be analogue or digital.

Digital video—Digital video is an electronic representation of moving visual images (video) in the form of encoded digital data.

Audience—can be categorised in different ways to help us better understand what they will want to watch or connect with...

- » Gender – this is whether the intended audience will be male or female.
- » Age – this is how old the intended audience is likely to be.
- » Ethnicity – where the audience is from (country/area).
- » Income – this is how much the target audience typically earns from their work/career.
- » Location – this is what area/country the target audience currently lives in.
- » Accessibility – this is whether the audience may require additional features in order to access the final product, like larger fonts for an older audience, for example.

Storyboards can include directions for **camera shots**. Some common camera shots include...



Camera shots are used to focus an audience's attention when needed. This image shows the **full shot**, or **long shot**. Lots of the background setting is visible.

A **mid**, or **medium**, camera shot (below, left) is one of the most common. It focuses on more of the subject whilst still



allowing the background to be visible. A **close up** camera shot (right) is very close to the subject of the scene; very little background is visible.



Purpose of a video:

Its role e.g. to advertise, promote, inform, entertain etc.

How good is it at meeting the purpose? Is it clear? Concise?

Does it work with the audience?

Does the music work? Does it set the right mood? Does it fit with the content?

Is it well made? Is it good quality? Is it clear? Do you get it?

Y9 Video Editing—Theory Knowledge Organiser

Storyboards can include directions for **camera movement**, basically how the director or writer of a scene would like the camera to move...

- » Pan – This is when a still camera (so the camera itself doesn't move position) turns from side to side – if you stand in a fixed position and look from left to right and back again, this is the same action as panning!
- » Tilt – This is when the camera stays in a fixed position but tilts/moves up and down. If you stand in a fixed position and look up and then down, this is the same movement a camera makes when it tilts.
- » Zoom – This is when the camera stays in a fixed position, but the lens is used to get closer to the subject in the scene; the camera doesn't get closer. Imagine zooming in on a document on your computer, your screen doesn't get bigger, the document enlarges.
- » Using a Track & Dolly – This is when the camera moves with the scene on a track, as if it was a train moving along a train track.

On demand video—video that can be accessed as and when the user wants to watch it, using the internet. It does not require physical media e.g. a DVD. It can be free or paid for.

Broadcast video—video that is sent over the airways or internet which can only be watched when it is being transmitted (e.g. TV / Live Stream). To watch it later it would need to be recorded.

If **sound** is going to be used in a piece of work, this may be included on a storyboard. Different sound types include...

- » Dialogue – dialogue is when someone speaks within a scene.
- » Sound effects – sound effects are short pieces of recorded or artificial sound used to enhance a scene.
- » Ambient sound – ambient sounds are continuous background sounds that help set a scene. Examples include wind, crowds, traffic or office noises.
- » Music – music is often played in the background of scenes to help set the mood for the audience. When you next watch a video/TV show, take note of how music is used in the background and imagine what the scene would be like if the music wasn't there.

Storyboards might also state what type of camera is to be used for different scenes. Different **camera types** will be used for different purposes and different projects. An animation, for example, might use a virtual camera whilst a standard video project would use a video camera/camcorder.

- » Still camera – this is a camera that just takes standard/static images, one picture at a time.
- » Video camera – a video camera, sometimes referred to as a camcorder, is capable of filming video scenes.
- » Virtual camera – a virtual camera is used to film animations, 3D models on a computer or computer game action.

Design and Technology Knowledge Organiser

Fibres and Fabrics Knowledge Organiser

Natural Fibre Products

Traditional fibres from plants and animals.

Wool: Fibres from sheep's wool are spun into yarn and can be woven and knitted. The fibres can also be spun into finer yarn which is turned into cloth. Absorbent, soft or coarse handle, not durable.

Used in yarn form in knitwear, scarves, gloves, bags, dresses and suits.

Cotton: Thread is spun from fibres from the cotton plant. Used widely due to its good durability and soft handle. Can be machine washed, but requires ironing as creases easily. Highly-absorbent.

Used in canvas, muslin, calico and denim, clothing, home furnishings

Silk: Natural fibre from silkworms, woven into fine fabric, which has a high sheen or lustre. Cool to wear.

Used in high-class clothing and home furnishings in Satin form.

Linen Made from fibres of the flax plant, linen is a traditional fabric. Does not cause allergies and is cool to wear. Highly absorbent.

Used in home furnishings, summer clothing.

Leather: Made from animal skins, leather is not strictly a fabric. Comfortable in both hot and cold conditions. Untreated, leather is absorbent but can be treated with a range of finishes to improve its effectiveness and durability. Tough and elastic.

Used in clothing, car upholstery, home furnishings.

Manmade Fibre Products (synthetic)

Modern fibres manufactured using polymers.

Nylon: Strong and durable manmade polymer fibre. Has a wide range of applications, as a clothing fabric and in other uses where durability is important. Warm to wear, non-absorbent and good drape. Can be made with soft or coarse handle.

Used in wide range of clothing in pure and blended form. Waterproof coats, tents.

Polyester: Very durable polymer fibre, non-absorbent and cool to wear. Often blended with cotton to produce low cost, breathable fabrics and used widely in place of pure cotton.

Used in clothing and home furnishings, industrial polyester used for ropes, seat-belts.

Organza: A lightweight, sheer fabric traditionally made from silk, although more often now made from polyester. Its decorative properties make it popular for embellishments on clothing.

Used in home furnishings, hat decorations, wedding dresses.

Lycra (brand name for spandex/elastane): A 20th century 'wonder material', Lycra is commonly found in sportswear due to its breathable and elastic qualities. Excellent shape retention. When blended with natural fibres, clothing with the feel of natural fibre, and the elasticity of Lycra can be achieved.

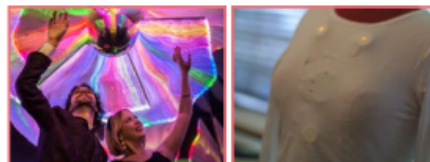
Used in tight-fitting sports wear, stockings and leggings, blended in denim, woollen clothing.

Photo courtesy of (@flickr) Mediamatic Hybrid Wearables - granted under creative commons licence - attribution.
Photo courtesy of (@flickr) Those Who Affected Me - granted under creative commons licence - attribution

Property	Definition	Found in
absorbent	A fabric's ability to hold moisture.	wool, cotton, linen, non-woven fabrics such as felt
blended	A fabric or yarn made from a mix of natural and manmade fibres, purposefully created to use the features of both.	
breathable	A fabric that uses specific fibres and weave that allows air to pass through the clothing, thereby preventing heat and moisture build-up.	sportswear blended fabrics, linen, cotton, wool
drape	The way a fabric looks when it is hanging down. Clothing designers must consider the drape of a fabric when choosing the material for a garment.	all fabrics
durable	Hard-wearing, stain resistant. Man-made fibres are mainly more durable, and are therefore blended with natural fibres to create more durable products.	nylon, polyester, denim, lycra
handle	What a fabric feels like to the touch, for instance: smooth, rough, stiff.	all fabrics
sheen	A smooth and slightly reflective surface finish to a fabric.	silk and synthetic satins, polyester products, some leathers
sheer	Fabrics that are flimsy and semi-transparent.	organza, voile, muslin lingerie products
shape retention	A fabric's ability to keep its shape and not become deformed through use.	lycra and lycra blends, leather, polyester, nylon
water-repellent	Non-absorbent. A fabric's natural ability, or manufactured finish, allowing water to not penetrate through the weave.	polyester, nylon, leather

Smart Fabrics

Advancements in modern technology have implications for fabrics and design. **Wearable technology** and **performance enhancing textiles** are important strands of sports and fashion design in the modern age.



This acupuncture therapy shirt allows the wearer to receive specific therapy at the same time as getting on with their job.

This light emitting fabric is an example of how designers can use fibre-optics to create high-impact visual clothing and accessories.

Design and Technology Knowledge Organiser

Fibres and Fabrics Knowledge Organiser

Wasting	Addition	Deforming and Reforming
<p>Fabrics are a compliant material and are relatively easy to cut and shape. They are, however, an unforgiving material, and an incorrect cut will be often difficult to undo or disguise.</p> <p>Cutting: Fabric is normally cut with textile shears. The blades are 150mm long and the lower handle is always bigger. This allows for a steadier, longer cut. Rotary cutters are used for cutting non-woven fabrics such as felt.</p> <p>Shearing: Although shearing and cutting are the same force and movement, pinking shears give a zig-zag edge to their cut. This prevents woven fabric from fraying</p> <p>Wasting Fabrics with CAD/CAM</p> <p>Sections of fabric can be wasted effectively using a laser cutter. A pattern can be created using CAD software such as 2D Design and used to control the laser cutter. Identical patterns can be created very quickly using this method with a high level of accuracy.</p> <p>Seam Allowance</p> <p>Fabrics require a seam allowance; the material where the stitch joins two pieces of fabric together. This means fabric must be cut larger than the size needed by approximately 10mm on all sides where a join is required.</p>	<p>Addition by hand-stitching</p> <p>All projects will require some degree of hand-stitching. This may be to add a button, join one piece of fabric over the top of another, such as in applique, or embroidering by hand. There are a range of stitches which can be done using a needle and thread:</p> <ul style="list-style-type: none"> • Running stitch: Quickly joints two fabrics along a line • Overstitch: Loops over the edge of the fabric preventing fraying. • Blanket-stitch: Ornamental stitch effective on decorative work. • Back stitch: Stronger than a running stitch and good for seams. <p>Zips, buttons, hook and eye, press-studs and Velcro can all be added to fabrics and used to add and fasten pieces together.</p> <p>Addition by machine-sewing</p> <p>The correct method for joining fabrics is dependent on the type of fabric being used, and the loads and stresses that will act upon the join. An overlock machine is good for professional looking products as it binds the seam inside the join. Sewing machines are required to add fasteners such as zips.</p> <p>Addition by computer sewing machine</p> <p>Many jobs can be completed by a programmable CAM sewing machine.</p> <p>Some schools have embroidery machines. A design is created on a computer, before being uploaded to the embroidery machine. Decoration, detail and personalised names can be added to a panel of a product this way.</p>	<p>Deforming by tailoring</p> <p>Once the pattern and fabric pieces have been cut, the main tool for shaping an item of clothing is a tailor's dummy. Re-forming, adjustment and fitting can be done whilst seeing the overall shape of the product. Because fabrics are compliant materials, they deform as part of their nature. Imagine wearing a pair of skinny jeans which didn't deform as you moved!</p> <p>Deforming by pleating and gathering</p> <p>Shape can be created and accentuated through the use of gathering. Pleating can create a strong visual effect and allow for movement in a garment.</p> <p>Pleat: Repeated folds in a textiles product, usually stitched at the top.</p> <p>Gather: To shorten a piece of fabric by drawing it together, like the top of some curtains.</p> <p>Deforming by heat and liquids</p> <p>Heat treatment: Some specially laminated fabrics can be formed into shape using heat. This is useful where the designer needs parts of a design to hold a shape without support, such as collars.</p> <p>Blocking: Traditionally, moulded hats, for both men and women have been created by deforming felt on wooden blocks. A felt hood or cone is placed on the block and a liquid stiffener is applied. A steam iron is then used to shape the felt around the block before shaping the brim and cutting off waste material.</p>

Design and Technology Knowledge Organiser

Tier 3 Vocab

Floor planner CAD
interior design
proportion
scale
layout
colour scheme
swatches
textures
fixtures fittings
design movement
furniture
room plan
architecture
Pop Art
De Stijl
Memphis
working triangle



Interior



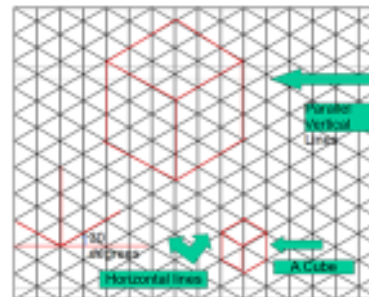
Exterior



Isometric Drawing



Isometric drawing is way of presenting designs/drawings in three dimensions. In order for a design to appear 3 dimensional, a 30 degree angle is applied to its sides.



Year 9 Graphic Communication Interior Design Knowledge Organiser

2D Floor planner



3D Floor planner



Design Movements

De Stijl



Memphis



Pop Art

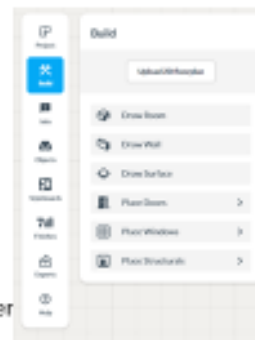


Assessment layout

1. Choose a view on 3D of your room
2. Next to F12 on the key board is PRINT SCREEN, press, and select area you require
3. Open a new power point – add title

Floor planner – CAD POP ART/MEMPHIS/DE STIJL Final Design

4. Paste (right click)
5. Click off the screen, make image smaller and twist and place on the slide, consider your presentation 15 views are required.
7. Format background – Design, format background, gradient fill
8. **Higher Level/Challenge** - Using the text box, explain your decorated room interior consider your design movement

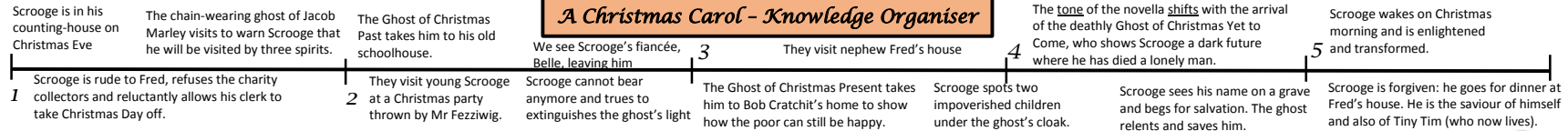


Drama Keywords

<p>Gothic Horror: Gothic horror can be defined as a performance that employs dark and picturesque scenery and an overall atmosphere of, mystery, fear, and dread.</p> <p>Reference point: A reference point is a place or object used for comparison to determine where something is.</p> <p>Status: The power dynamic between two characters. A high status character would behave in a dominant fashion, a low status character would behave submissively.</p> <p>Improvisation: The spontaneous and imaginative use of movement and speech to create a character or object in a particular situation and develop the scene. It is also a form of live theatre in which plot, characters and dialogue are made up on the spot, often based upon a suggestion from the audience. Often abbreviated to 'improv'.</p>	<p>In the round: Theatre-in-the-round' is a theatre space in which the audience surrounds the acting area.</p>	<p>Climax: The point of greatest intensity in a series or progression of events in a play, often forming the turning point of the plot and leading to some kind of resolution.</p> <p>Proxemics: Contemporary term for 'spatial relationships', referring to the physical distances between actors on a stage that communicates the relationship between different characters. Proxemics is also applied to the distance between a performer and elements of the set, which conveys information about character and circumstances.</p> <p>Story line: The plot or plan of action in a play or devised piece.</p>	<p>Intensity: The measurable amount, levels or strength of a given property (for example sound, light, emotion)</p>	<p>Suspense: A feeling of uncertainty as to the outcome, used to build interest and excitement on the part of the audience.</p>	<p>Tension: The atmosphere created by unresolved, disquieting or inharmonious situations that human beings feel compelled to address. In the theatre, tension may be caused by a threat to a character or confrontation between characters, creating a sense of anxiety in the audience.</p> <p>Interaction: The action or relationship between two or more characters.</p> <p>Rehearsal: Rehearsal of a devised piece does not properly start until at least the main outline and structure of the piece have been agreed by the group, although the piece will continue to be shaped and developed through the rehearsal process.</p>	<p>Dynamics: Variations in levels of energy, physical movement, pace or emotional intensity.</p> <p>Subtext: What a character is really thinking or feeling when they say particular words. Subtext is linked to motivation.</p> <p>Theatre in Education (TiE): is theatre that takes place in an educational setting such as schools, colleges, pupil referral units, and even onsite at museums and exhibitions.</p> <p>Epic Theatre: Within Epic theatre, audiences should remain distant, not becoming emotionally involved in the performance, so that they can make rational judgements about the social or political issues involved.</p>	
	<p>Rising action: A series of plot-related relevant incidents that create suspense, interest and tension in a narrative.</p>		<p>Fourth wall: The illusion of an invisible wall of a set through which the audience sees the action of the play. Breaking the fourth wall refers to the moment when an actor directly addresses the audience through the fourth wall, breaking the illusion.</p>	<p>Fourth wall: The illusion of an invisible wall of a set through which the audience sees the action of the play.</p>			<p>Text: The basis of dramatic activity and performance; a written script produced by a playwright or agreed by a group through the process of devising.</p>
	<p>Naturalism: A style of drama that developed in the late nineteenth century as an attempt to escape the artificial theatricality of contemporary forms of playwriting and acting. Its prime objective was to portray reality on stage.</p>		<p>Stanislavski: is the basis of most contemporary training, which features the cultivation of emotional and sense memory, physical and vocal training, and improvisation.</p>	<p>Devised drama: Drama that is developed through collaboration to create an original piece of work. It may derive from a range of starting points and use techniques of improvisation. The devising process refers to the collective shaping and structuring of the devised piece. It will often involve research, sharing of ideas, drafting of material and practical experimentation, leading to a working script or outline of the piece.</p>			



English Knowledge Organiser



Stave	Key Quotation	Info / Analysis
Stave One Marley's Ghost	<p>Hard and sharp as flint solitary as an oyster</p> <p>"I don't make myself merry at Christmas, and I can't afford to make idle people merry."</p> <p>"It's enough for a man to mind his own business, and not to interfere with other people's."</p> <p>"I wear the chain I forged in life" Jacob Marley</p> <p>"There is no light part of my penance" Jacob Marley</p>	<p>Description of Scrooge at start</p> <p>Smile to convey his lone existence</p> <p>Shows his unsympathetic attitude to the poor ('idle' people)</p> <p>He is obsessed with business and money.</p> <p>A warning for Scrooge: Marley created his own eternal punishment through his greed.</p> <p>Penance = punishment</p>
Stave Two Ghost of Christmas Past	<p>From the crown of its head there sprang a bright clear jet of light</p> <p>"Your reclamation, then. Take heed!" Ghost of Xmas Past</p> <p>"Your lip is trembling," said the Ghost. "And what is that upon your cheek?"</p> <p>A solitary child, neglected by his friends, is left there still</p> <p>"He has the power to render us happy or unhappy [...] The happiness he gives is quite as much as if it cost a fortune."</p> <p>"I have seen your nobler aspirations fall off one by one, until the master passion, Gain, engrosses you."</p> <p>"Remove me!" Scrooge exclaimed. "I cannot bear it!"</p>	<p>Refers to Ghost of Christmas Past. The light represents truth and enlightenment.</p> <p>Reclamation = recovery / change Take heed = listen and learn</p> <p>Scrooge visits his old schoolhouse and first shows emotion (self-pity).</p> <p>Description of Scrooge as a child. How has his childhood affected him?</p> <p>Scrooge speaking of Fezziwig's generosity. He realises how an employer can affect his employees.</p> <p>Scrooge's ex-fiancée (Belle) when she leaves him, because he is obsessed with 'gain'.</p> <p>Scrooge, just before extinguishing the ghost's light (he can't bear the truth).</p>
Stave Three Ghost of Christmas Present	<p>Scrooge entered timidly, and hung his head before this Spirit</p> <p>"Oh no, kind Spirit! say he will be spared"</p> <p>"To hear the insect on the leaf pronouncing on the too much life amongst his hungry brother in the dust!"</p> <p>"I am sorry for him [...] Who suffers by his ill whims? Himself, always."</p> <p>Uncle Scrooge had imperceptibly become so gay and light of heart "This boy is ignorance. This girl is Want. Beware them both."</p>	<p>Scrooge is more subdued when he meets the second ghost (Ghost of Xmas Present).</p> <p>Scrooge shows concern and sympathy for Tiny Tim.</p> <p>The Ghost reminds Scrooge of his earlier words about decreasing the population of the poor. He compares Scrooge to an insect.</p> <p>Fred discusses his Uncle Scrooge with the family.</p> <p>Scrooge is delighted that his family even speak of him.</p> <p>The ghost warns Scrooge with personification / symbols of mankind's faults.</p>
Stave Four Ghost of Christmas Yet To Come	<p>plundered and bereft, unwatched, unwept, uncared for, was the body of this man</p> <p>Avarice, hard dealing, gripping cares? They have brought him to a rich end, truly!</p> <p>"Are these the shadows of the things that Will be, or are they the shadows of the things that May be only?"</p> <p>"Men's courses will foreshadow certain ends"</p>	<p>Description of the man on the deathbed.</p> <p>Scrooge's ironic statement about the dead man, before he realises that he is looking at himself.</p> <p>Scrooge asks the ghost if it too late for him to transform and alter his future.</p> <p>Scrooge realises that his past behaviour will determine his future.</p>
Stave Five	<p>"I don't know how long I have been among the Spirits. I don't know anything. I'm quite a baby."</p> <p>Scrooge regarded everyone with a delighted smile.</p>	<p>Scrooge discards logic and is now carefree. He is a transformed character.</p> <p>He spreads good-will instead of fear and hatred.</p>

Themes
<p>Logic and Time</p> <p>Scrooge's sense of logic is continually disrupted, helping to dismantle his cold and rational view of society. He initially dismisses the supernatural appearances, before then submitting to them. The ghosts are late to visit him, and then distort time as they seem to visit him all in one night – not over three nights as planned. This discarding of logic reflects Dickens' criticism of the heartless economical logic that was used to create the New Poor Law.</p>
<p>Compassion, Forgiveness and Reclamation</p> <p>Dickens uses different characters to demonstrate compassion and forgiveness (Fred and Bob who feel pity for him) and how these people lead happy lives. In contrast, he shows the selfish nature of mankind in the dark and sinister Stave Four. Fred shows compassion and forgiveness to Scrooge in Stave Five by welcoming him for Christmas.</p>
<p>Poverty and Greed</p> <p>Dickens wanted to highlight the plight of the poor in Victorian England, and how they are exploited by the greed of the wealthy. He used to harshness of winter to further emphasise this. He also uses Scrooge as a vehicle to show that financial wealth does mean contentment. Scrooge is impoverished in other ways (family, friends, happiness).</p>
<p>Isolation versus Family</p> <p>We quickly learn that Scrooge ('solitary as an oyster') and Marley are isolated, and unhappy, characters. Scrooge was Marley's 'sole friend and sole mourner'. The warmth and emotional richness of families (Bob Cratchit's, Fred's, his ex-fiancée's) are used as a contrast to Scrooge's self-determined isolation. The disruption to Scrooge's childhood family life may have also contributed to his future behaviour. The message may be that family is the cornerstone of a happy society.</p>
<p>Transformation</p> <p>The novella contains many examples of transformation: the transformation of young Scrooge into an embittered old man; his transformation to a benevolent man; the transformation of Marley from selfish human to eternally suffering ghost; supernatural transformations; the transformation of the future – to save Scrooge and Tiny Tim. Dickens message may have been that it is never too late to change.</p>

Key Characters
<p>Scrooge</p> <p>the protagonist who initially dismisses the goodwill and generosity associated with Christmas. After being forced to transform, he becomes a symbol of Christmas spirit in Stave Five. He is cheerful and benevolent. He is a dynamic character (a character who changes).</p>
<p>Bob Cratchit and family</p> <p>Bob is Scrooge's downtrodden but loyal employee. His family are a symbol of Victorian poverty, cheerfulness in adversity, teamwork and Christmas Spirit. Bob shows pity for Scrooge, and provides a contrast to Scrooge's isolation and meanness.</p>
<p>Nephew Fred</p> <p>the character of Fred serves as another contrast to Scrooge. He epitomises the Christmas spirit of goodwill and refuses to be discouraged by his uncle's misery. People (such as the Cratchits) speak highly of him and his generosity, in contrast how they speak of Scrooge. Fred shows that Scrooge has chosen isolation.</p>
<p>The Ghosts</p> <p>the ghosts are the antagonists to Scrooge. They force him to view his selfish and greedy ways, and to admit how his behaviour will lead to a lonely death ("Men's courses will foreshadow certain ends"); a metaphor for how the greed of the wealthy middle class will lead to a disastrous future for society.</p>

Context
<p>Dickens' message on poverty</p> <p>Dickens had a comfortable childhood until the age of 12 when his father was sent to a debtors' prison and young Charles had to work in a factory. The harsh conditions made a lasting impression; through his works of social criticism, he sought to draw attention to the plight of the poor.</p>
<p>The New Poor Law, 1834</p> <p>In order to deter poor people from claiming financial help, the government made claimants live in workhouses: essentially, prisons for the poor. Dickens hated this concept. He spent 1843 touring factories and mines in England and wished to highlight the situation facing poor people. <i>A Christmas Carol</i> was published soon after – in December 1843.</p>
<p>The ingredients for a hit novella</p> <p>Dickens previous novel had not sold well and so he needed a hit. He deliberately combined elements that he knew would appeal to Victorian readers: a parable, the supernatural, a happy conclusion, and Christmas.</p>
<p>Dickens' construction of secular Christmas values</p> <p>Until the mid-1800s, Christmas was solely a religious festival. Dickens helped to popularise many of the cultural elements that we now associate with Christmas. This imagery (the food, the decorations, the music) is used throughout the novella. This has contributed to a more secular (non-religious) Christmas, based on good-will, benevolence and forgiveness.</p>

Form and Structure
<ul style="list-style-type: none"> The novella is narrated in the third person by an omniscient narrator, who also seems very biased against Scrooge. It is a parable: a moral tale with a strong message. It is arranged in five staves (not chapters) as a metaphor for an actual Christmas carol. It contains much musical imagery throughout (church bells, clock chimes, carol singers, Fezziwig's party). Dickens uses a circular structure. Scrooge's interactions in Stave Five mirror those in Stave One, however he now treats everyone much differently (Fred, Bob Cratchit, the portly gentlemen, the young boy, Christmas itself). The weather also changes to reflect his transformation.

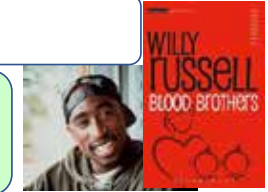
English Knowledge Organiser

DIVERSE VOICES: Poetry & Monologues



KMP 1: How does the speaker present their feelings about love in Medusa OR Havisham

KMP 2: How can I create a sense of character through a dramatic monologue?



FORMS OF POETRY		POETRY TERMINOLOGY (LANGUAGE)	
Autobiographical	A poem about the poet's life and experiences.	Abstract	An idea rather than a real thing.
Ballad	A form of poetry often set to music.	Alliteration	The occurrence of the same sound at the beginning of adjacent or closely connected words.
Blank verse	Verse with no rhyme - usually ten syllables	Anaesthesia	Resemblance of sound between syllables of nearby words, arising particularly from the rhyming of two or more stressed vowels, but not consonants
Dramatic monologue	A character speaks to the reader.	Authentic	Seems genuine or truthful
Epic poem	Tragic/heroic story poems	Colloquial Language	Informal, casual language
First person	From written from the poet's viewpoint or perspective using 'I'	Emotive Language	Language used to make you feel a specific emotion.
Free Verse	No regular rhythm/metre	Euphemism	Alternative words to make something nasty sound less harsh or blunt
Lyrical	Emotional and beautiful	Extended Metaphor	Refers to a comparison between two unlike things that continues throughout a series of sentences in a paragraph, or lines in a poem.
Narrative	A form of poetry that tells a story	Hyperbole	Exaggerated statements or claims not meant to be taken literally.
Onion	Cynical poems when addressed to one person	Imagery	Descriptive or figurative language.
Shallot	Excursion	Irony	A device or event in which what appears, on the surface, to be the case, differs radically from what is actually the case.
Sonnet	14 line poem often to do with love	Metaphor	A way of comparing by saying something is something else, even though it isn't.
Third person	A character perspective someone who isn't directly involved in the action explains something that is happening	Mood	Another word for atmosphere.
POETRY TERMINOLOGY (STRUCTURE)		Onomatopoeia	The formation of a word from a sound associated with what is named.
Anaphora	A device that consists of repeating a sequence of words at the beginning of neighbouring sentences.	Personification	The attribution of a personal nature or human characteristics to something non-human, or the representation of an abstract quality in human form.
Caesura	A pause in a line of poetry.	Phonics	A consonant that is produced by stopping the airflow using the lips, teeth, or palate, followed by a sudden release of air.
Enjambement	A thought or sense, phrase or clause, in a line of poetry that does not come to an end at the line break, but flows over to the next line.	Rhetorical Question	A question that does not have an answer.
Epitrophe	A device that can be defined as the repetition of phrases or words at the ends of the clauses or sentences.	Semantic field	Groups/categories of words
Juxtaposition	The act of placing two things side by side for comparison.	Simile	Simile is a more specific type of alliteration that relies on the repetition of soft consonant sounds in words to create a hissing sound in the writing.
Quatrain	A set of four lines.	Symbolism	Comparing something using the words 'like' or 'as'.
Rhyme	Close similarity in the final sounds of two or more words or lines of writing.	Symbolism	The use of symbols to represent ideas or qualities.
Stanza	A stanza is a division of four or more lines in a poem.	Tone/Voice	Attitude of a writer toward a subject or audience.
Volta	The turning point of a poem.		

- Themes**
- Diversity
 - Gender, feminism
 - Poverty, overcoming poverty
 - Grief
 - Race
 - Slavery
 - War
 - Mental Health
 - Love
 - Heartbreak

- Contexts**
- Diversity
 - Race
 - The impact of diversity upon society
 - Gender in time periods and countries / Expectations of women.
 - USA
 - Race laws
 - Understanding of mental health
 - Poverty and the impact of this on young people.

A **monologue** is a speech delivered by one person, who exposes inner thoughts and provides insights into his or her character.

The character/person speaks out their thoughts about a specific event or situation and tells us how they are feeling at that particular time.

Monologues are always written in first person (I think/I feel).

The Greek root word *monologos* translates to "speaking alone," and that's a monologue: one person doing all the talking.

- Themes**
- Diversity
 - Gender, feminism
 - Poverty, overcoming poverty
 - Grief
 - Crime
 - Insecurity
 - Love
 - Break-ups
 - Power

- Contexts**
- Poverty and the impact of this on young people.
 - LGBTQ+ issues – particularly transgender people.
 - Marriage
 - Education



Sentence Structure Type	What it Contains	Example
Simple	1 Independent Clause	I like grammar.
Compound	2 Independent Clauses + 1 or More Independent Clauses	I like grammar because I find language interesting.
Complex	1 Independent Clause + 2 or More Dependent Clauses	Because I like grammar, I have spent a lot of time studying sentence structure.
Compound-Complex	2 Independent Clauses + 1 or More Dependent Clauses	I have never been a great student, but because I like grammar, I have spent a lot of time studying sentence structure.

What I am looking for:

- Use of stage directions
- Use of repetition to emphasise points
- Use of imagery and metaphor
- Use of pause and silence
- Changes of tone

WRITING A MONOLOGUE (5)
EXAMPLE MONOLOGUE

Linda: *(Sits down on the chair and opens magazine)*. My daughter can be a right pain sometimes. She never ~~calls~~, no matter how often I tell her, remembers to clear the trash from her room. It drives me mad. *(One cup I found had so much mould in it, it had started evolving into a more intellectual species)* *(Puts magazine down in a huff, looks at audience)* And you know what? She never has her phone on, there's me worrying about where she has got to and I can't even phone her! I am not trying to check up on her, but it would be nice to know where she was occasionally. *(Pause)*
But you know, I will miss her when she leaves home. She will always offer to make me a cup of tea when I am feeling tired, bless her. She always does the cooking on a Friday night as well – a lovely ~~spag bol~~. The only thing she can cook right, but it is lovely. I know I complain and nag at her, but I will miss her so much when she goes...

STEP 2 – PLAN YOUR UNITS OF ACTION

Check that the character info is communicated and decide on what impact this will have.

Example Units of Action:	Character info revealed	Impact on the audience
On phone to wife who wants him to pick up some shopping for the kids – some food for their tea.	Family, Relationships, Job, Age	Audience introduced to the character in an informal way.
Explains where he has been today – to an important business meeting that will possibly lead to him losing his job.	Job, Angry emotion, Boss	Build tension – audience feel empathy for character
Tells the audience about his dreams as a child – to be a soldier.	Family, Friends, History	Give audience more character detail. Show the audience different emotions and a different side to the character.
Tells the audience about an exam he took at school that meant he could work in Business.	Joyful emotion, History, 1st job.	Give audience more character detail. Show the audience different emotions and a different side to the character.
Tells the audience that he has lost his job and is going home to tell his wife.	Upset emotion, scared, Family	Shock the audience. Build tension. Leave the audience on a cliff-hanger – what will happen?

The order can be changed – what is the most interesting order for the audience?

Sixth Form: A Level Literature	<ul style="list-style-type: none"> Analysis of a range of poetry and forms. Conversion of a text to a different form.
Year 11: Unseen Poetry / Revision	<ul style="list-style-type: none"> Alternate interpretations Revision of texts/ Annotation skills
Year 10: Poetry Anthology/ Language Paper 1	<ul style="list-style-type: none"> Poetry study at an academic level. Writing creatively from the perspective of a character

English Knowledge Organiser

Romeo and Juliet – Knowledge Organiser

<p>Plot summary</p> <p>Prologue: A sonnet, recited by the chorus, outlines the play.</p> <p><u>Act 1</u> Act I, Scene 1: Capulet and Montague servants fight in the streets. Benvolio tries to break them up, but Tybalt arrives and challenges him. The Prince arrives and declares that any further fighting will be punished with death. After this, the Montagues discuss Romeo's melancholy state and Benvolio learns Romeo is in love with Rosaline. Act I, Scene 2: Paris seeks Capulet's permission to marry his daughter Juliet. Capulet says she is too young, but Paris should try to win her affections at his banquet. Capulet's invitation list is intercepted by Benvolio and Romeo, who decide to attend the event. Act I, Scene 3: The Nurse and Lady Capulet tell Juliet about Paris, and she agrees to consider him as a potential suitor. Act I, Scene 4: Romeo, Benvolio, and Mercutio arrive at the banquet, and Mercutio banters with Romeo. Act I, Scene 5: Romeo and Juliet see each other and fall in love immediately. Tybalt sees Romeo and wants to fight him, but Lord Capulet stops him.</p> <p><u>Act 2</u> Act II, Scene 1: Romeo separates himself from his friends as they leave the party. Act II, Scene 2: Romeo listens to Juliet at her balcony, and they exchange vows to marry. Juliet says she will send a messenger to Romeo the next day to arrange the wedding. Act II, Scene 3: Romeo goes to see Friar Lawrence to ask for his help with marrying Juliet. The Friar agrees, hoping that their alliance will end their families' feuding. Act II, Scene 4: Benvolio and Mercutio discuss Tybalt, who has challenged Romeo to a duel. Romeo arrives and the friends banter about his love. The Nurse appears; Romeo's friends depart. Romeo gives the Nurse a message for Juliet: she is to go to Friar Lawrence that afternoon, and they shall be married. He arranges for the Nurse to receive a rope-ladder for Juliet to lower for him that night. Act II, Scene 5: The Nurse returns to an impatient Juliet. She teases her charge by withholding the message but then tells her the good news. Act II, Scene 6: Juliet comes to Romeo in Friar Lawrence's cell, and they greet each other joyfully. The Friar prepares to marry them.</p>		
<p><u>Act 3</u> Act III, Scene 1: Benvolio and Mercutio encounter Tybalt, and Mercutio mocks him. Romeo arrives and refuses to accept Tybalt's challenge to a duel (due to his secret marriage to Juliet). Mercutio thinks this is cowardly so fights on his behalf. Romeo tries to intervene and Mercutio is killed under his arm, cursing the families as he dies. Romeo fights and kills Tybalt to get revenge. At Benvolio's urging, Romeo flees. The Prince appears and interrogates Benvolio. Judging Tybalt to be guiltier than Romeo, he spares the latter the death sentence but banishes him from Verona. Act III, Scene 2: Juliet longs for night, when Romeo is to come. The Nurse brings her word of Tybalt's death and Romeo's banishment, and volunteers to bring Romeo to the distraught girl. Act III, Scene 3: Romeo is in a state of anger and disbelief, hiding with the Friar. The Nurse arrives with word of Juliet's distress. The Friar chastises Romeo for behaving so foolishly and proposes that, after a night with Juliet, Romeo should flee to Mantua until everything is cleared up. Romeo agrees and leaves. Act III, Scene 4: Capulet decides to marry Juliet to Paris in three days to cheer her up. Act III, Scene 5: Romeo and Juliet awake after spending the night together and Romeo leaves. Lady Capulet arrives and tells Juliet about her impending marriage. Juliet refuses and her parents fly into a rage. The Nurse advises that Juliet ignore her marriage to Romeo, which no one else knows about, and marry Paris.</p>	<p><u>Act 4</u> Act IV, Scene 1: Juliet interrupts Paris talking to Friar Lawrence and, when he leaves, threatens to kill herself if the Friar doesn't help her. He agrees to provide her with a potion that will make her seem to be dead, until Romeo collects her from the family crypt. Act IV, Scene 2: Juliet apologizes to her father, promising to obey him and marry Paris. Capulet moves the wedding up a day to the next morning. Act IV, Scene 3: Juliet drinks the potion. Act IV, Scene 4: Capulet sends the Nurse to awaken Juliet on the morning of her wedding day. Act IV, Scene 5: The Nurse finds Juliet dead and the family grieve for her.</p>	<p><u>Act 5</u> Act V, Scene 1: Balthasar arrives in Mantua and tells Romeo that Juliet has died. Romeo immediately plans to join her and buy a poison from an apothecary. Act V, Scene 2: Friar John reports to Friar Lawrence that he has been unable to deliver Lawrence's letter to Romeo. Lawrence sends John to fetch a crow bar, planning to open the vault and take Juliet into hiding in his own cell until Romeo can be summoned. Act V, Scene 3: Paris visits Juliet's tomb at night. Romeo appears with Balthasar, whom he sends away with a letter to Montague. Paris steps forth to challenge him. They fight, and Romeo kills Paris. Romeo then enters the crypt, drinks the poison, and dies. Friar Lawrence arrives tells Juliet what has happened and begs her to flee. She refuses and stays. She kisses her dead lover and stabs herself with his dagger. The watchmen appear, arresting Balthasar and the Friar as the Prince arrives, followed by both families. The Friar explains what has happened, and his tale is confirmed by Balthasar and by Romeo's letter to his father. Montague and Capulet make peace and vow to erect golden statues of the two lovers.</p>
<p>Historical context</p> <p>Queen Elizabeth I – She was queen while Shakespeare was writing, and supported him. Elizabeth I made Protestantism the official religion of England, which angered many Catholics, and led to much conflict. Shakespeare may be referencing this in 'Romeo and Juliet', with the two warring families.</p> <p>Patriarchy – patriarchal societies are ones where men are dominant, and have control over women e.g. by choosing who they would marry.</p> <p>Nurses – employed by wealthy families to feed and care for their children.</p> <p>The Humours – Elizabethans believed the body contained four 'humours': blood, phlegm, yellow bile and black bile. The amount you had of each determined your personality. People with too much phlegm are emotional. People with too much blood are irresponsible and gluttonous. People with too much yellow bile are violent and vengeful. People with too much black bile are depressed and self-centred.</p> <p>Fate - the belief that your life is mapped out for you, or 'written in the stars'. Many Elizabethans believed God decided your fate, and that astrology could help you identify your course in life.</p> <p>Bubonic Plague/Black Death – a plague that killed many people. Sufferers were quarantined in their houses, with a red 'X' painted on the door, and left to die.</p>		<p>Techniques and Terminology</p> <p>Prologue – sets up the story and foreshadows events.</p> <p>Foreshadowing – when an author drops hints about what will happen through language or symbolism.</p> <p>Dramatic irony – when an audience knows something the characters do not.</p> <p>Symbolism – when an image represents an idea, e.g. light symbolises happiness, flowers symbolise youth etc.</p> <p>Double meaning – when a word can be read to mean two things e.g. 'grave' = serious or grave stone.</p> <p>Personification – when an object is given human qualities</p> <p>Rhyming Couplets – two lines next to each other that rhyme with each other, often used for dramatic impact.</p>

English Knowledge Organiser

Critical Vocabulary		Key Themes
<p>Shakespeare presents the Montagues and their supporters as...</p> <p><u>Romeo</u></p> <ol style="list-style-type: none"> 1. Melancholic – someone who is prone to moping and being depressed. 2. Quixotic – extremely idealistic: unrealistic and impractical. 3. Ardent – enthusiastic and passionate. <p><u>Benvolio</u></p> <ol style="list-style-type: none"> 1. Appeasing- someone who tries to pacify others. 2. Sincere - honest and genuine. 3. Stalwart – loyal and reliable. <p><u>Mercutio</u></p> <ol style="list-style-type: none"> 1. Anarchic – unruly and chaotic. 2. Impulsive – someone who acts on a whim, without thinking. 3. Precocious – someone who ‘shows off’ their intelligence arrogantly. 	<p>Shakespeare presents the Capulets and their supporters as...</p> <p><u>Juliet</u></p> <ol style="list-style-type: none"> 1. Idealistic – someone who believes whole-heartedly in something, even if it is unrealistic. 2. Ingenuous – innocent, naïve and unworldly. 3. Resolute – someone who has made their mind up and whose opinion cannot be changed. <p><u>Tybalt</u></p> <ol style="list-style-type: none"> 1. Volatile – someone who could explode at any moment. 2. Tempestuous – someone who is unpredictable and has many conflicting emotions. 3. Righteous – someone who believes what they are doing is morally justifiable. <p><u>Nurse</u></p> <ol style="list-style-type: none"> 1. Maternal – motherly. 2. Submissive – will bend to a dominant authority and ‘do what they are told’ 3. Uncouth – uncivilised and uncultured, potentially vulgar. 	<p>Conflict</p> <p>Power</p> <p>Fate</p> <p>Loyalty</p> <p>Family</p> <p>Religion</p> <p>Love</p> <p>Hatred</p> <p>Violence</p> <p>Death</p>
<p>Key Quotations</p> <p><u>Prologue</u></p> <ol style="list-style-type: none"> 1. ‘Two households, both alike in dignity’ 2. ‘Ancient grudge’ 3. ‘A pair of star-cross’d lovers’ with a ‘death-mark’d love’ <p><u>Act 1</u></p> <ol style="list-style-type: none"> 1. Benvolio: ‘I do but keep the peace’ (Sc. 1) 2. Lord Capulet, to Paris: ‘let two more summers wither in their pride’ (Sc. 2) 3. Tybalt, about Romeo: ‘To strike him dead I hold it not a sin’ (Sc. 5) 4. Romeo, about Juliet: ‘she doth teach the torches to burn bright’ (Sc. 5) 5. Juliet, about Romeo: ‘if he be married, /My grave is like to be my wedding bed.’(Sc. 5) <p><u>Act 2</u></p> <ol style="list-style-type: none"> 1. Juliet, about Romeo: ‘Tis but thy name that is my enemy’ (Sc. 2) 2. Friar Lawrence: ‘This alliance may so happy prove to turn your household rancour to pure love’ (Sc. 3) 3. Friar Lawrence: ‘These violent delights have violent ends’ (Sc. 6) 	<p><u>Act 3</u></p> <ol style="list-style-type: none"> 1. Tybalt, to Romeo: ‘thou art a villain’ (Sc. 1) 2. Mercutio: ‘a plague o’ both your houses’ (Sc. 1) 3. Mercutio: ‘ask for me to-morrow, and you shall find me a grave man.’ (Sc. 1) 4. Romeo: ‘O, I am fortune’s fool!’ (Sc. 1) 5. Lord Capulet, about Juliet: ‘I think she will be ruled in all respects by me’ (Sc. 4) 6. Lady Capulet, about Juliet: ‘I would the fool were married to her grave’ (Sc. 5) 7. Lord Capulet, about Juliet: ‘Hang thee young baggage, disobedient wretch!’ (Sc. 5) 8. The Nurse, to Juliet, about Paris: ‘I think it best you married with the County’ (Sc. 5) <p><u>Act 4</u></p> <ol style="list-style-type: none"> 1. Juliet, to Friar Lawrence: ‘I long to die if what thou speak’st speak not of remedy’ 2. Lord Capulet, about Juliet: ‘Death is my son-in-law, Death is my heir’ 3. Lord Capulet: ‘with my child my joys are buried’ <p><u>Act 5</u></p> <ol style="list-style-type: none"> 1. Romeo: ‘here lies Juliet, and her beauty makes/ This vault a feasting presence full of light.’ 2. Prince: ‘all are punish’d’ 3. Capulet: ‘O brother Montague, give me thy hand’ 	<p>Key characters</p> <p><u>Montagues</u></p> <p>Romeo – age unknown, anywhere between 16 and 21</p> <p>Benvolio – Romeo’s cousin</p> <p>Lord and Lady Montague – Romeo’s parents.</p> <p>Abraham - servant</p> <p>Balthasar – servant</p> <p><u>Capulets</u></p> <p>Juliet –age 13 in the play</p> <p>Tybalt – Juliet’s cousin</p> <p>Lord and Lady Capulet – Juliet’s parents</p> <p>Gregory – servant</p> <p>Sampson – servant</p> <p><u>Others</u></p> <p>Rosaline – a nun, Romeo is in love with her before Juliet.</p> <p>Prince Escalus – ruler of Verona</p> <p>Mercutio – related to Prince, friends with Romeo</p> <p>Count Paris – related to Prince, betrothed to Juliet</p> <p>Friar Lawrence – friends with Romeo</p> <p>The Nurse – works for the Capulets, Juliet’s confidante</p>

English Knowledge Organiser

Spoken Language

Spoken Language Tasks: Candidates must undertake a prepared spoken presentation on a specific topic. As a guide, the duration of the whole assessment should be no more than ten minutes. **The key requirements are:**

- ✓ **Presentations are recorded audio-visually**
- ✓ *Presentations must be formal* but may take a wide variety of forms, including talks, debates, speeches and dialogues.
- ✓ Candidates must identify the subject for their presentations in advance and agree it with their teacher.
- ✓ Presentations must be planned and organised. Candidates should be advised that lack of preparation is likely to prevent access to the criteria for the higher grades.
- ✓ Candidates may use pre-prepared notes, Powerpoint etc. to assist them during their presentations but this is not a requirement.
- ✓ As part of, or following, the presentation, candidates must listen to and respond appropriately to questions and feedback.



Audience

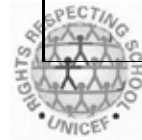
To help you decide on a style of speaking that is suitable for a particular situation or context you should think about:

- ✓ **who** you are speaking to – an examiner and your peers
- ✓ **why** you are speaking to them – to inform and explain

As this is your final **GCSE Spoken Language exam**, you are expected to speak with a **formal register**. That does not mean you have to speak like someone else, or feel fake. You need to use the best vocabulary and tone that you can.

- ✓ Do not use slang or colloquialisms
- ✓ Choose your most formal vocabulary where possible
- ✓ Show the range and maturity of your vocabulary
- ✓ Practise your presentation so you can speak slowly, carefully and clearly.

Pass	Merit	Distinction
<ul style="list-style-type: none"> • Expresses straightforward ideas / information / feelings • Makes an attempt to organise and structure talk • Makes an attempt to meet the needs of the audience • Listens to questions / feedback and provides an appropriate response in a straightforward manner 	<ul style="list-style-type: none"> • Expresses challenging ideas / information / feelings using a range of vocabulary • Organises and structures talk clearly and appropriately to meet the needs of the audience • Achieves the purpose of talk • Listens to questions / feedback responding formally and in some detail 	<ul style="list-style-type: none"> • Expresses sophisticated ideas / information / feelings using a sophisticated repertoire of vocabulary • Organises and structures talk using an effective range of strategies to engage the audience • Achieves the purpose of talk • Listens to questions / feedback, responds perceptively and elaborates with further ideas and information



Purpose

Be clear about your **purpose** in your GCSE presentation and discussion.

Your aim is:

- ✓ To prepare yourself so that you can speak as confidently and clearly as possible.
- ✓ To inform your audience about your chosen text and topic.
- ✓ To explore themes, characters, ideas and meanings, showing that you have both knowledge and understanding.
- ✓ To answer questions posed by your examiner or other people in your group.
- ✓ To listen to other people's presentations, and to pose questions to them at the end.

Discussion skills

In a discussion, you should aim to **interact and respond to what other people are saying**. Talk with confidence and let others speak.

Remember that listening is as important as speaking.

You can show you are listening by:

- ✓ making eye contact with the speaker and **responding** to what they say
- ✓ using body language to show co-operation and **understanding**, for example shrugs and nods
- ✓ **building** on what other people say
- ✓ **challenging** points made by others

In this GCSE exam, you will be asked questions after your presentation. The examiner will always ask questions to help you improve your grade; they will never try to catch you out. They want you to achieve the best grade possible.

When you are asked a question, think about it carefully. Answer in as much detail as you can, maybe giving examples from the text.

Geography Knowledge Organiser



YEAR 9

NATURAL RESOURCES

GEOGRAPHY KNOWLEDGE ORGANISER



1. NATURAL RESOURCES

Natural resources are materials found in nature that we need to live. Humans can use natural resources as raw materials to produce something else to meet these needs.

The Earth has 4 main sections called spheres. Different natural resources are created in these spheres and exist here.

Atmosphere – Layers of gas surrounding the planet.

Biosphere – ecosystems and living things.

Hydrosphere – bodies of water (oceans, seas, lakes, rivers), making up 70% of the planets surface.

Lithosphere – Solid parts of the Earth (rocks).



Examples of natural resources include food, water, oil, natural gas, coal, metals, wood, soil, uranium, minerals, plants.



A **renewable resource** is one that is replaced by the natural processes of the Earth's spheres, which take place in less time than an average human life. These are air, water, sunlight and living things.

Some resources like coal and oil take millions of years to be replaced naturally. Within a human's lifetime these resources would seem like they are never replaced. These are **non-renewable** resources.

2. WATER AS A NATURAL RESOURCE

Water surplus exists where supply exceeds demand.

Water deficit exists where demand is greater than supply.

We use water for many tasks every single day; this is why it is one of the most important resources on Earth. It is used for cleaning, sanitation, drinking and many other purposes.

Water is not distributed equally around the world.



WaterAid UK is a charity working to get clean water, decent toilets and good hygiene to everyone, globally. They are a non-profit organisation who look into schemes to help areas of the world which are experiencing mass water deficits.

Play pumps are one method of supplying water that WaterAid have introduced in Tanzania – an LIC in Africa.

1. Children play on the play pump – this causes water to travel up from the underground reservoir.

2. The water then travels up to a suspended tank where it is stored.

3. The water can then be released at the pump by whoever needs it e.g., drinking, sanitation.

- Locals are no longer having to use dangerous polluted wells. ✓
- It is low-tech so simple in construction.
- Play pumps are generally easy to use.
- More girls attending school as they do not have to collect water.
- Mainly used in schools, limiting where they can be placed. ✗
- Risk of injury to children using the play pumps.
- You can provide 4 standard water pumps for the price of 1 play pump (\$14,000).

4. RENEWABLE ENERGY

Renewable energy is energy from a source that is not depleted when used, such as wind or solar power.

There are many types of renewable energy including bio-energy, geothermal energy, hydroelectricity, hydrogen fuel cells, solar energy, wind energy, wave energy and tidal energy.



Bio-energy is plant an animal matter e.g., wood, straw, sewage and waste food. This can be burnt to produce heat and electricity.

- Fuel is cheap. ✓
- It helps get rid of waste which can cause smells and pollution.

- Creates CO₂. ✗
- Collecting waste in big enough amounts to generate energy can be difficult.

Solar energy is energy from the sun. It can be used to provide hot water for homes or can use photovoltaic cells which converts energy from the sun into electricity.

- Once the solar plant is constructed, running costs are very low.
- Solar energy can be used to generate electricity in remote places.

- It does not work at night.
- Photovoltaic (PV) cells are very expensive (but they are getting cheaper).

Wind energy uses wind to turn a rotor which is connected to a generator which produces electricity. To produce power, you need a wind speed of at least four metres per second (around 14KPH).

- No waste or pollution is produced.
- The land occupied by a wind farm can still be used for farming.
- Once the wind turbine is built, running costs are very low.

- No wind, no power.
- Wind farms create a constant low-level noise.
- Some people object because they feel wind farms spoil the view.

5. FRACKING

Fracking is a form of extracting natural gas from below the Earth's surface.

This method is used to obtain once inaccessible natural gas which was formed over millions of years.

A machine is used to drill vertically (2500-3000m) and then horizontally into shale rock, creating a series of holes which burst into the rock layer. 3-4 months after the initial drilling, fracking fluid (liquid and sand) is injected at high pressure into rocks forcing open existing cracks and allowing trapped gas and oil to escape.



✓ Fracking is seen as beneficial because:

- It can improve the economy of a country
- It creates employment
- Provides access to more gas and oil meaning we do not need to get energy from other countries

✗ Fracking is seen as problematic because:

- Ground water can become contaminated
- Methane pollution
- Exposure to toxic chemicals
- The disposal of the waste
- Blowouts due to gas explosions
- Large volume water use in areas with a water deficit
- Fracking related earthquakes

3. FOOD AS A NATURAL RESOURCE

Imports: bringing goods into a country.

Exports: sending goods out of a country.

Food miles: the total number of miles a food product travels to get to a country.

Carbon footprint: a measure of the amount of carbon dioxide released into the atmosphere as a result of the activities of a particular individual, organization, or community.

Many of the foods we eat in the UK come from countries all over the world – 46% of it! This is for several reasons, including:

- Our climate
- Cheaper to import from poorer countries
- People demand food out of season
- People travel more and wish to recreate foods they have eaten on holiday
- Primary industry jobs e.g., farming are unpopular with British people
- Supermarkets compete for lower food prices



How can we get food more sustainably?

Local food	Organic farming	Seasonal diets
<ul style="list-style-type: none"> • Buying food locally can reduce food miles. • It puts money back into the local economy. • People can grow their own produce to save money. 	<ul style="list-style-type: none"> • Fresher and better tasting food. • No pesticides. • No additives. 	<ul style="list-style-type: none"> • Eating seasonal foods e.g., strawberries in summer will stop produce from being imported from abroad.

6. SUSTAINABLE SCHOOLS

Sustainability is the practice of using natural resources responsibly, so they can support both present and future generations.

There are 4 main areas which schools can look at to become more sustainable:

1. Energy
2. Water use
3. Waste management
4. Food



How can schools be sustainable?

- Reduce the use of paper
- Encourage pupils to walk to school
- Have recycling bins available
- Local foods used, not imported
- Turn electronic devices off when not in use
- Create some of the energy used through wind of solar power
- Include environmental learning within the curriculum
- Plant more trees around the site



Geography Knowledge Organiser











YEAR 9

EXPLORING THE TROPICS

GEOGRAPHY KNOWLEDGE ORGANISER



1. THE GREAT BARRIER REEF	2. BORNEO ENDANGERED ANIMALS	3. THE CITARUM RIVER
<p>The Tropics are the region of the Earth near to the equator and between the Tropic of Cancer (23.5°N) and the Tropic of Capricorn. Tropical areas have a climate that is warm to hot and moist year-round. This includes tropical rainforests with lush vegetation.</p> <p>Coral reef: an underwater ecosystem made up of a ridge or mound of coral.</p> <p>Coral: very small animals with a hard exoskeleton.</p> <p>Coral bleaching: when coral forces out the algae living in it as a result of higher water temperatures, leaving the coral white.</p> <p>Coral Reef Importance</p> <ul style="list-style-type: none"> •Food and fishing •Medicine •Ecology •Coastal protection •Tourism  <p>Threats to the Great Barrier Reef</p> <ul style="list-style-type: none"> •Tourists •Agricultural chemicals and sediment discharged •Fishing nets •People taking coral from the reef to sell or keep •Ship anchors 	<p>Due to Borneo's hot and wet climate there are a wide variety of plants and animals that live there. Borneo is home to more than 15,000 species of flowering plants, at least 222 different species of mammals, 420 resident birds, 100 different amphibians, more than 700 species of trees, and more than 500 species of wild fruit.</p> <p>There are however problems with the illegal trading of animals, illegal hunting and deforestation which has resulted in many endangered species. Many cultures in Asia use endangered animals for traditional medicines.</p> <p>Sun bears: The second rarest species after the giant panda. They help keep termite populations down, helping tropical tree species. They are hunted for bear paws and they are killed for its gall bladder. They are also taken for the pet trade as their cubs are considered as incredibly cute and there is a high demand for them as pets.</p> <p>Orang-utans: Orang-utans stay with their mother until they are around 8 years old, learning how to find food and survive. Orang-utans are known as gardeners of the forest and the seeds they eat help the forest regenerate. Threats to orang-utans include illegal trafficking, deforestation, mining, fires and logging. Orang-utan populations are threatened because their habitat, low-lying tropical rainforest, has been cleared and converted to oil-palm plantations.</p> 	<p>The Citarum River is the longest and largest river in West Java, Indonesia. It is also one of the world's most polluted rivers.</p> <p>It has an important role in the life of the people of West Java as it supports agriculture, water supply, finery, industry, sewage and electricity.</p> <p>The river is heavily polluted by human activity; about 5 million people live in its basin. Waste is disposed of in the river, including plastic, litter and dead animals.</p> <p>The Citarum River is so polluted in places, that you are unable to see the water through the rubbish. More than 2000 industries contaminate the river with lead, mercury, arsenic and other toxins. The factories from the textile industry also add dye to the river which affects ecosystems and contaminates the water.</p> <p>As a result of this heavy contamination, many people suffer from skin diseases such as scabies and infections. The poor water quality due to contamination of waste and pollution also damages the crops of farmers.</p> 
4. THE MALDIVES	5. BOLIVIA	6. SOMALIA PIRACY
<p>The Maldives comprises of 1110 islands and are grouped into a double chain of 26 atolls. An atoll is a ring-shaped coral reef or island. The atoll surrounds a body of water called a lagoon.</p> <p>Malé is the capital city of the Maldives. 64,000 people live there, which is 26% of the Maldives' population. It is the most densely populated capital city in the world.</p> <p>The Maldives is threatened by sea level rise as a result of global warming enhanced by humans.</p> <p>Threats to the Maldives:</p> <ul style="list-style-type: none"> •Rising sea temperatures killing the coral reefs •Sea level rises. Islands submerged in the next decade •Coastal erosion; more frequent tropical storms  <p>Some strategies to reduce the impacts of climate change on the Maldives is:</p> <ul style="list-style-type: none"> •Beach nourishment to control beach erosion •Planting natural and artificial coral reefs to curb coral bleaching •Boosting tourism through tourism adaptation projects •Hard engineering – building sea wall 	<p>Bolivia is located in the centre of South America. It is entirely landlocked and borders the countries of Chile, Paraguay and Brazil. The capital, La Paz, is found in the west of Bolivia.</p> <p>Natural hazards: Floods and landslides, especially in mountainous areas, are a regular feature of the rainy season, which runs from November to March. Roads are frequently impassable for days at a time.</p> <p>Education: Public school education in Bolivia is of extremely poor quality, particularly in rural areas where teachers are not likely to be properly trained.</p> <p>Disease in Bolivia: Dengue fever is common in Bolivia and can occur throughout the year.</p> <p>Healthcare in Bolivia: Bolivian's living in rural areas lack access to medical services, which makes them helpless against diseases such as malaria.</p> <p>Access to clean water and sanitation is also limited which allows the spread of water-borne diseases.</p>  	<p>Somalia is located in an area of Africa known as the "Horn of Africa" due to its shape. The inhabitants of Somalia are mostly Sunni Muslims. Those who did not leave to go to other countries had to endure prolonged drought, and desertification and soil erosion.</p> <p>Many Somalis are nomads (no fixed home) but natural disasters have wiped out large portions of their livestock (animals), leaving them stranded with no alternative income to support their families. Many people therefore turn to piracy to make a living.</p> <p>Due to trade routes, many ships carrying cargo enter the Gulf of Arden towards the Suez Canal. Some companies hire security such as former soldiers to guard against the pirates. Now many of the richest countries send fleets of navy vessels to patrol the area against the threat of pirates.</p> <p>They have set up a task force involving all countries to capture pirates and their equipment.</p> <p>The average ransom payment received by pirates in Somalia between 2005 and 2012 was \$2.7 million.</p> <p>If Somalia remains more peaceful it is hoped people will start to earn more money from fishing and tourism.</p> 

Geography Knowledge Organiser

YEAR 9	AFRICA	GEOGRAPHY KNOWLEDGE ORGANISER
<p>1. INTRODUCTION TO AFRICA</p> <p>Africa is a continent made up of 54 countries. Approximately 90% of all cases of malaria worldwide occur in Africa.</p> <p>The river Nile is the longest river in the world with a total length of 6.650km.</p> <p>Africa has a lot of natural resources.</p> <ul style="list-style-type: none"> • 55% of the world's diamonds are produced in Africa • Over 110 mining companies operate in South Africa • 60% of mining in Africa is gold • Africa has 10% of the world's oil and gas reserves <p>Minerals are not evenly distributed across the continent.</p>	<p>2. AFRICA POPULATION</p> <ul style="list-style-type: none"> • Between 1600s and the 1800s, 12-15 million Africans were sold into slavery. • Slavery was abolished from 1833 and European nations exploited Africa through colonisation. • The Berlin Conference took place in 1884-1885 where 14 European nations met to divide up Africa between themselves. They did not consider local people. • In the 1960s African countries began to get their independence from Europe. They struggled to become strong independent countries due to colonialism. • There are thousands of languages and ethnic groups in Africa. 	<p>3. AFRICAN COUNTRIES DEVELOPMENT</p> <p>HDI (Human Development Index) is a way of measuring development. It looks at living standards, health and education. HDI has a number between 0 and 1.</p> <p>African countries have several causes of poverty:</p> <p>Location: If a country has no coastline or access is limited it can be difficult to trade with other countries.</p> <p>Climate: In extreme climates it can be difficult to grow crops which makes food supplies unreliable.</p> <p>Politics: Politically unstable countries are often in poverty.</p> <p>Natural hazards: Many countries experience earthquakes/volcanoes frequently. Continually rebuilding or recovering from disasters costs money.</p> <p>War: War-torn countries' services are continually disrupted, buildings and roads are destroyed, people are killed or forced to flee.</p>
<p>4. CLIMATES AND BIOMES OF AFRICA</p> <p>Africa has 4 biomes:</p> <p>Hot desert/semi desert</p> <ul style="list-style-type: none"> • Hot in the day (up to 50°C) • Very little rain, very strong winds <p>Savanna</p> <ul style="list-style-type: none"> • Warm all year, with a wet season & longer dry season • Rolling grasslands with scattered trees • Desertification is a problem <p>Rainforest</p> <ul style="list-style-type: none"> • Warm and wet all year • Thousands of species of plants & animals <p>Deciduous woodland</p> <ul style="list-style-type: none"> • Temps range between 0°C - 20°C • Trees are deciduous (lose leaves) 	<p>5. THE SAHEL</p> <p>The Sahel is on the southern edge of the Sahara Desert. Droughts have happened in the Sahel when the normally short rainy season is delayed or does not take place.</p> <p>Desertification is the process where land becomes drier and degraded.</p> <p>The Sahara Desert has spread southwards. Other factors contributing towards desertification are population increase, overgrazing and farmers not rotating their crops.</p> <p>Reducing desertification: Africa's Great Green Wall</p> <ul style="list-style-type: none"> • Line of trees 8000km long, 15km wide • 11 million trees planted in Senegal. Started in 2007 • Stops soil erosion <p>Acacia trees act like big umbrellas. The temperature is 20°C cooler in the shade and the leaves intercept the rainfall and help reduce soil erosion as the rain hits the ground from the leaves more gently.</p>	<p>6. POVERTY IN GHANA</p> <p>Together Ghana and Ivory Coast produce 60% of the world's cocoa. More than 10m people survive off the industry. Many children are taken from Burkina Faso by traffickers and are forced to work as coca pickers.</p> <p>Many children who are forced into this slavery do not go to school and do not receive wages for the work that they do.</p> <p>There is great debate about companies such as Nestle and whether they are using products that are gained due to child labour.</p>
<p>7. URBANISATION IN ETHIOPIA</p> <p>Africa currently has the highest rate of urbanisation in the world. In 1990, there were only 24 cities in Africa with more than 1 million inhabitants. Today this number of cities has increased to 48 cities.</p> <p>Reasons slums in cities are growing are due to push and pull factors.</p> <p>Slums in Addis Ababa (capital city of Ethiopia)</p> <ul style="list-style-type: none"> • More than 40% of homes have only 1 room • 39% of homes are without a kitchen • 42% of homes lack a toilet • 4/5 homes in slums are made out of mud and wood • Half of Ethiopia's 72 million people live on less than \$1 a day • Many children live in tunnels and sewers 	<p>8. TRADE BETWEEN CHINA AND AFRICA</p> <p>Ethiopia is land locked – 90% of its imports and exports have been transported by road to ports in Somalia at the Red Sea. A new railway 460 miles long is being built to reduce travel times heavily influenced by Chinese firms.</p> <p>China's role in Africa</p> <ul style="list-style-type: none"> • In Ethiopia, dozens of students are taking lessons in classrooms built with Chinese money. • Many Chinese firms employ large numbers of local workers, but wages remain low. • Africa's need for new roads, schools, computers and power has opened an opportunity for Chinese firms. • China is happy to deal with any government in Africa, however corrupt. 	

Geography Knowledge Organiser



YEAR 9

COASTS

GEOGRAPHY KNOWLEDGE ORGANISER



Relief of the UK

Relief of the UK can be divided into uplands and lowlands. Each have their own characteristics.

Key

- Lowlands
- Uplands

Physical Landscapes in the UK

Unit 1c

Areas +600m: Peaks and ridges cold, misty and snow common. I.e. Scotland

Areas - 200m: Flat or rolling hills. Warmer weather. I.e. Fens

Types of weathering

Weathering is the breakdown of rocks where they are.

Chemical	Breakdown of rock by changing its chemical composition.
Mechanical	Breakdown of rock caused by physical changes e.g. temperatures, freezing and thawing, effects of the wind

Types of transportation

A natural process by which eroded material is carried/transported.

Longshore drift	The movement of material along a coast by waves which approach the shore at an angle.
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Mass movement

A large movement of soil and rock debris that moves down slopes in response to the pull of gravity in a vertical direction.

Sliding	Blocks of rock slide downhill.
Slumping	Slump of saturated soil and weak rock along a curved surface.
Rock falls	Fragments of rock break away from the cliff face, often due to freeze-thaw weathering

Types of erosion

The break down and transport of rocks – smooth, round and sorted.

Hydraulic power	Water enters cracks in the cliff, air compresses, causing the crack to expand.
Abrasion	Rocks hurled at the base of a cliff to break pieces apart.
Attrition	Rocks that bash together to become smooth/smaller.

Mechanical weathering example: salt weathering

- Seawater contains salt. When the water evaporates it leaves behind salt crystals.
- In cracks and holes these salt crystals grow and expand.
- This puts pressure on the rocks and flakes may eventually break off.

Wavecut Platform

Wave-cut cliff, Former cliff positions, Cliff retreat, Wave attack zone, High water level, Wave-cut platform

Transportation

Suspension - fine material such as clay and silt is carried by the sea.	Solution - dissolved minerals are carried by the sea.
Traction - large boulders and pebbles are rolled along the sea bed.	Salutation - small stones, pebbles and silt bounce along the sea bed.

What is deposition?

When the sea or river loses energy, it drops the sand, rock particles and pebbles it has been carrying. This is called deposition.

Sand dunes - deposition

Formation of bays and headlands

- Waves attack the coastline.
- Softer rock is eroded by the sea quicker forming a bay, calm area causes deposition.
- More resistant rock is left jutting out into the sea. This is a headland and is now more vulnerable to erosion.

How do waves form?

Waves are created by wind blowing over the surface of the sea. As the wind blows over the sea, friction is created - producing a swell in the water.

Why do waves break?

- Waves start out at sea.
- As waves approaches the shore, friction slows the base.
- This causes the orbit to become elliptical.
- Until the top of the wave breaks over.

Mechanical weathering example: freeze-thaw weathering

Stage One: Water seeps into cracks and fractures in the rock.

Stage Two: When the water freezes, it expands about 9%. This wedges apart the rock.

Stage Three: With repeated freeze-thaw cycles, the rock breaks off.

Formation of coastal stack

Example: Old Harry Rocks, Dorset

- Hydraulic action widens cracks in the cliff face over time.
- Abrasion forms a wave cut notch between HT and LT.
- Further abrasion widens the wave cut notch to form a cave.
- Caves from both sides of the headland break through to form an arch.
- Weather above/erosion below – arch collapses leaving stack.
- Further weathering and erosion leaves a stump.

Size of waves

- Fetch how far the wave has travelled
- Strength of the wind.
- How long the wind has been blowing for.

Types of waves

<h4>Constructive waves</h4> <p>This wave has a swash that is stronger than the backwash. This therefore builds up the coast.</p>	<h4>Destructive waves</h4> <p>This wave has a backwash that is stronger than the swash. This therefore erodes the coast.</p>
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YEAR 9

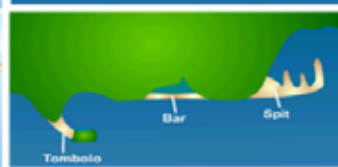
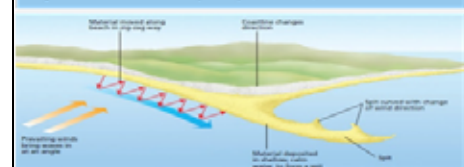
COASTS/RIVERS



GEOGRAPHY KNOWLEDGE ORGANISER



Spit formation Example: Spurn Head, Holderness Coast. Tombolo, bar and spit - deposition



- Swash moves up the beach at the angle of the prevailing wind.
- Backwash moves down the beach at 90° to coastline, due to gravity.
- Zigzag movement (longshore drift) transports material along beach.
- Deposition causes beach to extend, until reaching a river estuary.
- Change in prevailing wind direction forms a hook.
- Sheltered area behind spit encourages deposition, salt marsh forms.

Beach formation

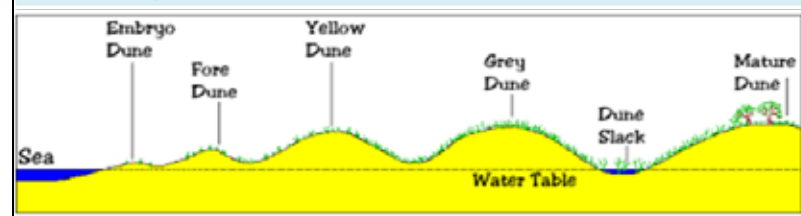
Beaches are made up from eroded material that has been transported from elsewhere and then deposited by the sea. For this to occur, waves must have limited energy, so beaches often form in sheltered areas like bays.

- Deposition is the main process that creates a beach.
- This occurs where waves have limited energy and so beaches often form in sheltered areas such as bays where wave energy is less than on exposed headlands.
- Here, waves are likely to be constructive where the swash is dominant and the backwash weaker so that material is left on the beach rather than being taken away by the waves.
- Over time this beach material will accumulate in the sheltered bay, and may be composed of different sediments from pebbles to fine sands.
- Beaches are under constant change, from processes like longshore drift. Beaches can also grow over time when constructive waves dominate, or even shrink in size during winter periods in the UK when we are more likely to get storms and destructive waves.

Sand dune formation

Sand dunes are mounds of sand that are found behind sandy beaches. To form they require a large, flat beach, a good supply of sand, strong winds and obstacles.

- Sand is deposited by longshore drift and blown to the top of the beach by onshore winds.
- Obstacles, such as driftwood, block sand movement, causing deposits to build over time.
- Vegetation e.g., marram grass or sand couch helps to stabilise and bind the sand together, creating small embryo dunes.
- These dunes grow bigger and trap more sand becoming taller turning into fore dunes and yellow dunes. Eventually they are less threatened by salt in the seawater and plants colonise.
- Over time, the dune migrates inland and turn to grey dunes with smaller bushes and more humus adding nutrients to the soil. In 100s of years these can turn to mature dunes which have deeper, richer soils for trees to grow.



Coastal defences

Hard engineering defences

Groynes	Wood barriers prevent longshore drift, so the beach can build up.	<ul style="list-style-type: none"> ✓ Beach still accessible. ✗ No deposition further down coast – erodes faster.
Sea walls	Concrete walls break up the energy of the wave. Has a lip to stop waves going over.	<ul style="list-style-type: none"> ✓ Long life span ✓ Protects from flooding ✗ Curved shape encourages erosion of beach deposits.
Gabions or rip rap	Cages of rocks/boulders absorb the waves energy, protecting the cliff behind.	<ul style="list-style-type: none"> ✓ Cheap ✓ Local material can be used to look less strange. ✗ Will need replacing.

Soft engineering defences

Beach nourishment	Beaches built up with sand, so waves have to travel further before eroding cliffs.	<ul style="list-style-type: none"> ✓ Cheap ✓ Beach for tourists. ✗ Storms = need replacing. ✗ Offshore dredging damages seabed.
Managed retreat	Low value areas of the coast are left to flood & erode.	<ul style="list-style-type: none"> ✓ Reduce flood risk ✓ Creates wildlife habitats. ✗ Compensation for land.

Case Study: Mappleton: the Holderness coast

Location and background
- Mappleton is a village located on the Holderness coast – on the east coast of the UK. The coastline is made out of boulder clay and glacial till which was deposited during the last ice age around 100,000 years ago.



Coastal processes
- Longshore drift: moving material southwards.
- Every year 500,000 tonnes of material is moved south along the 40km stretch of coast south of Hornsea.

Coastal management effects
- In 1991 £2.1 million spent on a groyne made out of large boulders.
- Money from an EU grant designed to promote tourist development.
- Protects only the village, not farmland to the north and south.

Coastal management conflicts
- Farmland either side of the groyne at Mappleton is not protected.
- The groyne reduces longshore drift which has resulted in increased erosion further down the coastline due to the reduction in beach material to protect the coast.

River management schemes

Soft engineering	<ul style="list-style-type: none"> Afforestation – plant trees to soak up rainwater, reduces flood risk. Floodplain zoning – restricting land use depending on value & flood risk. River restoration – artificially changed river is restored to original course. 	Hard engineering	<ul style="list-style-type: none"> Straightening channel – increases velocity to remove flood water. Artificial levees – heightens river so flood water is contained. Deepening or widening river to increase capacity for a flood.
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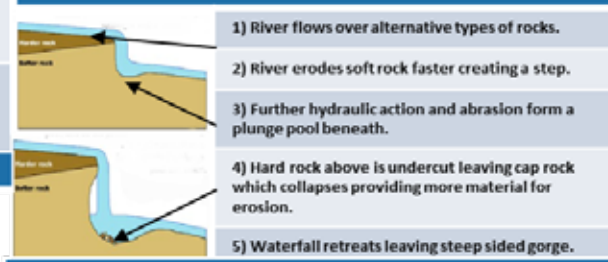
Physical and human causes of flooding.

Physical: Prolong & heavy rainfall Long periods of rain causes soil to become saturated leading runoff.	Physical: Geology Impermeable rocks causes surface runoff to increase river discharge.
Physical: Relief Steep-sided valleys channels water to flow quickly into rivers causing greater discharge.	Human: Land use Tarmac and concrete are impermeable. This prevents infiltration & causes surface runoff.

Upper course of a river

Near the source, the river flows over steep gradient from the hill/mountains. This gives the river a lot of energy, so it will erode the riverbed vertically to form narrow valleys.

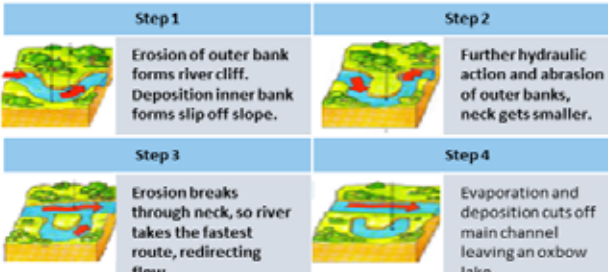
Formation of a waterfall



Middle course of a river

Here the gradient get gentler, so the water has less energy and moves more slowly. The river will begin to erode laterally making the river wider.

Formation of ox-bow lakes



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Lower course of a river
Near the river's mouth, the river widens further and becomes flatter. Material transported is deposited.

Formation of floodplains and levees

When a river floods, fine silt/alluvium is deposited on the valley floor. Closer to the river's banks, the heavier materials build up to form natural levees.

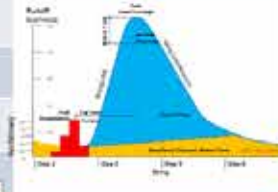
- ✓ Nutrient rich soil makes it ideal for farming.
- ✓ Flat land for building houses.



Hydrographs and river discharge

River discharge is the volume of water that flows in a river. Hydrographs who discharge at a certain point in a river changes over time in relation to rainfall

1. **Peak discharge** is the discharge in a period of time.
2. **Lag time** is the delay between peak rainfall and peak discharge.
3. **Rising limb** is the increase in river discharge.
4. **Falling limb** is the decrease in river discharge to normal level.



Case Study: The River Tees

Location and background
Located in the North of England and flows 137km from the Pennines to the North Sea at Red Car.



Geomorphic processes
Upper features: V-shaped valley, rapids and waterfalls. Highforce Waterfall drops 21m and is made from harder whinstone and softer limestone rocks. gradually a gorge has been formed.
Middle features: meanders and ox-bow lakes. The meander near Yarm encloses the town.
Lower features: greater lateral erosion creates features such as floodplains & levees. Mudflats at the river's estuary.

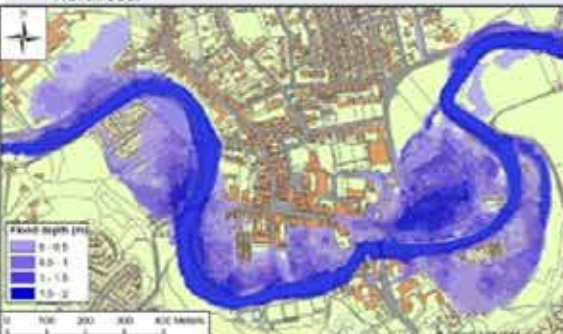
Management
-Towns such as Yarm and Middleborough are economically and socially important due to houses and jobs that are located there.
-Dams and reservoirs in the upper course, controls river's flow during high & low rainfall.
- Better flood warning systems, more flood zoning and river dredging reduces flooding.

Types of erosion		Types of transportation	
The break down and transport of rocks – smooth, round and sorted.		A natural process by which eroded material is carried/transported.	
Attrition	Rocks that bash together to become smooth/smaller.	Solution	Minerals dissolve in water and are carried along.
Solution	A chemical reaction that dissolves rocks.	Suspension	Sediment is carried along in the flow of the water.
Abrasion	Rocks hurled at the base of a cliff to break pieces apart or scraped against the banks and bed of a river.	Saltation	Pebbles that bounce along the sea/river bed.
Hydraulic Action	Water enters cracks in the cliff, or river bank, air compresses, causing the crack to expand.	Traction	Boulders that roll along a river/sea bed by the force of the flowing water.

C.S Morpeth flood management scheme

Location

- Morpeth is an ancient market town situated in a loop of the river Wansbeck in the northeast of England about 15 miles north of Newcastle upon Tyne and 12 miles west from the North Sea.



The new flood management scheme

Morpeth already had a system of flood defences (flood walls and low embankments) in place following the 1963 flood event, but these were overtopped by the high flood waters in 2008.

New plans were developed to ...

- Walls were raised by 30cm in the most vulnerable areas
- Poles were placed in the River Wansbeck to catch debris upstream, to stop debris clogging up the bridges in the town which caused the flooding
- Clear out toe culverts that drain water into Morpeth
- Construction of a huge upstream reservoir – holding over 1million m³ of water
- Building new flood walls
- Add an earthen embankment to protect the housing estate of High Stanners

Reservoir



6th and 7th September 2008

Causes

1. Prolonged rainfall – a month's rain fell in 12 hours
2. River Wansbeck valley is very narrow and steep = more surface runoff
3. Wet summer = soil already saturated
4. Increased urbanisation
5. Oldgate Bridge obstructed the flow of the water



Social Impacts

- More than 400 residents evacuated
- Shelter was provided in the town hall
- An error made by the Environment Agency's warning system meant that 198 properties in the Middle Greens area of the town did not receive a flood warning
- Many residents had to be forced from their homes and lived in caravans or with relatives as rebuilding took place.

Economic impacts

- 995 properties were directly affected by the flood water
- Farming losses were estimated at over £1million
- Damages cost over £40 million
- Houses were full of mud and sewage
- The Red Cross and Morpeth Lions Club had raised over £20,000 by Wednesday 10th September under the Morpeth Flood Disaster Fund
- The library suffered severe structural damage due to the heavy debris transported by the river

Environmental impacts

- Fine silt and water damage affected a lot of library books and peoples homes

Issues

- The scheme cost £27 million which is a lot of money for a small town in the North of England
- Flood walls were raised to a height of 1.8m which obscures the view of the river for many residents
- The walls are a barrier to some forms of wildlife

History Knowledge Organiser

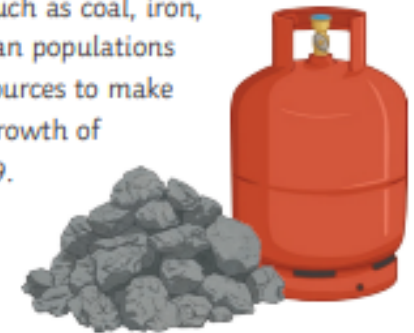
Boom in the USA Knowledge Organiser

Key Terms

boom	Fast-paced economic growth.
credit	Buying things using the promise of paying in the future, usually with interest payments on top.
hire purchase	Buying a product and paying for it later in instalments.
shares	A small percentage of a company that can be purchased and traded. Shares give their holder a share in the company's profits each year, called a dividend.
suburbs	The area on the edge of a city that is predominantly made up of homes.

Resourceful USA

The USA had a booming economy by 1920. The First World War saw great demand from countries like the UK and France for American resources for the war effort. Following the war, America was in a better financial position than Europe as it had not been part of the war long. Most American wealth came from its huge amount of natural resources such as coal, iron, oil and gas. The growth of factories and urban populations meant that the USA could harness these resources to make a lot of money. The USA enjoyed economic growth of approximately 40% between 1920 and 1929.



Republican Party Policies

The Boom was sustained by the government which was run by the Republican party throughout the 1920s. This government had three important policies to encourage economic growth:

- **Low Taxation:** low taxes left consumers with more money to spend on consumer goods and businesses with more money to spend on growth.
- **Laissez Faire:** the idea that people and businesses should be left alone by the government and be allowed to spend, earn and grow as they wished.
- **Tariffs:** taxes on goods coming into America (imports) meant that people preferred to buy American-made goods. This encouraged growth in American businesses.



Consumerism

Low taxation and growing businesses meant that people had more disposable income. Advertising in cinemas and newspapers encouraged people to buy the latest gadgets and time-saving inventions such as fridges, radios and Hoover vacuum cleaners. Sales of clothing, cigarettes and other consumer goods increased too. Larger items were made available to poorer people through the use of buying things on **credit** using **hire purchase** schemes.



History Knowledge Organiser

The Great Depression Knowledge Organiser

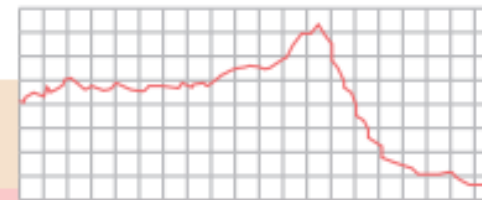
Key Terms

crash	The term used to describe a suddenly failing economy or stock market. Crashes follow a boom.
depression	A period where a country is experiencing negative growth – a reduction in the amount of wealth a country is producing from year to year.
Democratic Party	One of the two main political parties in the USA; seen as more left-wing and liberal than Republicans.
GDP	Gross Domestic Product: the measure of a country's wealth in dollars.
Republican Party	One of the two main political parties in the USA; seen as more conservative and business-friendly than the Democrats.

The Wall Street Crash

In October 1929, the boom in the US economy suddenly came to a halt with the Wall Street **Crash**. Shares in the stock market suddenly lost all their value, causing those businessmen who traded stocks to lose their money overnight. As a result of this, America was plunged into **depression**. The rest of the world followed suit, as depressions spread across Europe.

Years of spending and over-confidence in the eternal growth of the stock market had led people in the USA to buy too much on credit, put too much money into shares and had seen interest rates rise throughout the 1920s. This boom led to a sudden bust which was first seen on Wall Street.



President Herbert Hoover

Herbert Hoover was elected as President in 1928, before the Wall Street Crash. He was a **Republican**, like all presidents in the 1920s. His background was as Secretary for Commerce, an important role in the government centring on managing the economy. Born into a poor family, Hoover made his way up the political ranks until his eventual election after much public support.



Herbert Hoover with his dog 'King Tut'

Unemployment

As the economy collapsed businesses failed and millions of workers were left without a job. The unemployment rate had been at a stable rate of 5% during the 1920s. By 1933, unemployment had hit almost 25%. This meant that a huge amount of people in America were now living in poverty.

Most of the unemployment was to be found in cities, with food banks and other charities desperately trying to feed millions of people across America.



History Knowledge Organiser

The New Deal Knowledge Organiser

Key Terms

AAA	The Agricultural Adjustment Agency
Act	A law that is created.
CCC	Civilian Conservation Corps
federal government	The branch of government, led by the president, that has overall control of nation-wide laws.
NRA	The National Recovery Association
PWA	The Public Works Administration

Roosevelt's Plan

Roosevelt was elected in 1932 promising a 'New Deal' for Americans. He told Americans that he would be more proactive than Hoover was before him and laid out his main goals for the nation, Roosevelt promised:



- more help for the unemployed, old and sick;
- to reduce unemployment;
- to revive industry and agriculture;
- to protect American's savings and homes.

Fireside Chats

Roosevelt believed that Americans should know what he was doing to help them. He made weekly radio broadcasts explaining his plans and actions which were listened to by 60 million people. These became known as his 'fireside chats'.

The Hundred Days

Roosevelt got straight to work on his New Deal. His first hundred days as president saw a closing of all banks which were then checked by accountants. Only the most trustworthy banks could re-open, around 5,000.

He set up the **AAA** to improve farming. By setting limits on the amount of food that could be produced he hoped to raise prices. He encouraged farmers to modernise and use new technology that helped preserve soil quality.

The **CCC** was set up to give young men jobs. Around 2.5 million young men were given jobs in environmental projects that would improve America and let them earn a living.

The Federal Emergency Relief Administration was established to give help directly to those in poverty in the form of food, blankets and nursery schools.

NIRA

Roosevelt passed the National Industrial Recovery Act in 1933. This Act allowed him to take direct control of many aspects of the economy. Two organisations that grew from this Act were:

- The **NRA**, which improved the working conditions for labourers and outlawed child labour. Roosevelt hoped to increase standards and wages, giving workers more money to spend and boosting the overall economy.
- The **PWA**, which provided money for public services and infrastructure such as school and road building. This gave many people jobs in the construction industry.



History Knowledge Organiser

KS3 History Knowledge Organiser CIVIL RIGHTS



1. JIM CROW LAWS

These laws separated black and white people in America:

- It was against the law to serve black and white people in the same room in a restaurant.
- Black and white people were not allowed to marry.
- Black people were not allowed to take books out of the library.
- Black and white people had to have separate public drinking fountains.
- There were separate schools for black and white children.

Can you find out any other ways black people were separated from white people legally?

2. LITTLE ROCK NINE

In 1954, the US Supreme Court declared segregated schools were wrong. A key test case came in Arkansas in 1957. Nine very able black students were allowed to attend an all white school.



On the first day, Elizabeth Eckford arrived at school alone. An angry mob surrounded her and she had to be rescued. The President Dwight Eisenhower sent paratroopers to Little Rock and the nine were taken to school by armed escort every day. They continued to go to the school until the State Governor closed it after a year, unable to accept desegregation in school.

Why was there so much hate in Arkansas? What was shown on the national tv?

3. EMMETT TILL

On August 28 1955, one of the most famous events in the early days of the civil rights movement occurred, when 14-year-old Emmett Till, from Chicago, was murdered in Mississippi where he had gone on vacation to visit relatives.

His mother, Mamie Till Bradley, insisted that the body be sent back to Chicago and then further insisted on an open casket funeral. The two murderers were arrested and put on trial. Amazingly, despite the evidence against them, they were acquitted.

What was Emmett Till's 'crime'?. How do we know the two tried for murder were guilty?

4. MARTIN LUTHER KING



Early on, King was inspired by his father's opposition to racial segregation and discrimination. Although he grew up in a system that treated him as inferior, his mother taught him he was "as good as anyone".

He is famous for, the Montgomery Bus Boycott, his letter from a Birmingham jail, his speeches on Vietnam and 'I have a dream' and his march to protest against voting qualifications.

Why are the above events significant?

5. ROSA PARKS

In 1955, Rosa Parks refused to give up her seat on a bus to a white man who was standing as all the 'white' seats had been taken. She was arrested and on December 5th, a boycott (ban) of the buses started that lasted for 381 days.



In 1956, the Supreme Court said that segregation on buses was against the law. Rosa Parks was given the title "Mother of the Civil Rights Movement"

Why did Rosa Parks refuse to give up her seat?

Key words

Discrimination, segregation, paratrooper, casket, civil rights, boycott, supremacist, influential, separate but equal, Double jeopardy.

7. THE KU KLUX KLAN

The Ku Klux Klan was a white underground terrorist group. They would not accept black people as equals. Members of the KKK dressed in white robes. *Why did they dress like this and how influential were they?*

6. MALCOLM X

He told black Americans they should defend themselves 'by any means necessary'. He inspired many Black Americans through his speeches and articles.

How did he differ from Martin Luther King?



History Knowledge Organiser

Y9 History Knowledge Organiser – How do you fight a Cold War?

1. Glossary		2. Key leaders		3. Contrasting ideologies					
Cold War	A period of tension between USA and USSR that didn't involve direct war	Winston Churchill	British Prime Minister, made famous 'iron curtain speech' in 1946.	USA (United States of America)		USSR (Union of Soviet Socialist Republics)			
Superpower	A country with huge influence or strength	Harry S. Truman	US President, named the Truman Doctrine to stop communism	Capitalism	System with privately owned businesses and profit	Communism	A classless society where all property is owned publicly		
Ideology	A set of beliefs/ideas someone has	Joseph Stalin	Soviet dictator until his death in 1953.	White House	Official residence of the President of the US	Kremlin	Official residence of the President of Russia		
Containment	American policy to stop communism from spreading to other countries	John F. Kennedy	US President at height of Cold War, assassinated in 1963	Marshall plan	American plan to help Europe recover from WW2 and stop communism	Molotov Plan	Soviet plan to offer financial help to rebuild Eastern European countries		
Domino Theory	American idea that if one country fell to communism, others would follow	Mikhail Gorbachev	President of the USSR, started Soviet 'opening up' and détente	NATO (North Atlantic Treaty Organisation)	A military alliance of western powers for mutual protection in case of attack	Warsaw Pact	12 communist countries that agreed to defend each other if one of them was attacked		
Propaganda	Information designed to persuade people to adopt a particular opinion	4. Friends to enemies (1945)		CIA (Central Intelligence Agency)	A US organisation used to gather information on the country's enemies	KGB (Committee for State Security)	State police of the USSR used for external espionage and counter-intelligence		
Arms race	Competition to build more and more powerful nuclear weapons	Yalta conference (February)		5. Conflicts by proxy			6. The end of the Cold War		
Space race	Competition to build the best technology to go to outer space and the moon	<ul style="list-style-type: none"> Aim: to decide what to do with Germany after WW2 Outcome: divided Germany into 4 zones (controlled by Britain, USA, USSR and France) 		Proxy war	Conflict between groups that represent superpowers, while the superpowers themselves do not fight.		Détente	The easing of tensions between the East and West	
Atomic bomb	A very destructive bomb that gets power from the energy released when atoms are split	Potsdam conference (July)		Korea (1950-53): Country split after WW2 along 38 th parallel – communist north, capitalist south. US invaded to stop communists taking over. Success – but Korea remains divided.			↓	Revolutions of 1989	Protests all over USSR against communist rule
Nuclear warfare	Conflicts with nuclear weapons (atomic bombs)	<ul style="list-style-type: none"> Aim: act on agreements from Yalta Outcome: disagreements over how to handle Germany and about nuclear weapons 		Vietnam (1955-75): Country split – communist north; south controlled by US-backed group, but most people supported Vietcong (communists). USA sent troops to fight the Vietcong, but failed - all of Vietnam became (and remains) communist.			↓	Fall of the Berlin Wall	9 th November 1989 Symbolises the end of the Cold War and the falling of the 'iron curtain'
Mutually Assured Destruction	(MAD) - Situation where America and Russia knew if they started a nuclear war it would destroy the world	Atomic bombs in Japan (August)		Cuba (16-29 Oct 1962): Cuba is a communist country 90 miles south of the USA. Americans discovered USSR installed missile bases in Cuba that could reach US cities. Resolved 2 weeks later with dialogue. Both sides agreed to stop nuclear testing.			↓	End of USSR	Gorbachev resigned in 1991 and the USSR was dissolved
Iron Curtain	Division in Europe between the communist East and capitalist West	<ul style="list-style-type: none"> USA dropped nuclear bombs in Hiroshima and Nagasaki (Japan) USSR felt threat of nuclear war and started their own atomic programme 		Afghanistan (1979-89): USSR invaded after the Mujahideen, an anti-communist group, took power. It was a disaster for USSR as Mujahideen won. Afghanistan left vulnerable to terrorist groups.					
Berlin Wall	Built in 1961 dividing the German capital to stop people leaving USSR								

History Knowledge Organiser

Knowledge Organiser History YR 9 HT3

The Holocaust 1933-1945

Nazi beliefs about race

The Nazis believed in a hierarchy of races. These ideas came from Victorian ideas in England and Darwin. Hitler and the Nazis believed that the Aryan Race was superior and destined to control. They believed that other ethnicities were inferior, in particular Jews. Nazis believed that inferior races were meant to either be ruled or destroyed by the "master race". This informed much of Nazi Policy.

Nazi persecution of Jews

Nazi persecution of Jews started when Hitler took power in January 1933. Firstly, it started with the boycotting of Jewish shops and businesses, attempting to deport Jews, and pogroms. As the Second World War started, the Nazis became more aggressive with their policies, with forced deportations to ghettos. As they expanded eastwards, the Nazis started to encounter more Jews and started to murder thousands. After the Wannsee conference, the Nazis started the final solution, which ended in 1945 after over 6 million Jews and other minorities were murdered by the Nazis.

Map of Nazi Death Camps



Key dates, people and vocabulary.

Key Terms	Definitions	Key Terms	Definitions
Pogrom	When Jews are attacked on mass through a country	Einsatzgruppen	Mobile death squad of the SS that followed the German army, executing Jewish residents.
Kristalnacht	Night of the Broken Glass. 1933-When Jewish businesses and homes were attacked and destroyed in Germany	Final Solution	Agreed at the Wannsee Conference, designed to end the Jewish Presence in Europe.
Genocide	When one ethnic group are indiscriminately persecuted and killed.	Ghetto	A section of a city where Jews were forced to live, usually with several families living in one house, separated from the rest of the city by walls or wire fences.
Auschwitz	The Largest death camp used by the Nazis in Southern Poland. Over 1 million Jews and other minorities were murdered.	Mein Kampf	Hitler's memoirs, written in Munich whilst imprisoned by Hitler.
Gestapo	The secret state police of the German army, organized to stamp out any political opposition.	SA (Storm troopers)	The terrorist branch of the Nazi army, was formed in 1923 and was used to help secure Hitler's rise to power.
Aryan race	Term used by the Nazis to describe northern European physical characteristics (such as blonde hair and blue eyes) as racially "superior".	SS	The German army's elite guard, organized to serve as Hitler's personal protectors and to administer the concentration camps.
Untermenschen	Translates as lesser people. Refers to groups that Nazis believed were racially inferior to Aryans.	Third Reich	Name given to Hitler's Germany.
Volksdetuch	The collective name for the German People.	Wannsee Conference	December 1940-A meeting of the most Senior Nazi officials, where they agreed on the Final Solution to the "Jewish problem".
Greater Germany	An idea of a united Germany, including all German speaking people.	Anti-Semitism	Persecution of Jews.

History Knowledge Organiser

John F Kennedy – Knowledge Organiser

Timeline

- **November 8th, 1960:** JFK defeats Nixon and becomes president.
- **January 20th, 1961:** John F Kennedy is sworn in as President of the United States.
- **March 1961:** JFK announces the establishment of the Peace Corps (volunteer organisation where people do charity work abroad).
- **April 1961:** Attempted U.S backed invasion of Cuba ends in disaster at the Bay of Pigs. JFK looks weak as many people are killed.
- **March 1962:** USA and Latin American nations join the “Alliance for Progress”. This makes the Americas safer as countries are willing to work together.
- **October 16th – 28th 1962:** The U.S. obtains photos of Soviet nuclear missile emplacements in Cuba, bringing about the Cuban Missile Crisis. A tense stand- off ensues where nuclear missiles are close to being launched by both the USA and Russia against each other.
- **June 1963:** JFK calls civil rights struggle a “moral crisis” for America. He wants more equality between Black and White Americans.
- **August 5th, 1963:** US and Soviet Union agree to a nuclear test-ban treaty. This ensures no more nuclear weapons are tested between the two countries.
- **Early November, 1963:** US backed coup overthrows the government of South Vietnam, replaces it with a military dictatorship. USA begins to send government advisors to the country and money for the new government.
- **November 22nd, 1963:** JFK is assassinated while riding through the streets of Dallas, Texas. Lyndon Johnson becomes president.

Key Vocabulary

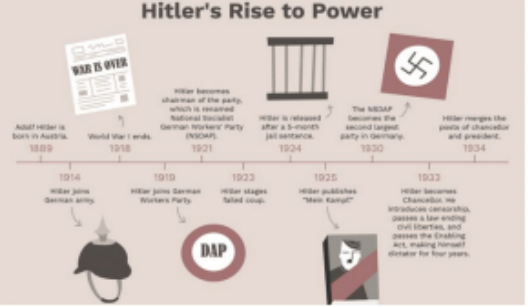
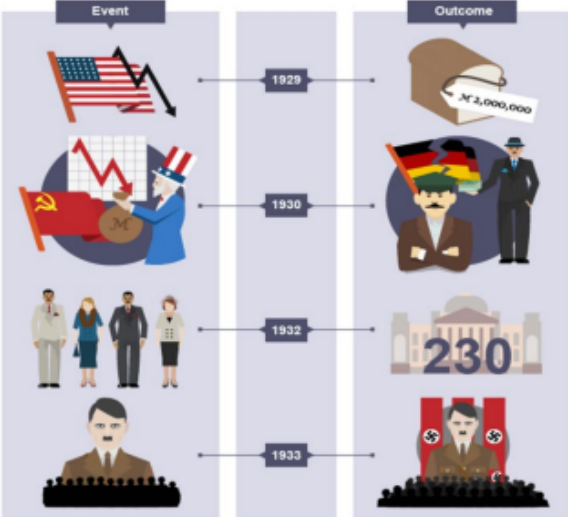
Cold War	The state of hostility that existed between the Soviet bloc countries and the Western powers from 1945 to 1990.
Assassination	The murder of someone famous or important.
Inauguration	The ceremony when a new president is sworn into office.
Soviet Union	A union of several Communist countries that existed between 1922 and 1991
Communism	A system where all property is public, and people work and are given things by the government according to their needs.
CIA	US central intelligence agency.
Mafia	An organised group of criminals

Key People

John F Kennedy	The 35 th US president – assassinated
Jackie Kennedy	First lady – wife of John F Kennedy
Robert Kennedy	Attorney General during Kennedy’s presidency and president’s younger brother
Lyndon B Johnson	The 36 th US president and vice president during Kennedy’s presidency. Sworn into office 2 hours after assassination.
Lee Harvey Oswald	Communist arrested for the assassination of John F Kennedy


History Knowledge Organiser

Knowledge organiser: Hitler's Rise to Power, 1919-33

Hitler joined the Nazi Party in 1919 and was influential in defining its beliefs. He also led the Munich Putsch in 1923. However, from 1924 to 1929 the unpopular party gained little electoral success.		Chronology: what happened on these dates?		Vocabulary: define these words.	
		1919	Hitler joined the German Workers' Party (DAP). In DAP, Hitler discovered he was good at public speaking.	Freikorps	Private armies set up by senior German army officers at the end of WW1.
		1920	Hitler set up the Nazi Party. The party was based on the Twenty-Five Point Programme.	Socialism	The belief that land, industry and wealth should be owned by the state.
		1923	The Munich Putsch was an attempt to overthrow the Weimar Republic, which would allow Hitler to form his own Nazi government.	Nationalism	The belief that the interests of a particular nation-state are of primary importance.
		1929	When the US stock market collapsed in October – the Wall Street Crash – the problems created had huge consequences for the German economy. The death of Stresemann also added to the crisis. Bankers and financiers in the USA recalled the loans made to Germany in 1924. This led to the Great Depression and unemployment rose.	Völkisch	Literally 'of the people'. In Germany it was linked to extreme German nationalism.
		January, 1933	Hitler became Chancellor of Germany.	Führerprinzip	The leadership principle; the idea that the Nazi Party and Germany should have one leader, obeyed by all.
		Who or what were these people/events?			
		Adolf Hitler	German politician and leader of the Nazi Party. He rose to power as the Chancellor of Germany in 1933.		
		Anton Drexler	Founded the German Workers' Party (DAP) in 1919.		
		Sturmabteilung (SA)	The paramilitary 'storm troopers' of the Nazi Party.		
		Ernst Röhm	Leader of the SA.		
		Paul von Hindenburg	President of Germany, 1925-34.		
		Franz von Papen	Appointed Chancellor of Germany in 1932. He was later appointed Vice-Chancellor under Hitler. Papen assumed that Hitler could be dominated.	Reichswehr	German army and navy.
		Kurt von Schleicher	Appointed Chancellor on 2 December 1932.	Great Depression	Slump in the economy in the 1930s which led to high unemployment.
				Real wages	A measure which reflects not the actual monetary value of wages, but the buying power of wages.
				Putsch	Attempted takeover of the government.
Summarise your learning					
Topic 1: The development of the Nazi Party, 1920-29	During the five years after the war, several new parties emerged, including DAP. As it grew, it added the words 'national' and 'socialist' to become the NSDAP and acquired the new leader, Hitler. The party carried out the Munich Putsch, but failed. In the years 1925-28 Hitler reorganised the Nazi Party.				
Topic 2: The growth in support for the Nazis, 1929-33	The Wall Street Crash led to a depression in the USA, which then spread around the world. US loans to Germany were called in and unemployment began to rise as companies collapsed. By 1932, there were about 6 million unemployed. The economic problems led to political discontent and the Nazis gained support. Hitler became Chancellor of Germany in January 1933.				
					

History Knowledge Organiser

Y9-WW1 1914-1918: Knowledge Organiser

Long term causes of WW1	
Militarism	An emphasis on military ideals and strength. Wanting your country to have a strong Army and navy.
Alliances	<p>A group of countries who promise to support and protect each other. Rival groups have rival alliances. For a number of years tension between the main European powers has been increasing. In 1914 there were two main power blocks / alliances:</p> <ul style="list-style-type: none"> The Triple Entente- Great Britain / France / Russia The Triple Alliance- Germany / Italy and Austria-Hungary <p>Each member promised to help its allies if they were attacked by a country belonging to another alliance.</p> 
Imperialism	The desire to conquer colonies, especially in Africa. This brought the powers into conflict: Germany wanted an empire. France and Britain already had empires.
Nationalism	The belief that your country is better than others. This made nations assertive and aggressive
Short term cause of WW1-The Assassination of Franz Ferdinand	
Cause: In 1914 Austria owned Bosnia. Many Bosnians hated Austria and wanted to be free- known as Nationalism .The Archduke Franz Ferdinand was to become the next Emperor of Austria, so many Bosnians wanted to kill him. Many of these were part of the Black Hand group.	
Events: Archduke Franz Ferdinand was inspecting the army in Sarajevo with his wife Sophie. Seven young Bosnian Serbs planned to assassinate Franz Ferdinand as he drove along the main road in Sarajevo. The first conspirator who tried to kill Franz Ferdinand threw a bomb at his car. He missed and was arrested. He decided to abandon the visit and return home via a different route to the one planned. No one had told the driver the route had changed. Unfortunately, the car stopped in front of Gavrilo Princip, one of the conspirators, who was on his way home thinking he had failed. Princip pulled out a gun and shot at Franz Ferdinand. Both he and his wife were killed.	
Consequences: Austria-Hungary immediately blamed the Serbian government for the attack. On July 28, Austria-Hungary declared war on Serbia, and the fragile peace between Europe's great powers collapsed, beginning the devastating conflict now known as the First World War.	
Conscientious objectors Conscientious objectors are people who refused to fight or be involved with war. There were over 16,000 conscientious objectors in Britain. These 'conchie's' or 'had many different reasons for refusing to fight: Some were pacifists who were against war in general, some people felt the war was wrong or thought it went against their conscience or personal beliefs. Some were political objectors who did not consider the government of Germany to be their enemy, some were religious objectors who believed that war and fighting was against their religion. Groups in this section were the Quakers and Jehovah Witnesses.	

Recruitment and Propaganda

When war broke out, Britain had a small army of around 250,000 professional soldiers. Lord Kitchener, Secretary of State for War told the government that Britain needed at least one million men. The government began a massive recruitment drive. It set up recruitment offices in every town and city, it commissioned posters and pamphlets urging young men to join up. The campaign was hugely successful. There was a frenzy of enthusiasm. Football teams and bus depots joined up together entering the army in 'Pals Battalions'. No one, it seemed, wanted to be left out. In the first month over 500,000 men had signed up. By March 1916 over 2.5 million men had volunteered to join 'Kitchener's Army'.

Why did men go to war?

- To fight alongside friends and family e.g. Pals battalion
- Duty to defend the King and Country
- To avenge the deeds of the enemy
- Fear of being seen as a coward
- For better money or wages.
- To learn a trade or skill

Trenches:

Trenches were long, narrow ditches dug into the ground where soldiers lived all day and night. **Trenches were long, narrow ditches dug into the ground where soldiers lived all day and night.** In the middle, was **No Man's Land**, so-called because it did not belong to either army. Soldiers crossed No Man's Land when they wanted to attack the other side.



Life in the trenches:

Soldiers in the trenches did not get much sleep. When they did, it was in the afternoon during daylight and at night only for an hour at a time. They were woken up at different times, either to complete one of their daily chores or to fight. During rest time, they wrote letters and sometimes played card games. The trenches could be very muddy and smelly. There were many dead bodies buried nearby and the latrines (toilets) sometimes overflowed into the trenches. Millions of rats infested the trenches and some grew as big as cats. There was also a big problem with lice that tormented the soldiers on a daily basis.

Problems in the trenches:

- Trench foot:** The wet and muddy conditions in the trenches caused feet to swell up and go black. The flesh would go rotten and the soldiers would be in terrible pain.
- Lice:** The trenches did not have running water or showers, so soldiers found it very hard to keep clean. They soon became infected with lice that lived on all parts of their bodies.
- Rats:** The dirty conditions and the lack of storage attracted rats to the trenches. The rats ate the soldiers' rations and crawled all over them when they slept. They carried diseases.
- Toilets:** There was no running water or sewage pipes in the trenches. This meant that proper toilets could not be fitted.

The Battle of the Somme

By December 1915 it was still a stalemate on the Western Front. Neither side had made any real progress towards victory. In February 1916 the Germans began an attack. They sent soldiers over the top to attack the French forts around the town of Verdun.

In response, the British planned an attack.

At the end of June, a huge artillery bombardment took place for 5 days. On 1st July the order to "go over the top" was given. On the first day of the Battle almost 20,000 soldiers died and 40,000 more were injured. In total 1 million men were wounded or killed, making it one of the bloodiest battles in human history. By November when fighting ended. Only 6 miles of land had been gained by the allies.

Shot at Dawn/Shell shock

Shot at dawn refers to many men who were killed due to desertion or cowardice during WW1. The British and Commonwealth military command executed 306 of its own men during World War One. Relatives and supporters of the executed men fought to win these soldiers a pardon. Their 'Shot at Dawn' campaign claimed the soldiers were not just cowards but were actually suffering from 'shell shock'.

Shell shock describes the type of post-traumatic stress disorder (PTSD) many soldiers experienced during the war. It is a reaction to the bombardment and fighting that produced a helplessness appearing variously as panic and being scared, flight, or an inability to reason, sleep, walk or talk.

The Home Front:

The Home Front during World War One refers to life in Britain during the war itself. The Home Front saw a massive change in the role of women, rationing, and the bombing of parts of Britain by the Germans (the first time civilians were targeted in war), conscientious objectors and strikes by discontented workers.



Remembrance: On the 11am of the 11th month 1918 (November 11th). This became known as Armistice Day – the day Germany signed an armistice (an agreement for peace) which caused the fighting to stop. The reason poppies are used to remember those who have given their lives in battle is because they are the flowers which grew on the battlefields after World War One ended.

History Knowledge Organiser



WORLD WAR II KNOWLEDGE ORGANISER

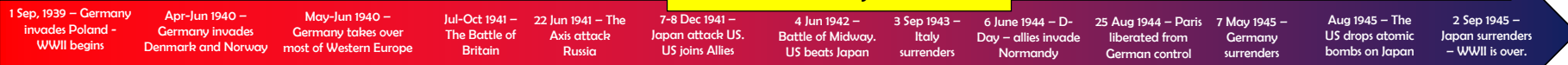


Main Participating Countries					
ALLIED POWERS			AXIS POWERS		
Country	Date Joined	Death Toll	Country	Date Joined	Death Toll
FRANCE 	3 rd Sep, 1939	600,000 1.44% of population in 1939	GERMANY 	1 st Sep, 1939	approx. 7,200,000 8.5% of population in 1939
UK 	3 rd Sep, 1939	450,900 0.94% of population in 1939	ITALY 	11 th Jun, 1940	approx. 500,000 1.14% of population in 1939
SOVIET UNION 	22 nd Jun, 1941	approx. 24,000,000 13.7% of population in 1939	HUNGARY 	27 th Jun, 1941	464,000 5.08% of population in 1939
USA 	8 th Dec, 1941	419,400 0.32% of population in 1939	JAPAN 	7 th Dec, 1941	approx. 3,000,000 4.1% of population in 1939

Key People	
<p>Sir Winston Churchill – (1874-1965) was a British politician who served as the Prime Minister between 1940 and 1945 and again from 1951 to 1955. He took over after a disastrous start to the war in which Nazi Germany conquered much of Europe. He did his best to rally the nation in defiance of Adolf Hitler, possessed excellent military knowledge and forged crucial alliances with both the USA and Russia. Churchill is often characterised for his extraordinary leadership throughout World War II – he was bold, brave, and tireless in his resolve to take on the might of Nazi Germany.</p>	<p>Adolf Hitler – (1889-1945) was a German politician who was the leader of the Nazi party, Chancellor of Germany from 1933-1945, and the Führer of Germany from 1934-1945. In 1923, Hitler had attempted to seize power via a failed coup, and was arrested. However, he began to gain a loyal following through his populist ideas, powerful speeches and charisma. Hitler's Germany invaded Poland in Sep 1939 to start the war, and he initiated the Holocaust. He is therefore significantly responsible for millions of deaths. He committed suicide on 30th Apr 1945, when the war was clearly lost.</p>
<p>Franklin Roosevelt – (1882-1945) was the 32nd President of the United States, from 1933-1945. Not only did Roosevelt guide the USA through most of World War II, but also the Great Depression – When he took office, nearly a third of America's workforce were unemployed. Whilst the USA remained officially neutral at the outset of war, Roosevelt offered diplomatic and financial support to the Allies. After the Japanese attacked Pearl Harbor on 7th December 1941, he declared war on the Axis powers. The US greatly helped the Allies to win the war – He died months before it ended.</p>	<p>Benito Mussolini – (1883-1945) the leader of Italy's National Fascist Party. He was Prime Minister from 1922-1945 –from 1925 onwards this was not democratically as he established a dictatorship. Italy entered the war on the side of Germany in 1940, but suffered some disastrous losses. In 1943, Mussolini was dismissed as leader and arrested, but was rescued by Hitler's paratroopers. He was later put in charge of a puppet regime called the Italian Social Republic, by Hitler. He was later caught by Italian Communist partisans and executed by firing squad in 1945.</p>
<p>Joseph Stalin – (1878-1953) was the Communist leader/ dictator of the USSR during WWII. After the death of the Communist Leader Lenin, Stalin won a vicious grapple for power before eventually establishing himself as a totalitarian dictator. His own policies became known as 'Stalinism.' He had signed a non-aggression pact with Germany in August 1939, but in June 1941, Hitler broke it and the Germans invaded. Although initially suffering heavy losses, the USSR's key victories in pushing the Germans back signalled a shift in the war in favour of the Allies.</p>	<p>Anne Frank – (1929-1945) was a German-born diarist. As a young Jewish girl, her family were forced into hiding, fleeing Germany for a secret attic in Amsterdam in the Netherlands. She wrote a diary of her time there. After years in hiding, her family was betrayed and arrested, and taken to concentration camps. Anne died of Typhus in Bergen-Belsen concentration camp. The only survivor from her family was Otto, her father, who published her diaries after her death. It has now become one of the most famous and well-read texts in contemporary history.</p>

Major Events				
Event	Image	Description	Date/s	Fact
WWII Begins		On 1 st September 1939, Germany invaded Poland, utilising the 'Blitzkrieg' strategy. Britain and France (Poland's allies) gave a notice period for the Germans to withdraw their troops from Poland. When they did not, Britain and France declared war on 3 rd September. Britain initially responded with bombing raids over Germany. Nearly six years of war in Europe was to follow.	1 st -3 rd September 1939	Hitler claimed to attack Poland to give the German people 'Lebensraum' – living space
Evacuation of Children		People expected cities to be bombed, as enemy planes tried to hit targets, for example warehouses and factories. This put would have put city children (in schools and houses close by) in grave danger, and so thousands were evacuated to the countryside. Many were extremely homesick, but some enjoyed their new lives.	September 1939 onwards	About 800,000 children left their homes throughout the war.
The Holocaust		The Holocaust was a genocide committed by Germany and its allies before and during WWII. It involved the systematic murder of 6 million Jews, and millions of 'undesirable' others (around 9-12 million in total). Many were gassed, starved, or died of disease in concentration camps. Conditions in the camps diabolical.	1933-1945	During the Holocaust, about two thirds of the Jews in Europe were killed.
Evacuation of Dunkirk		Large numbers of British, French, and Belgian troops were surrounded by German soldiers at the French coastal town of Dunkirk, and seemed set to perish. Remarkably, 338,226 were saved by a fleet of 800 small boats. The event is also known as the 'Miracle of Dunkirk.'	26 th May – 4 th June 1940	Many were the first queen to rule England in her own right.
Battle of Britain		In the Battle of Britain, the Royal Air Force (RAF) successfully defended UK against attacks by Nazi Germany's air force: Luftwaffe. It has been described as the first military campaign fought entirely by air forces.	10 th July – 31 st October 1940	This was seen by many as Germany's first major defeat in the war.
Attack on Pearl Harbor		This was a surprise military attack by Japan on the United States naval base at Pearl Harbor. It led to the US joining the Allies in the war. The attack commenced at 7.48am Hawaiian time, and was carried out by 353 Imperial Japanese aircraft.	7 th December 1941	188 aircraft were destroyed and 2,403 Americans were killed.
D-Day Landings		The Normandy Landings, also known as D-Day, were a series of landing operations by the Allies to claim back Europe. It was the largest seaborne invasion in history. The operation began the liberation of north-western Europe from being under German control.	6 th June 1944	Between 14,000 and 19,000 men died in the D-Day landings
Hitler's Suicide		With the Germans facing defeat, Hitler married his long-time love Eva Braun on 29 th April. The next day, they committed suicide, reportedly by gunshot.	30 th April 1945	There is debate as to how they killed themselves.
Germany Surrenders		The Allies had gradually forced the surrender of Axis troops across Europe in April and early May, 1945. On 7 th May, Germany officially surrendered to the Allies, bringing to an end the European fighting in World War II.	7 th May 1945	VE (Victory in Europe) Day is still celebrated on 8 th May.
America drops the atomic bombs		Japan refused to surrender to the terms of the Potsdam Declaration in July 1945, pledging to fight onto the bitter end. The US considered an invasion, but would have lost around 500,000 men. Instead, they dropped atomic bombs on Hiroshima (6 th Aug) and Nagasaki (9 th Aug).	6 th -9 th August 1945	It is thought that 135,000 people died in Hiroshima and 70,000 in Nagasaki.
WWII Ends		The surrender of Japan was announced on August 15 th 1945. On August 28 th , the Occupation of Japan, led by the Supreme Commander for Allied Powers, began. Japan formally signed for surrender on 2 nd September 1945, aboard the US Navy battleship USS Missouri. Allied civilians and military celebrated the end of war. The use of atomic bombs to force the surrender is still debated.	2 nd September 1945	Some rogue Japanese soldiers and pilots refused to surrender even into the 1970s!

Timeline of Major Events



Maths Knowledge Organiser

NUMBER SKILLS

What do I need to be able to do?

You should be able to:

- Understand properties of addition and subtraction
- Understand properties of multiplication and division
- Use formal methods of addition and subtraction for integers
- Use formal methods of multiplication and division for integers
- Add and subtract directed numbers
- Multiply and divide directed numbers
- Understand and use order of operations with positive and negative integers

Key Words

- Commutative:** changing the order of operations does not change the result
- Associative:** when you add or multiply you can do so regardless of how the numbers are grouped
- Inverse:** the operation that undoes what was done by the previous operation
- Subtract:** taking away one number from another
- Negative:** a value less than zero
- Debit:** money that leaves a bank account
- Credit:** money that goes into a bank account
- Integer:** a whole number
- Product:** multiply terms
- Operation:** a mathematical process

What do I need to be able to do?

You should be able to:

- Understand and use factors
- Understand and use multiples
- Recognise prime numbers
- Recognise square/triangular numbers
- Find common factors, including HCF
- Find common multiples, including LCM
- Express a number as the product of its prime factors

FACTORS, MULTIPLES AND PRIMES

Key Words

- Multiple:** found by multiplying any number by a positive integer
- Factor:** integers that multiply together to get another number
- Prime:** an integer with only two factors (1 and itself)
- HCF:** the highest common factor of two or more numbers
- LCM:** the lowest common multiple of two or more numbers
- Product:** multiply terms

Factors

A number can have many factors!

Example: what are the factors of 12?

- 1 x 12
- 2 x 6
- 3 x 4

So the factors of 12 are 1, 2, 3, 4, 6, 12

How to find factors

Be systematic! Always find your factor pairs and then write them in ascending order. This way you can be sure you've not missed any out!

Multiples

Example: What are the multiples of 4?

4 x 1, 4 x 2, 4 x 3, 4 x 4 etc.
4, 8, 12, 16, 20

This list never ends!

The multiples of a number make up its times table

Is 15 a multiple of 3?

5 5 5

As 1 can share 15 into 3 equally sized parts, 15 is a multiple of 3.

3 x 5 = 15

Why is 10 not a multiple of 4?

4 x 2 = 8, 4 x 3 = 12

4 x 25 = 100 but 25 is not an integer therefore 10 cannot be a multiple of 4!

Addition

Addition is commutative

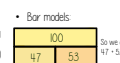
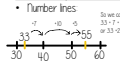
$$2 + 4 = 4 + 2$$

The order of addition doesn't change the result

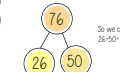
Formal written method

H	T	U
3	4	2
+	1	4
4	9	1

Models to help with addition



Part/Whole diagrams



Subtraction

Subtraction is NOT commutative or associative.

$$12 - 8 \neq 8 - 12$$

When you subtract, the order must stay the same.

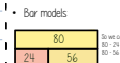
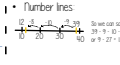
Formal written method

H	T	U
5	2	12
-	2	1
3	1	6

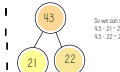
Remember 0 is a place holder!

2	0	8
-	0	0
2	0	8

Models to help with addition



Part/Whole diagrams



Written Methods for Multiplication

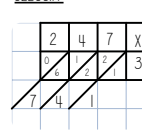
LONG MULTIPLICATION

	2	4	7
x	1	2	3
7	4	1	

GRID METHOD

x	200	40	7
3	600	120	21
600	120	21	741

GELOSIA



REPEATED ADDITION

H	T	U
2	4	7
+	2	4
7	4	1

Calculations with Directed Numbers

Addition

$$2 + 3 = 5$$

Remember if I add a negative, I'm adding something that will make a smaller or if I'm adding a positive, I'm adding something that will make a bigger.

$$2 - 3 = -1$$

Subtraction

$$2 - 3 = -1$$

Remember if I subtract a negative, I'm taking away something that will make a smaller or if I'm subtracting a positive, I'm taking away something that will make a bigger.

$$2 + 3 = 5$$

Generalisation

Multiplication

2×-3
"2 lots of -3"
= -6

-2×3
Think of this as the negative of 2×3 .
= -6

Division

Remember that multiplication and division are inverse operations.

Eg $6 \div -3 = -2$
 $-6 \div 2 = -3$

Generalisation

x	+	-
+	+	-
-	+	-
-	-	+

Models to help

It can be helpful to put calculations involving directed numbers into real life contexts. Think about temperature or bank accounts when unsure.

Written Methods for Division

SHORT DIVISION

0	4	2
6	2	5
8	8	1

SHORT DIVISION with remainders

1	2	5	5
2	2	5	1

Continue after the decimal point! If you start to get a repeating decimal, stop.

LONG DIVISION

0	4	2
6	2	5
-	2	4
0	1	2
-	0	1
0	1	2
-	0	0

This method relies on you being comfortable with multiples of your divisor in the case of 4.

Order of Operations

Example 1
 $(4 \times 7) + 3$

So we need to evaluate the brackets first, $4 \times 7 = 28$
This is now $28 + 3 = 31$

Example 2
 $(6 + 4 - 3)^2 \times 4$

So we need to evaluate the brackets first and we work left to right, $6 + 4 - 3 = 7$
This is now $7^2 \times 4 = 49 \times 4 = 196$

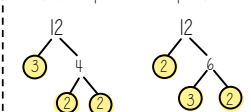
Example 3
 $4 - 8 \times 2 + 12 \div 4$

So first we do the multiplication/division left to right, $4 - 16 + 3$
Now we do the addition/subtraction from left to right, $-12 + 3 = -9$

Product of Prime Factors

Example 1

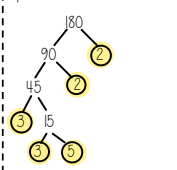
Write 12 as a product of its prime factors



Both of these trees represent the same decomposition
 $12 = 2 \times 2 \times 3 = 2^2 \times 3$

Example 2

Write 180 as a product of its prime factors



$180 = 2 \times 2 \times 3 \times 3 \times 5 = 2^2 \times 3^2 \times 5$

Using prime factor decomposition

If we know that 12 written as a product of its prime factors, how does that help us to write 36 as a product of its prime factors?

We know $12 \times 3 = 36$ therefore we can multiply our answer by three and $36 = 2 \times 2 \times 3 \times 3 = 2^2 \times 3^2$

What about 120?
Well 120 is 10×12 so we can say $120 = 2 \times 2 \times 3 \times 10 = 2^2 \times 3 \times 5$

Lowest Common Multiple (LCM)

Example 1

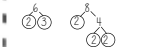
What is the LCM of 6 and 8?

6: 6, 12, 18, 24, 30
8: 8, 16, 24, 32, 40

The first time their multiples match is 24 therefore the LCM of 6 and 8 is 24

Example 2

What is the LCM of 6 and 8?



LCM of 6 and 8 = $2 \times 2 \times 2 \times 3 = 24$

Example 3a

What is the LCM of 24 and 16?

24	16
2	2
3	2
2	2
2	2

LCM of 24 and 16 = $2 \times 2 \times 2 \times 3 \times 2 = 48$

Example 3b

What is the LCM of 12 and 15?

12	15
2	3
2	5

LCM of 12 and 15 = $2 \times 2 \times 3 \times 5 = 60$

Highest Common Factor (HCF)

Example 1

What is the HCF of 6 and 8?

6: 1, 2, 3, 6
8: 1, 2, 4, 8

The biggest number which is a factor of both 6 and 8 is 2, therefore the HCF of 6 and 8 is 2

Example 2

What is the HCF of 6 and 8?



HCF of 6 and 8 = 2

Example 3a

What is the HCF of 24 and 16?

24	16
2	2
2	2
3	2

HCF of 24 and 16 = $2 \times 2 = 4$

Example 3b

What is the HCF of 12 and 15?

12	15
2	3
2	5

HCF of 12 and 15 = 3

Maths Knowledge Organiser

What do I need to be able to do?

You should be able to:

- Add/subtract with indices
- Multiply expressions with indices
- Divide expressions with indices
- Know the addition law for indices
- Know the subtraction law for indices
- Be familiar with the key results
- Work with negative exponents

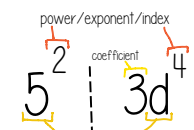
HIGHER TIER ONLY

- Work with fractional exponents

INDICES

Key Words

- **Base:** the number that gets multiplied by a power
- **Power:** the number of times the number is used in a multiplication
- **Exponent:** power (see above)
- **Index:** power (see above)
- **Coefficient:** a number used to multiply a variable
- **Variable:** a letter which represents an unknown number
- **Commutative:** changing the order of the operations doesn't change the result



Addition Law for Indices

$$a^m \times a^n = a^{m+n}$$

Examples
 $2^2 \times 2^3 = 2 \times 2 \times 2 \times 2 \times 2 = 2^5$

$$k^4 \times k^2 = k \times k \times k \times k \times k \times k = k^6$$

Further Examples

$$1 \quad 4w \times 5z = 4 \times 5 \times w \times z = 20wz$$

$$2 \quad 3a \times 4a^2 \times 2a = 3 \times 4 \times 2 \times a \times a \times a \times a = 24a^4$$

$$3 \quad (t^3)^2 = t^3 \times t^3 = t^3 \times t^3 \times t^3 \times t^3 = t^6$$

$$4 \quad 3p^2 \times 4p^3 = 6p^2 \times p^3 = 6p^2 \times p \times p \times p = 6p^5$$

$$5 \quad 5^3 \times 5 = 5 \times 5 \times 5 \times 5 = 5^4$$

$$6 \quad d^5 \times d^2 = d \times d \times d \times d \times d \times d \times d = d^7$$

$$7 \quad a^m \times a^n = a^{m+n}$$

$$8 \quad a^m \times a^n = a^{m+n}$$

$$9 \quad a^m \times a^n = a^{m+n}$$

$$10 \quad a^m \times a^n = a^{m+n}$$

$$11 \quad a^m \times a^n = a^{m+n}$$

$$12 \quad a^m \times a^n = a^{m+n}$$

$$13 \quad a^m \times a^n = a^{m+n}$$

$$14 \quad a^m \times a^n = a^{m+n}$$

$$15 \quad a^m \times a^n = a^{m+n}$$

$$16 \quad a^m \times a^n = a^{m+n}$$

$$17 \quad a^m \times a^n = a^{m+n}$$

$$18 \quad a^m \times a^n = a^{m+n}$$

$$19 \quad a^m \times a^n = a^{m+n}$$

$$20 \quad a^m \times a^n = a^{m+n}$$

$$21 \quad a^m \times a^n = a^{m+n}$$

$$22 \quad a^m \times a^n = a^{m+n}$$

$$23 \quad a^m \times a^n = a^{m+n}$$

$$24 \quad a^m \times a^n = a^{m+n}$$

Spotting Patterns

$$2^3 = 2 \times 2 \times 2 = 8$$

$$2^2 = 2 \times 2 = 4$$

$$2^1 = 2$$

$$2^0 = 1$$

$$2^{-1} = \frac{1}{2}$$

$$2^{-2} = \frac{1}{4}$$

$$2^{-3} = \frac{1}{8}$$

$$2^{-4} = \frac{1}{16}$$

$$2^{-5} = \frac{1}{32}$$

$$2^{-6} = \frac{1}{64}$$

$$2^{-7} = \frac{1}{128}$$

$$2^{-8} = \frac{1}{256}$$

$$2^{-9} = \frac{1}{512}$$

$$2^{-10} = \frac{1}{1024}$$

$$2^{-11} = \frac{1}{2048}$$

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$$2^{-20} = \frac{1}{1048576}$$

FRACTIONAL INDICES

HIGHER TIER ONLY

$$a^{\frac{m}{n}} = \sqrt[n]{a^m}$$

Examples
 $25^{\frac{1}{2}} = \sqrt{25} = 5$ $8^{\frac{1}{3}} = \sqrt[3]{8} = 2$

$$a^{\frac{m}{n}} = (\sqrt[n]{a})^m$$

Examples
 $25^{\frac{3}{2}} = (\sqrt{25})^3 = 5^3 = 125$

Harder Examples
 $(8k)^{\frac{1}{3}} = \sqrt[3]{8k^3} = 2k$

$(9c)^{\frac{2}{3}} = (\sqrt[3]{9c^3})^2 = (3c)^2 = 9c^2$

$(32r^5)^{\frac{2}{5}} = (\sqrt[5]{32r^5})^2 = (2r)^2 = 4r^2$

It is really helpful to know the powers of 2.

- 2
- 4
- 8
- 16
- 32

Subtraction Law for Indices

$$a^m \div a^n = a^{m-n}$$

Examples
 $5^3 \div 5 = \frac{5 \times 5 \times 5}{5} = 5^2$

$$d^5 \div d^2 = \frac{d \times d \times d \times d \times d}{d \times d} = d^3$$

$$a^m \div a^n = a^{m-n}$$

$$a^m \div a^n = a^{m-n}$$

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Spotting Patterns

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What do I need to be able to do?

You should be able to:

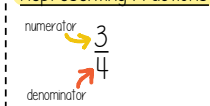
- Understand different representations of fractions
- Fully simplify fractions
- Recognise and find equivalent fractions
- Convert between mixed numbers and improper fractions
- Add/subtract any fractions
- Add/subtract mixed numbers

FRACTIONS

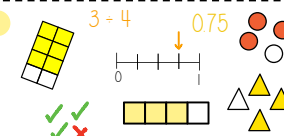
Key Words

- **Numerator:** the top number of a fraction
- **Denominator:** the bottom number of a fraction
- **Equivalent:** of equal value
- **Mixed Number:** a number with an integer and a proper fraction
- **Improper Fraction:** a fraction where the numerator is larger than the denominator
- **Coprime:** two numbers which share no common factors (except 1)

Representing Fractions



We say 'three quarters' or 'three out of four'

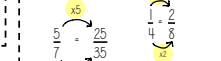


All of these show $\frac{3}{4}$ or 75%

Equivalent Fractions

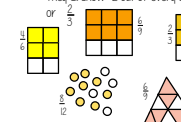
Two fractions are equivalent if they represent the same quantity

If the numerator and denominator have the same multiplier, they are equivalent



Each of these diagrams represents an equivalent amount

They all show '2 out of every 3'



Maths Knowledge Organiser

What do I need to be able to do?

You should be able to:

- Multiply unit fractions
- Multiply non-unit fractions
- Use cross-cancelling to simplify fractions before multiplying
- Divide integers by fractions
- Divide fractions by fractions
- Find fractions of amounts
- Use a given fraction to find the whole
- Find the reciprocal of an integer/fraction

FRACTIONS 2

Key Words

- **Numerator:** the top number of a fraction
- **Denominator:** the bottom number of a fraction
- **Unit fraction:** a fraction with a numerator of one
- **Commutative:** changing the order of the operations doesn't change the result
- **Reciprocal:** the reciprocal of a number is 1 divided by the number
- **Coprime:** two numbers which share no common factors (except 1)

What do I need to be able to do?

You should be able to:

- Understand place value and the number system
- Read and write decimal numbers
- Order decimals of any size
- Use inequality symbols
- Add and subtract decimals
- Multiply and divide decimals
- Use related calculations to find the answers to questions

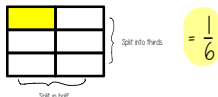
DECIMALS

Key Words

- **Place Value:** the value of a digit depending on its place in a number
- **Place Holder:** we use 0 as a place holder to show there are none of a particular place in a number
- **Integer:** a whole number that is positive or negative
- **Decimal:** a number with a decimal point used to separate ones, tenths, hundredths etc...
- **Inequality:** compares two values and indicates which is larger

Multiplying unit fractions

$\frac{1}{2} \times \frac{1}{3}$ "One half of one third"



Split into thirds = $\frac{1}{6}$

Multiplying any fractions

Example 1: $\frac{2}{3} \times \frac{2}{5} = \frac{4}{15}$

Example 2: $\frac{5}{7} \times \frac{14}{15} = \frac{5 \times 14}{7 \times 15} = \frac{70}{105} = \frac{2}{3}$

Example 3: $\frac{1}{2} \times 2\frac{2}{3} = \frac{3}{2} \times \frac{7}{3} = \frac{21}{2} = 10\frac{1}{2}$


Cross Cancelling Method

Example 1: $\frac{5}{9} \times \frac{18}{25} = \frac{10}{25} = \frac{2}{5}$

Example 2: $\frac{15}{27} \times \frac{36}{45} = \frac{4}{3}$

Dividing integers by a unit fraction

$3 \div \frac{1}{3}$ Think of this as 'how many times does a third go into 3?'



there are three thirds in one whole, so there are 9 thirds in 3 wholes

Reciprocals

A number multiplied by its reciprocal is always 1

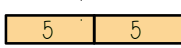
$2 \times \frac{1}{2} = 1$

$5 \times \frac{1}{5} = 1$

The reciprocal of $\frac{1}{a}$ is a

Finding Fractions of Amounts

Find $\frac{1}{2}$ of 10. "Share 10 into 2 equal parts"



Find $\frac{2}{3}$ of 24. "2 parts is 16. 3 is 8 as 24 ÷ 3 = 8. Each part must be worth 8"

$\frac{2}{3}$ of 24 = 16

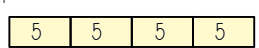
Find $\frac{7}{10}$ of £105. $\frac{105}{10} = 10.5$

$7 \times 10.50 = 73.50$

$\frac{7}{10}$ of £105 = £73.50

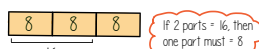
Reverse Fractions of Amounts

$\frac{3}{4}$ of a number is 15. What is the number?



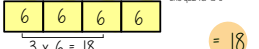
The original number was 20

$\frac{2}{3}$ of a number is 16. What is $\frac{3}{4}$ of the number?



If 2 parts = 16, then one part must = 8

The number is $8 \times 3 = 24$. So what is $\frac{3}{4}$ of 24?



$3 \times 8 = 18$

Dividing Fractions


Example 1: $\frac{2}{3} \div \frac{5}{7} = \frac{2}{3} \times \frac{7}{5} = \frac{14}{15}$

Example 2: $\frac{5}{12} \div \frac{25}{18} = \frac{5}{12} \times \frac{18}{25} = \frac{3}{10}$

Worded problem

A TV is on sale for $\frac{2}{5}$ off the price. It now costs £150. How much did it cost originally?

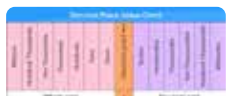
sale price discount



£150

So the original price of the TV was $5 \times £50 = £250$

Place Value



3 2 4 7 3 5 | . 1 4 5

"Three million, two hundred and forty seven thousand, three hundred and fifty one point one four five"

Decimal Place Value



1 one, 3 tenths and 4 hundredths

$1 \cdot 01 \cdot 01 \cdot 01 \cdot 001 \cdot 001 \cdot 001 \cdot 001$

$= 1 \cdot 03 \cdot 004$

$= 1.34$

Inequalities

> greater than
< less than
≥ greater than or equal to
≤ less than or equal to
= equal to
≠ not equal to

Examples:
 $5 > 3$ 5 is greater than 3
 $2 \cdot 2 = 4$ 2 · 2 is equal to 4
 $5 \cdot 3 \times 2 \neq 4$ 5 · 3 · 2 is not equal to 4
 $x \leq 3$ x is less than or equal to 3

Ordering Decimals

Example WHICH IS BIGGER, 16 OR 166?


Method 1: Compare both numbers with the same number of decimal places

Method 2: Compare both numbers with the same amount of units

Example WHICH IS BIGGER, 0.304 OR 0.034?

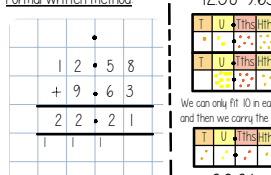
By looking, we can see that 0.304 > 0.034 as it has 3 tenths compared to 0

Decimal intervals on a number line



Adding Decimals

Formal written method



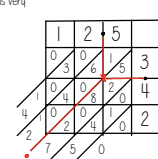
1258.963
+ 22.21

1281.173

Visual Prompt: 1258 + 22 = 1280, then 0.963 + 0.21 = 1.173

Multiplying Decimals

125×3.42



$= 427.5$

Related Calculations

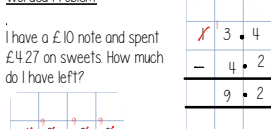
Example 1: If I know that $5 \times 2 = 10$, what is 0.5×2 ?

$5 \times 2 = 10$
 $0.5 \times 2 = 1$

Example 2: $19 \times 900 = 17100$
 $19 \times 90 = 1710$
 $19 \times 9 = 171$
 $19 \times 0.9 = 17.1$
 $19 \times 0.009 = 0.171$

Subtracting Decimals

Formal Written Method



9.26
- 4.27

4.99

Wording Problem: I have a £10 note and spent £4.27 on sweets. How much do I have left?

Method 1: $10 - 4.27 = 5.73$

Method 2: $10 - 4.27 = 5.73$

Dividing Decimals

The place holder is very important in division

All of these give the same solution:

$15 \div 0.05 \rightarrow 15 \div 0.5 \rightarrow 150 \div 5$

Method 1: $15 \div 0.05 = 300$

Method 2: $1500 \div 5 = 300$

EXAMPLES

Related calculations to $6 \times 8 = 48$

- Keep the values in proportion.
- If you are stuck with a division, write it as a fraction and simplify that

$0.6 \times 8 = 4.8$
 $0.6 \times 0.8 = 0.48$
 $48 \div 8 = 6$
 $4.8 \div 0.6 = 8$

Maths Knowledge Organiser

What do I need to be able to do?

- You should be able to:
- Find percentages of amounts
 - Increase or decrease by a percentage
 - Find percentage change
 - Find the original amount
 - Express one number as a fraction of another
 - Increase or decrease using multipliers
 - Work with simple interest
 - Work with compound interest

PERCENTAGES

Key Words

- Percent:** parts per hundred
- Simple Interest:** interest calculated as a percent of the original amount
- Compound Interest:** interest calculated on the amount borrowed plus the previous interest
- Multiplier:** the number that you are multiplying by
- Increase:** make bigger
- Decrease:** make smaller

What do I need to be able to do?

- You should be able to:
- Convert fluently between fractions, decimals and percentages
 - Order fractions, decimals and percentages
 - Know the key FDP equivalences

HIGHER TIER ONLY

- Convert recurring decimals into fractions

FDP EQUIVALENCE

Key Words

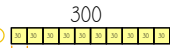
- Percent:** parts per hundred
- Fraction:** how many parts out of a whole
- Decimal:** a number with a decimal point used to separate ones, tenths, hundredths etc.
- Tenth:** one whole split into 10 parts
- Equivalent:** of equal value
- Recurring decimal:** a decimal number with a digit that repeats forever

Percentage of an Amount

Find 10% of 300

300 shared into 10 equal parts (300 ÷ 10)

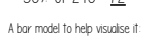
100% of 300 = 300
10% of 300 = 30



Find 30% of 240

100% of 240 = 240
10% of 240 = 24
30% of 240 = 72

A bar model to help visualise it



Find 81% of 480

100% of 480 = 480
10% of 480 = 48
1% of 480 = 48

100% of 480 = 480
10% of 480 = 48
80% of 480 = 384

80% + 1% = 81% so we need to add 1% (48)

81% of 480 = 388.8

24 x 3 = 72

Finding 10% of things is a good place to start

Percentage Increase/Decrease

An antique clock has increased in value by 12%. If its original price was £400, what is the new price?

Method 1

12% increase means we have 112% of the original price. So we are now finding 112% of £400

100% of £400 = £400
10% of £400 = £40
2% of £400 = £8

112% of £400 = £448

Method 2

We need to find 12% of £400

100% of £400 = £400
10% of £400 = £40
2% of £400 = £8

12% of £400 = £48

We are increasing by 12%, so adding 12% on £400 + £48 = £448

Helpful Percentages

It is helpful to remember the relationships between some percentages to help speed up the process!

50% is half of 100%. To find 50% of something, we can divide it by 2.

25% is a quarter of 100%. To find 25% of something, we can divide it by 4.

10% is one tenth of 100%. To find 10% of something, we can divide it by 10.

20% is one fifth of 100%. To find 20% of something, we can divide it by 5.

A useful one to remember: 12.5% is one eighth of 100% (as it is half of 25%)

Percentages to Decimals

Convert 37% to a decimal

Remember this means 37 out of 100 or 37 hundredths. If 1 hundredth is 0.01, 37 hundredths would be 0.37

12% = 0.12 123% = 1.23
85% = 0.85 0.1% = 0.001

Percentage → Decimal, -100

Percentages to Fractions

Convert 37% to a fraction

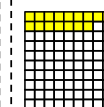
Remember this means 37 out of 100. We can write this as $\frac{37}{100}$ ← this is fully simplified

12% = $\frac{12}{100}$ = $\frac{3}{25}$ 123% = $\frac{123}{100}$ = $1\frac{23}{100}$
85% = $\frac{85}{100}$ = $\frac{17}{20}$

Percentage → Fraction, write over 100 and then simplify

Visual aids

Sometimes, it can be helpful to draw a diagram to help understand what is happening.



Here are 100 squares. I have 17 yellow squares.
The fraction of yellow squares is $\frac{17}{100}$
The percentage of yellow squares is 17%

Percentage Change

I bought a phone for £200. A year later it sold for £125. What was the % loss?

£200
£125

Amount lost £75

$\frac{75}{200} \times 100 = 37.5\%$

Difference in value x 100
Original value

I bought a house for £180,000. I sold it for £216,000. What was the % profit?

£180,000
£216,000

Profit £36,000

$\frac{36,000}{180,000} \times 100 = 20\%$

Expressing One Number as a Percentage of Another

Express 12 as a percentage of 20

$\frac{12}{20} = \frac{60}{100} = 60\%$

Equivalent fractions

37 out of 50 people in a class are Manchester United fans. What percentage of the class support Manchester United?

$\frac{37}{50} = \frac{74}{100} = 74\%$

Equivalent fractions

Multipliers

What multiplier would represent an increase of 15%?

What multiplier would represent a decrease of 15%?

We are finding 100% + 15%, so 115%.

We are finding 100% - 15%, so 85%.

As a decimal this is 1.15

As a decimal this is 0.85

Compound Interest

I put £1000 in a bank account. It earns compound interest of 10% per year. How much will be in the account after 5 years?

INTEREST: Compound interest means we work out the interest each year and the original amount plus any interest in the account.

- 10% of £1000 = £100
- So after year 1, the account will have £1100
- 10% of £1100 = £110
- So after year 2, the amount is £1210 etc.

If we are increasing by 10% each time, this is the same as finding 110% of the amount, or multiplying by 1.1 (see multipliers). So another way we can work this out is: £1000 x 1.1 x 1.1 x 1.1 x 1.1 x 1.1

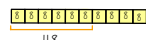
Or, £1000 x 1.1⁵ = £1610.51

Finding the Original

60% of a number is 48. What is the number?

60% of x = 48
10% of x = 8
100% of x = 80

A bar model to help visualise it.



48

As a quick sense check, our answer should be BIGGER than 48. Always make sure you look both at your answer and make sure it makes sense.

A pair of shoes are on sale for 87.5% off. The sale price is £4950, how much did they cost originally?

87.5% off means we are left with 12.5%. So 12.5% = £4950.

12.5% of x = £4950
25% of x = £990
100% of x = £3960

Simple Interest

I put £1000 in a bank account. It earns simple interest of 10% per year. How much will be in the account after 5 years?

INTEREST: Simple interest means we calculate the interest the initial amount we earn and add that amount on each year.

10% of £1000 = £100

So each year, the account will gain £100 interest.

£1000 + (£100 x 5) = £1500

Maths Knowledge Organiser

What do I need to be able to do?

You should be able to:

- Round numbers to an appropriate accuracy
- Truncate numbers to an appropriate accuracy
- Use inequality notation to identify the error interval due to rounding
- Estimate the value of a calculation

HIGHER TIER ONLY

- Find the greatest and least possible value of a calculation

ESTIMATION

Key Words

- **Significant Figure:** the digits in a number which are significant to the size of the number
- **Error Interval:** The range of values a number could have taken before rounding
- **Estimation:** finding a number close to the right answer
- **Lower Bound:** the smallest number that would round up to the estimated value
- **Upper Bound:** the smallest value that would round up to the next estimated value

Place Value



"Three million, two hundred and forty seven thousand, three hundred and fifty one point four five"

Round to Decimal Places

Method 1
Round 7.46582 to 1 dp
7.4 | 6582 | 75
Round 7.46582 to 2 dp
7.46 | 582 | 747

Method 2
Round 7.46582 to 1 dp
7.4 | 6582 | 75
Round 7.46582 to 2 dp
7.46 | 582 | 747

Truncation

Truncate 3.828 to 1 decimal place
3.8 | 28
Truncate 3.828 to 2 decimal places
3.82 | 8

Truncate 3.828 to 1 significant figure
3.828
Truncate 3.828 to 3 significant figures
3.828
Truncate 0.003728 to 3 significant figures
0.003728

Round to Powers of 10

2745 to the nearest 10: 2740 | 2745 | 2750
2745 to the nearest 100: 2700 | 2745 | 2800
2745 to the nearest 1000: 2000 | 2745 | 3000

Round to Significant Figures

Rounding to 1 significant figure (1 sf)
Round 1394 to 1 sf = 1000
Round 265 to 1 sf = 300
Round 32 to 1 sf = 30
Round 187 to 1 sf = 200
Round 0.439 to 1 sf = 0.4
Round 0.008722 to 1 sf = 0.009
Round 0.0005043 to 1 sf = 0.0005

Rounding to 2 significant figures (2 sf)
Round 1394 to 2 sf = 1400
Round 265 to 2 sf = 270
Round 32 to 2 sf = 32
Round 187 to 2 sf = 190
Round 0.439 to 2 sf = 0.44
Round 0.008722 to 2 sf = 0.0087
Round 0.0005043 to 2 sf = 0.00050

Error Intervals

A plant is 35cm tall, rounded to the nearest cm, what was the shortest and tallest height of the plant?
34.5cm < height < 35.5cm

A number was rounded to 3 decimal places to leave 0.673. What could the true value of the number be?
0.6725 < x < 0.6735

The speed of a train is 230 km/h truncated to 2 significant figures. What was the range for the true value of the speed?
230 < speed < 240

Estimating Calculations

Estimate the value of 28×48
If we round both to 1 sf, this gives:
 $30 \times 50 = 1500$
Therefore $28 \times 48 \approx 1500$

Estimate the value of $(5.3 - 12.09) \div 23.4$
We can approximate this sum to be $(6 - 12) \div 20 = 25$
Therefore, $(5.3 - 12.09) \div 23.4 \approx 25$

Estimate the value of 4.2×2.4
We can estimate that (4.2×2.4) is approximately equal to $4 \times 2 (8)$
Now to deal with $\sqrt{5}$ We know that 4 is a square number and it is close to 5 so we can say that $\sqrt{5}$ is approximately equal to $\sqrt{4} (2)$
The sum becomes $\frac{(4 \times 2) \times 2}{\sqrt{4}} = 32$
so $\frac{4.2 \times 2.4}{\sqrt{5}} \approx 32$

Using Error Intervals in Calculations

HIGHER TIER ONLY
A bag of peas has a mass of 700g (to the nearest 10g). Find the maximum mass of 5 bags of peas.
Maximum weight of one bag of peas:
690 | 700 | 710
695 | 705 | 705g
Therefore, the maximum weight of 5 bags of peas = $5 \times 705 = 3525g$

A = 30 (to the nearest whole number)
B = 115 (to the nearest 1 decimal place)
C = 300 (to the nearest 1 significant figure)
Error interval for A: $29.5 < A < 30.5$
Error interval for B: $114.5 < B < 115.5$
Error interval for C: $250 < C < 350$

Calculate the maximum value of A + B
UB of A + UB of B: $305 + 115.5 = 420.5$

Calculate the minimum value of A x C
LB of A x LB of C: $29.5 \times 250 = 7375$

Calculate the maximum value of C - B
UB of C - LB of B = $350 - 114.5 = 235.5$ (2dp)

What do I need to be able to do?

You should be able to:

- Recognise metric measures
- Convert metric measures
- Calculate with metric measures
- Convert between units of time
- Understand compound measures
- Work out compound units

Metric Units

Length
• Millimetres (mm)
• Centimetres (cm)
• Metres (m)
• Kilometres (km)

Mass
• Grams (g)
• Kilograms (kg)
• Tonnes (t)

Capacity
• Millilitre (ml)
• Litre (l)

Imperial Units

Length
1 inch \approx 2.5cm | 1 foot = 12 inches | 1 mile \approx 1.6km

Mass
1 ounce \approx 28g | 1 pound = 16 ounces | 1 stone = 14 pounds

Capacity
1 pint \approx 568ml | 1 gallon = 8 pints

1 inch = 2.54cm
1 foot = 30.48cm
1 mile = 1.609344km
1 ounce = 28.3495g
1 pound = 453.59237g
1 stone = 6.35029386kg
1 pint = 568.26125ml
1 gallon = 4.54609 litres

Time

Remember:
60 seconds = 1 minute
60 minutes = 1 hour
24 hours = 1 day
7 days = 1 week

1 hour = 60 minutes
1 minute = 60 seconds
1 day = 24 hours
1 week = 7 days

Example 1

Convert 34 days to hours
Step 1
1 day = 24 hours, so
3 days = 72 hours
Step 2
0.4 of a day, think of this as $\frac{1}{2}$ of a day = 12 hours
 $\frac{1}{4}$ of a day = 6 hours
So 34 days = 816 hours

Example 2

Reece finishes a sudoku puzzle in 354 seconds. Daniel takes 5 minutes and 20 seconds. Who finished the quickest, and by how long?
REECE - 354 seconds
60 seconds = 1 minute
300 seconds = 5 minutes
REECE - 5 mins 54 seconds
DANIEL finished 34 seconds quicker

UNIT CONVERSIONS

Key Words

- **Length:** the distance from one point to another
- **Mass:** a measure of how much matter is in an object
- **Capacity:** the amount an object can contain (usually liquids)
- **Volume:** the amount of 3-dimensional space an object takes up
- **Convert:** change a value or expression from one value to another
- **Unit:** any measurement that there is one of
- **Imperial:** a system of weights and measures originally developed in England
- **Metric:** a system of measuring that replaced the imperial system to fall in line with the rest of Europe
- **Compound Units:** units which require two types of measurement

Length

mm $\xrightarrow{\times 10}$ cm $\xrightarrow{\times 100}$ m $\xrightarrow{\times 1000}$ km
cm $\xrightarrow{\div 10}$ mm
m $\xrightarrow{\div 100}$ cm
km $\xrightarrow{\div 1000}$ m

10mm = 1cm
100cm = 1m
1000m = 1km

REMEMBER!
10mm = 1cm
100cm = 1m
1000m = 1km

Example 1: Convert 123m to mm
 $123m \times 100 = 12300mm$

Example 2: Convert 28400mm to km
 $28400mm \div 1000 = 28.4km$

Mass

g $\xrightarrow{\times 1000}$ kg $\xrightarrow{\times 1000}$ t
kg $\xrightarrow{\div 1000}$ g
t $\xrightarrow{\div 1000}$ kg

1000g = 1kg
1000kg = 1t

REMEMBER!
1000g = 1kg
1000kg = 1t

Example 1: Convert 1458t to g
 $1458t \times 1000 = 1458000g$

Example 2: Convert 15600t to kg
 $15600t \times 1000 = 15600000kg$

Example 3: One parcel weighs 280g. How much will 12 weigh? Leave your answer in kg.
 $280g \times 12 = 3360g = 3.36kg$

Volume

ml $\xrightarrow{\times 1000}$ l
l $\xrightarrow{\div 1000}$ ml

1000ml = 1L

REMEMBER!
1000ml = 1L

Example 1: Convert 5000ml to litres
5000ml = 5 litres

Example 2: Convert 1257l to ml
we multiply by 1000, so
 $1257l = 1257000ml$

Example 3: I need 1l of water. I can only buy 300ml bottles. How many bottles do I need to buy?
 $1000 \div 300 = 3.3333$
So we need to buy 3.3333 bottles. But we can't buy 0.3333 of a bottle so we need to buy 3.3333 bottles.

Compound Measures

Speed, Distance, Time
A car travels 200m in 30 minutes, calculate its speed in mph.
 $\frac{200m}{30 \text{ mins}} \times 60 = 400 \text{ mph}$

Density, Mass, Volume
Density is a way of looking at the amount of mass contained in a certain volume.
The standard units are kg/m^3 or g/cm^3 .
The density of air is $1.3kg/m^3$. Calculate the mass of a balloon which holds $0.0035m^3$ of air.
MASS = DENSITY X VOLUME
 $MASS = 1.3 \times 0.0035 = 0.00455kg$

Pressure, Force, Area
Pressure indicates the amount of force being exerted per unit area.
A box is placed on a table and exerts a force of 200N on an area of $40cm^2$. Find the pressure.
 $PRESSURE = \frac{FORCE}{AREA} = \frac{200}{40} = 5N/cm^2$

Maths Knowledge Organiser

What do I need to be able to do?

You should be able to :

- Write numbers in standard form
- Convert numbers written in standard form to ordinary numbers
- Order numbers in standard form
- Add/subtract numbers in standard form
- Multiply/divide numbers in standard form
- Use a calculator when working with standard form

STANDARD FORM

Key Words

Standard Form: a system of writing very big or small numbers

Commutative: changing the order of operations doesn't change the result

Base: the number that gets multiplied by a power

Power: the number of times the number is used in a multiplication

Index: power (see above)

Exponent: power (see above)

Negative: a value below zero

Converting ordinary numbers into standard form

Any integer $\times 10^n$
Any number between 1 and 10

Examples

700 = 7×10^2
must be between 1 and 10

12500 = 1.25×10^4
Remember a negative power doesn't make the answer negative, just close to 0

0.00034 = 3.4×10^{-4}

Converting standard form into ordinary numbers

Example 1
 $2 \times 10^3 = 2 \times 10 \times 10 \times 10 = 2000$

Example 2
 $4.12 \times 10^2 = 4.12 \times 10 \times 10 = 412$

Non-Examples

$12 \times 10^2 = 1200$
must be an integer

$184 \times 10 = 1840$
must be between 1 and 10

$64 \times 10^1 = 640$
must be a power of 10

Index Laws Recap

$10^3 = 10 \times 10 \times 10 = 1000$
Each time I add one to the power, I multiply by 10

$10^2 = 10 \times 10 = 100$
Each time I take one from the power, I divide by 10

$10^1 = 10$
Therefore, 10 to the power of 0 is 1. Remember anything to the power of 0 is 1

$10^0 = 1$
If we carry this on, we can even say what 10 to the power of a negative number is!

$10^{-1} = \frac{1}{10}$
We can even say that 10 to the power of -2 is the same as 1 over 10 squared

$10^{-2} = \frac{1}{100} = \frac{1}{10^2}$

$10^{-3} = \frac{1}{1000} = \frac{1}{10^3}$

Ordering Numbers in Standard Form

10^4	10^3	10^2	10^1	10^0	10^{-1}	10^{-2}	10^{-3}
3.1×10^2	4.12×10^4	2×10^{-2}	3281×10^3	2.4×10^{-2}			
310	41200	0.02	3281	0.024			
2×10^{-2}	2.4×10^{-2}	3.1×10^{-2}	3.281×10^{-3}	4.12×10^{-4}			

Adding and Subtracting Numbers in Standard Form

$(2.1 \times 10^6) + (3.3 \times 10^3)$
 Footproof method convert both numbers to ordinary numbers and then add

$(2.1 \times 10^6) + (3.3 \times 10^3)$
 $2,100,000 + 3300$
 $= 2,103,300$
 $= 2.1033 \times 10^6$
You should leave your answer in the form given in the question

$(7.32 \times 10^1) - (2.8 \times 10^3)$
 $0.732 - 0.0028$
 $= 0.7292$
 $= 7.292 \times 10^{-1}$
Remember, the best way to work out a subtraction is with column method

Multiplying and Dividing Numbers in Standard Form

$(2.1 \times 10^6) \times (3.3 \times 10^3)$
 In multiplication and division problems, you can multiply the A values and the look at the powers of 10

$2.1 \times 3.3 \times 10^6 \times 10^3$
 $= 6.93 \times 10^9 \times 10^3$
 $= 6.93 \times 10^{12}$
Remember $a^x \times a^y = a^{x+y}$

$(2.8 \times 10^5) \div (7 \times 10^3)$
 $\frac{2.8 \times 10^5}{7 \times 10^3} = \frac{0.4 \times 10^5}{10^3} = 0.4 \times 10^2$
 $= 40$
BUT, 0.4×10^2 is not in standard form, as A is not a number between 1 and 10! So, $0.4 \times 10^2 = 40 = 4 \times 10^1$

Using a Calculator

If we need to write 1.3×10^3 in our calculator,

Input 1.3 and then press You're going to need this button here!

Then press 3 for the power.

Your calculator will often give you the solution to your sum, if it is suitably big/small, in standard form.

MFL Knowledge Organiser - French

Tu es comment? • What do you look like?

J'ai les cheveux ...	I have ... hair:
blonds.	blond
noirs.	black
bruns.	brown
roux.	red
J'ai les yeux ...	I have ... eyes:
bleus.	blue
marron.	brown
gris.	grey
verts.	green
Je suis beau/belle.	I am good-looking/ beautiful

Mon caractère • My personality

Je suis ...	I am ...
drôle.	funny.
gentil(le).	kind.
intelligent(e).	intelligent.
lunatique.	moody.
sportif/sportive.	sporty.
timide.	shy.

Qu'est-ce que tu fais • What do you do on Facebook?

Je poste des messages à mes copains.	I post messages to my friends.
Je modifie mes préférences.	I update my likes.
Je regarde les photos de mes copains.	I look at my friends' photos.
Je commente des photos.	I comment on photos.
J'invite mes copains à sortir.	I invite my friends out.
Je fais des quiz.	I do quizzes.

La fréquence • Frequency

quelquefois	sometimes
souvent	often
tous les jours	every day
tous les soirs	every evening
tous les weekends	every weekend
une fois/deux fois par semaine	once/twice a week

Les invitations et les réactions • Invitations and reactions

Tu veux aller ... au cinéma /à la piscine?	Do you want to go ... to the cinema/ swimming pool?
ce matin	this morning
cet après-midi	this afternoon
ce soir	this evening
demain (matin)	tomorrow (morning)
samedi (après-midi/soir)	Saturday (afternoon/ evening)
Oui, je veux bien.	Yes, I'd like to.
D'accord.	OK.
Génial!	Great!
Pourquoi pas?	Why not?
Non, merci.	No thanks.
Tu rigoles!	You're joking!
J'ai horreur de ça!	I hate that!
Désolé(e), je ne peux pas.	Sorry, I can't.

Qu'est-ce que tu as fait samedi? • What did you do on Saturday?

J'ai dansé avec ...	I danced with ...
J'ai joué au bowling avec ...	I went bowling with ...
J'ai mangé un hamburger avec ...	I ate a hamburger with ...
J'ai regardé un DVD avec ...	I watched a DVD with ...
Je suis allé(e) au cinéma avec ...	I went to the cinema with ...
Je suis allé(e) en ville avec ...	I went into town with ...
Je suis allé(e) à une fête avec ...	I went to a party with ...
C'était ... génial.	It was ... great.
romantique.	romantic.
sympa.	nice.
ennuyeux.	boring.
nul.	rubbish.
un désastre.	a disaster.

Où vas-tu le weekend? • Where do you go at the weekend?

Je vais ...	I go ...
au centre commercial.	to the shopping centre.
au centre de loisirs.	to the leisure centre.
au cinéma.	to the cinema.
au fastfood.	to the fast-food restaurant.
à la patinoire.	to the ice rink.
à la piscine.	to the swimming pool.

Au festival de • At the music festival musique

On a écouté toutes sortes de musiques.	We listened to all sorts of music.
On a chanté.	We sang.
On a dansé toute la soirée.	We danced all night.
On a mangé de la pizza.	We ate pizza.
On a regardé le concert sur des écrans géants.	We watched the concert on giant screens.
On a bien rigolé.	We had a good laugh.

Stratégie 1
Endings, not beginnings
When you want to work out what a verb means, look at the end of the word as well as the beginning.

regarder to watch (the infinitive)
regarde watch/watching (present tense)
regardé watched (past participle)

KNOWLEDGE ORGANISER

Module 1
Ma vie sociale
d'ado

Les mots essentiels • High-frequency words

oui	yes
non	no
j'ai	I have
je suis	I am
et	and
mais	but
ou	or
aussi	also
très	very
assez	quite
un peu	a bit
avec	with
qu'est-ce que?	what?
pourquoi?	why?
parce que	because
ce/cet	this
merci	thank you

MFL Knowledge Organiser - French

Les parties du corps • Parts of the body

la bouche	mouth
le bras	arm
le corps	body
le dos	back
l'épaule	shoulder
les fesses	buttocks
le front	forehead
le genou	knee
la jambe	leg
la main	hand
le nez	nose
l'œil	eye
les oreilles	ears
le pied	foot
la tête	head
le visage	face
les yeux	eyes

Manger sain • Healthy eating

les boissons gazeuses	fizzy drinks
les céréales	cereals
les chips	crisps
l'eau	water
les fruits	fruit
les légumes	vegetables
les œufs	eggs
le pain	bread
le poisson	fish
les produits laitiers	dairy products
les sucreries	sweet things
la viande	meat
Je mange sain.	I eat healthily.
Je ne mange pas sain.	I don't eat healthily.
Je mange des ...	I eat ...
Je ne mange pas de ...	I don't eat ...
Je ne mange jamais de ...	I never eat ...

Le sport et le fitness • Sport and fitness

Pour être un bon sportif, ...	In order to be a good sportsperson, ...
Il faut ...	You must ...
avoir un bon programme d'entraînement.	have a good training programme.
bien manger.	eat well.
bien dormir.	sleep well.
être motivé.	be motivated.
aimer la compétition.	like competition.

Je vais changer • I am going to change my life

Je vais faire du sport régulièrement.	I am going to do sport regularly.
Je vais manger sain.	I am going to eat healthily.
Je vais prendre des cours d'arts martiaux.	I am going to take martial-arts classes.
Je vais aller au collège à pied.	I am going to walk to school.
Je vais faire trente minutes d'exercice par jour.	I am going to do thirty minutes' exercise per day.
Je vais aller au collège à vélo.	I am going to go to school by bike.

On joue au paintball • We go paintballing

Où est-ce que tu es touché(e)?	Where have you been hit?
blessé(e)	injured
gagner	to win
éliminé(e)	eliminated
le membre	member
le matériel	materials
le fairplay	fairplay

Tu aimes le sport? • Do you like sport?

J'aime ...	I like ...
Je n'aime pas ...	I don't like ...
jouer dans une équipe	to play in a team
Ça booste le moral.	That boosts morale.
C'est fatigant.	It's tiring.
C'est ennuyeux.	It's boring.

La routine • Routine

l'entraînement	training
faire de l'activité physique	to do physical activity
jouer un match	to play a match
travailler avec son coach	to work with your coach

Les mots essentiels • High-frequency words

à l'avenir	in the future
alors	so
c'est	it is
ce sont	they are
d'abord	first
deux fois par semaine	twice a week
en général	in general
en plus	as well as that
ensuite	then
finalement	finally
où	where
parce que	because
quand	when
tous les jours	every day
très	very
Voilà!	That's that!/ Here you are!/ There you go!

Les opinions • Opinions

Je pense que ...	I think that ...
Je suis d'accord avec ...	I agree with ...
Je ne suis pas d'accord avec ...	I don't agree with ...
À mon avis, ...	In my opinion, ...

La forme • Fitness

actif/active	active
Ça ne m'intéresse pas.	That doesn't interest me
J'ai un problème.	I have a problem.
Je joue à des jeux vidéo.	I play video games.

Module 2 Bien dans sa peau

KNOWLEDGE ORGANISER

MFL Knowledge Organiser - French

Mon avenir • My future

Dans deux/quatre ans, ...	In two/four years ...
Un jour, ...	One day, ...
Je vais ...	I am going to ...
aller au lycée	go to sixth-form college
avoir un emploi bien payé	have a well-paid job
faire un apprentissage	do an apprenticeship
faire des études à la fac	study at university
quitter le collège	leave secondary school
travailler	work
voyager	travel

Parler une autre langue • Speaking another language

Avec les langues, on peut ...	With languages, you can ...
comprendre les gens	understand people
habiter à l'étranger	live abroad
travailler dans un autre pays	work in another country
communiquer avec les jeunes de son âge	communicate with young people your own age
regarder la télévision	watch television
écouter de la musique	listen to music
dans une autre langue	in another language
À mon avis, parler une autre langue, c'est ...	In my opinion, speaking another language is ...
un avantage	an advantage
important	important
un plus	a bonus
parce que ...	because ...

Travailler • Working

le boulot	job (informal)
l'emploi	job (more formal)
le travail	work
le job	job

Du matin au soir • From morning till night

d'abord	first
ensuite	next
l'après-midi	in the afternoon
le lendemain	the next day
le matin	in the morning
puis	then
tous les jours	every day
très tôt	very early

J'aime mon job parce que c'est ... • I like my job because it's ...

créatif	creative
intéressant	interesting
motivant	motivating
stimulant	stimulating
varié	varied

Mon boulot • My job

Qu'est-ce que tu fais comme travail?	What kind of work do you do?
Quelles sont tes responsabilités?	What are your responsibilities?
Tu travailles seul(e) ou avec d'autres personnes?	Do you work alone or with other people?
Est-ce que tu aimes ton boulot?	Do you like your job?
acheter	to buy
contacter	to contact
créer	to create
inventer	to invent
organiser	to organise
répondre au téléphone	to answer the telephone
travailler en équipe	to work in a team
trouver	to find

The near future tense

To talk about the future, use the near future tense: *aller* + the infinitive (going to).

Je vais travailler.	I am going to work.
Tu vas faire un apprentissage.	You are going to do an apprenticeship.
Il/Elle va voyager.	He/She is going to travel.
On va aller à la piscine.	We are going to go to the swimming pool.

Mes ambitions • My ambitions

Qu'est-ce que tu voudrais faire plus tard?	What would you like to do later on?
Je voudrais être ...	I would like to be a(n) ...
acteur/actrice	actor
chanteur/chanteuse	singer
chauffeur de taxi/camion	taxi/lorry driver
contrôleur aérien	air-traffic controller
designer de chaussures	shoe designer
directeur/directrice de magasin	store manager
footballeur	footballer
guide touristique	tourist guide
ingénieur	engineer
journaliste	journalist
pâtissier/pâtissière	pastry chef
pilote	pilot
professeur	teacher
réceptionniste	receptionist
serveur/serveuse	waiter/waitress
secrétaire	secretary
vétérinaire	vet
webdesigner	web designer

Les opinions • Opinions

Ce serait ...	It would be ...
cool/ennuyeux	cool/boring
génial/intéressant	great/interesting
Ça ne m'intéresse pas.	That doesn't interest me.
Non, merci!	No thanks.
Jamais de la vie!	No way!

je vais	aller au lycée
tu vas	avoir un emploi bien payé
il va	faire un apprentissage
elle va	faire des études à la fac
on va	travailler
	voyager

Module 3 – À l'horizon Knowledge Organiser

Some common irregular verbs

je fais	I do/make
tu fais	you do/make
il/elle fait	he/she does/makes
on fait	we do/make

je prends	I take
tu prends	you take
il/elle prend	he/she takes
on prend	we take

je vais	I go
tu vas	you go
il/elle va	he/she goes
on va	we go

MFL Knowledge Organiser - French

Module 4 – Spécial Vacances Knowledge Organiser

Les vacances • Holidays

Je passe mes vacances ...	<i>I spend my holidays ...</i>
au bord de la mer	<i>at the seaside</i>
à la campagne	<i>in the countryside</i>
à la montagne	<i>in the mountains</i>
en colo	<i>at a holiday camp</i>
Je vais en vacances ...	<i>I go on holiday ...</i>
avec ma famille	<i>with my family</i>
avec mes parents	<i>with my parents</i>
avec mes copains	<i>with my friends</i>
Je reste ...	<i>I stay ...</i>
une semaine	<i>one week</i>
quinze jours	<i>a fortnight</i>
dix jours	<i>ten days</i>

Les activités de vacances • Holiday activities

Je fais ...	<i>I do/I go ...</i>
du canoë-kayak	<i>canoeing</i>
du ski	<i>skiing</i>
du snowboard	<i>snowboarding</i>
du VTT	<i>mountain biking</i>
de la voile	<i>sailing</i>
de la planche à voile	<i>windsurfing</i>
de l'équitation	<i>horse riding</i>

Les affaires de vacances • Holiday items

un chargeur (pour mon mp3/ma PlayStation Portable)	<i>a charger (for my mp3/ my portable PlayStation)</i>
un portable	<i>a mobile phone</i>
un tuba	<i>a snorkel</i>
une bombe anti-insectes	<i>an insect-repellent spray</i>
du gel coiffant	<i>hair gel</i>
de la crème solaire	<i>sun cream</i>
des lunettes de plongée	<i>swimming goggles</i>
des palmes	<i>flippers</i>
des tongs	<i>flip-flops</i>

À la base de loisirs • At the leisure park

J'ai ...	<i>I ...</i>
Il/Elle a ...	<i>He/She ...</i>
fait du tir à l'arc	<i>did archery</i>
fait du trampoline	<i>did trampolining</i>
fait de l'escalade	<i>went climbing</i>
Je suis ...	<i>I ...</i>
Il/Elle est ...	<i>He/She ...</i>
allé(e) à la pêche	<i>went fishing</i>

Les verbes pronominaux • Reflexive verbs

Je me baigne.	<i>I swim.</i>
Je me coiffe.	<i>I do my hair.</i>
Je me douche.	<i>I have a shower.</i>
Je me fais bronzer.	<i>I sunbathe.</i>
Je me fais piquer.	<i>I get stung.</i>
Je m'ennuie.	<i>I get bored.</i>

Des vacances désastreuses • Disastrous holidays

J'ai oublié mon passeport.	<i>I forgot my passport.</i>
J'ai perdu mon portemonnaie.	<i>I lost my purse.</i>
J'ai cassé mon appareil photo.	<i>I broke my camera.</i>
J'ai pris un coup de soleil.	<i>I got sunburnt.</i>
J'ai mangé quelque chose de mauvais.	<i>I ate something bad.</i>
On a raté l'avion.	<i>We missed the plane.</i>
Aïe!	<i>Oh, no!/Ouch!</i>
Mince!	<i>Damn!</i>
Oh là là!	<i>Oh, dear!</i>
C'est pas possible!	<i>No way!</i>
Quel désastre!	<i>What a disaster!</i>

Mes rêves • My dreams

Un jour, je voudrais ...	<i>One day, I would like to ...</i>
aller au pôle Nord	<i>go to the North Pole</i>
descendre l'Amazone en canoë	<i>go down the Amazon in a canoe</i>
faire de la plongée sous-marine	<i>go scuba diving</i>
faire des sports extrêmes	<i>do some extreme sports</i>
faire un safari en Afrique	<i>go on safari in Africa</i>
habiter sur une île déserte	<i>live on a desert island</i>

Les réactions • Reactions

Ouais! Cool!	<i>Yeah! Cool!</i>
Bonne idée!	<i>Good idea!</i>
Pourquoi pas?	<i>Why not?</i>
Quelle horreur!	<i>How horrible!</i>
Tu rigoles!	<i>You must be joking!</i>
Ce n'est pas mon truc.	<i>It's not my kind of thing.</i>

Les mots essentiels • High-frequency words

où?	<i>where?</i>
avec qui?	<i>who with?</i>
combien de?	<i>how much?/how many?</i>
que?	} <i>what?</i>
qu'est-ce que?	
normalement	<i>usually, normally</i>
quel/quelle	<i>which/what (a)</i>
alors	} <i>so/therefore</i>
donc	
quand	<i>when</i>
mon/ma/mes	<i>my</i>
ton/ta/tes	<i>your</i>
son/sa/ses	<i>his/her</i>
d'abord	<i>first of all</i>
ensuite	<i>then/next</i>
puis	<i>then</i>
après	<i>afterwards</i>
finalement	<i>finally</i>

MFL Knowledge Organiser - French

Mes droits • My rights

J'ai le droit ...	<i>I have the right/I am allowed ...</i>
Je n'ai pas le droit ...	<i>I don't have the right/I am not allowed ...</i>
d'aller au MacDo avec mes copains.	<i>to go to McDonald's with my friends.</i>
d'aller sur des forums.	<i>to go on forums.</i>
d'aller sur Facebook.	<i>to go on Facebook.</i>
de jouer à des jeux vidéo le soir.	<i>to play video games in the evening.</i>
de regarder la télé dans ma chambre.	<i>to watch TV in my bedroom.</i>
de sortir avec mes copains le weekend.	<i>to go out with my friends at the weekend.</i>
de sortir seul(e).	<i>to go out by myself.</i>
de surfer sur Internet une heure par jour.	<i>to surf the internet for one hour a day.</i>

Les achats • Shopping

J'achète ...	<i>I buy ...</i>
J'ai acheté ...	<i>I bought ...</i>
Je vais acheter ...	<i>I'm going to buy ...</i>
des jeux vidéo et des DVD.	<i>video games and DVDs.</i>
des vêtements ou des chaussures.	<i>clothes or shoes.</i>
des produits du commerce équitable.	<i>fair-trade products.</i>
des produits d'occasion.	<i>second-hand products.</i>
des produits écolos.	<i>'green' products.</i>
des produits que j'aime.	<i>products that I like.</i>

Mes priorités • My priorities

Mes priorités sont ...	<i>My priorities are ...</i>
le foot.	<i>football.</i>
la musique.	<i>music.</i>
la santé.	<i>health.</i>
l'argent.	<i>money.</i>
mon chien.	<i>my dog.</i>
ma famille.	<i>my family.</i>
mes amis.	<i>my friends.</i>
mes études.	<i>my studies/schoolwork.</i>

Quand? • When?

en général	<i>generally, usually</i>
hier	<i>yesterday</i>
le weekend dernier	<i>last weekend</i>
la semaine dernière	<i>last week</i>
demain	<i>tomorrow</i>
le weekend prochain	<i>next weekend</i>
la semaine prochaine	<i>next week</i>

Le bonheur • Happiness

Pour moi, le bonheur, c'est ...	<i>For me, happiness is ...</i>
d'aller à la pêche.	<i>going fishing.</i>
d'être avec mon chien.	<i>being with my dog.</i>
d'être en famille.	<i>being with my family.</i>
de danser.	<i>dancing.</i>
de faire les magasins.	<i>going shopping.</i>
de jouer au foot.	<i>playing football.</i>
de manger de la pizza.	<i>eating pizza.</i>
de partir en vacances.	<i>going on holiday.</i>
de retrouver mes copains.	<i>meeting up with my friends.</i>

Je n'aime pas du tout ... *I really dislike ...*

le racisme.	<i>racism.</i>
la cruauté envers les animaux.	<i>cruelty to animals.</i>
la pauvreté dans le monde.	<i>poverty in the world.</i>
la violence.	<i>violence.</i>
l'état de la planète.	<i>the state of the planet.</i>

Module 5 Moi dans le monde

KNOWLEDGE ORGANISER

Studio Grammaire

The infinitive of a verb often means '-ing'.

To use *c'est* followed by an infinitive, put *de* between the two of them.

Pour moi, le bonheur, c'est de jouer au foot. For me, happiness is **playing** football.

de shortens to *d'* if the infinitive starts with a vowel.

Pour moi, le bonheur, c'est d'être en famille. For me, happiness is **being** with my family.

	masculine	feminine	plural
my	mon père	ma mère	mes parents
your	ton père	ta mère	tes parents
his/her	son père	sa mère	ses parents

Les mots essentiels • High-frequency words

à mon avis	<i>in my opinion</i>
avec	<i>with</i>
c'est	<i>it is</i>
d'abord	<i>first of all</i>
j'ai	<i>I have/I've got</i>
mon/ma/mes	<i>my</i>
parce que	<i>because</i>
pour moi	<i>for me</i>
pour toi	<i>for you</i>
puis	<i>then</i>
quelquefois	<i>sometimes</i>
souvent	<i>often</i>

Faire des achats • Shopping

le produit	<i>product</i>
l'ouvrier/l'ouvrière	<i>worker</i>
l'éthique sur l'étiquette	<i>ethical labelling</i>
écoco	<i>green</i>
les conditions de travail	<i>working conditions</i>
le commerce équitable	<i>fair trade</i>
bon marché	<i>cheap</i>

MFL Knowledge Organiser - Spanish

Cartelera de cine		What's on at the cinema	
¿Qué tipo de película es?	What type of film is it?	una película de ciencia ficción	a science-fiction film
Es...	It is...	una película de fantasía	a fantasy film
una comedia	a comedy	una película de superhéroes	a superhero film
una película de acción	an action film	una película de terror	a horror film
una película de animación	an animated film		
una película de aventuras	an adventure film		

Mañana	voy a	bailar	natación.
Esta tarde	vas a	ser	una tarta.
El fin de semana que viene	va a	ir	genial.
En dos años	vamos a	estudiar	Zumba®.
En julio	vais a	comer	ciencias.
En el futuro	van a	hacer	a un parque acuático.

Opiniones		Opinions	
¿Qué cosas te gustan?	What things do you like?	el dibujo	drawing
¿Qué cosas te encantan / te chiflan?	What things do you love?	el fútbol	football
¿Qué cosas no te gustan (nada)?	What things do you not like (at all)?	el racismo	racism
Me gusta(n) (mucho)...	I like... (a lot).	la música	music
Me encanta(n) / Me chifla(n)...	I love...	la tele	TV
No me gusta(n) (nada)...	I don't like... (at all).	la violencia	violence
el deporte	sport	los animales	animals
		los deberes	homework
		los insectos	insects
		los videojuegos	video games
		las artes marciales	martial arts

¿Cuándo vas a celebrar tu cumpleaños?		When are you going to celebrate your birthday?	
mañana	tomorrow	el mes que viene	next month
la semana que viene	next week	el nueve de febrero	on the ninth of February
el fin de semana que viene	next weekend		

Expresiones de frecuencia		Expressions of frequency	
una vez a la semana	once a week	siempre	always
dos veces a la semana	twice a week	(casi) todos los días	(almost) every day
a veces	sometimes	todos los fines de semana	every weekend
a menudo	often		



¿Qué tipo de películas te gustan?		What type of films do you like?	
Me encantan las comedias.	I love comedies.	Mi película favorita es...	My favourite film is...
Me chiflan las películas de ciencia ficción.	I love science-fiction films.	Mi actor favorito es...	My favourite actor is...
No me gustan las películas de terror.	I don't like horror films.	Mi actriz favorita es...	My favourite actress is...

¿Cómo vas a celebrar?		How are you going to celebrate?	
Voy a hacer karting.	I am going to do go-karting.	Voy a sacar muchas fotos.	I am going to take lots of photos.
Voy a ir a la bolera.	I am going to go bowling.	Vamos a montar en una montaña rusa.	We are going to ride a roller coaster.
Voy a ir a un parque de atracciones.	I am going to go to a theme park.	Vamos a ver películas de terror.	We are going to watch horror films.
Voy a jugar al paintball.	I am going to play paintball.	¡Va a ser genial!	It's going to be great!
Voy a pasar la noche en casa con mis amigos/as.	I am going to have a sleepover at home with my friends.		

Palabras muy frecuentes		High-frequency words	
casi	nearly, almost	o	or
primero	first	y	and
luego	then	pero	but
después	afterwards	también	also
más tarde	later	por supuesto	of course

Using different tenses

Use the **present tense** to describe something that you **are doing** now or that you regularly **do**.

Use the **near future tense** to talk about what you **are going to do**.

Bailo salsa una vez a la semana. I dance salsa once a week.

Mañana **voy a bailar** flamenco. Tomorrow I am going to dance flamenco.

¿Vas a menudo al cine?		Do you often go to the cinema?	
Voy una vez al mes.	I go once a month.	Voy los sábados por la mañana.	I go on Saturday mornings.
Voy dos veces al mes.	I go twice a month.		
Voy los domingos por la tarde.	I go on Sunday afternoons / evenings.		

The present tense

There are three groups of regular verbs in Spanish; **-ar**, **-er** and **-ir**. Remember to replace the infinitive ending with the endings shown in bold to form the present tense.

bailar	to dance	comer	to eat	escribir	to write
bailo	I dance	como	I eat	escribo	I write
bailas	you dance	comes	you eat	escribes	you write
baila	he/she dances	come	he/she eats	escribe	he/she writes
bailamos	we dance	comemos	we eat	escribimos	we write
bailáis	you (plural) dance	coméis	you (plural) eat	escribís	you (plural) write
bailan	they dance	comen	they eat	escriben	they write

MFL Knowledge Organiser - Spanish

¿En qué trabajas? What's your job?			
Soy...	I am...	jardinero/a	a gardener
camarero/a	a waiter	limpiador(a)	a cleaner
cocinero/a	a cook	peluquero/a	a hairdresser
dependiente/a	a shop assistant	repcionista	a receptionist

¿Qué te gustaría hacer? What would you like to do?			
Me gustaría...	I would like...	Por eso me gustaría ser...	Therefore I would like to be...
No me gustaría (nada)...	I wouldn't like... (at all)	cantante	a singer
trabajar al aire libre	to work in the open air	diseñador(a)	a designer
trabajar con animales	to work with animals	enfermero/a	a nurse
trabajar con niños	to work with children	mecánico/a	a mechanic
trabajar en equipo	to work in a team	periodista	a journalist
trabajar en una oficina	to work in an office	policia	a police officer
trabajar solo/a	to work alone	profesor(a)	a teacher
hacer un trabajo creativo	to do a creative job	veterinario/a	a vet
hacer un trabajo manual	to do a manual job		

¿Qué tienes que hacer? What do you have to do?			
Tengo que...	I have to...	limpiar habitaciones	clean rooms
ayudar a los clientes	help customers	preparar comida	prepare food
cutar el pelo a los clientes	cut customers' hair	servir en el restaurante	serve in the restaurant
hablar por teléfono	talk on the phone	vender productos en la tienda	sell products in the shop



¿Cómo es un día típico? What is a typical day like?			
Escribo correos (electrónicos).	I write emails.	Los idiomas son importantes.	Languages are important.
Hago reservas.	I make reservations.	¿Te gusta tu trabajo?	Do you like your job?
Hago entrevistas.	I do interviews.	Me encanta mi trabajo porque...	I love my job because...
Organizo excursiones.	I organise excursions.	es muy práctico	it's very practical
Preparo el programa.	I prepare the programme.	es muy variado	it's very varied
Salgo con los grupos.	I go out with the groups.	Ayer...	Yesterday...
Trabajo con mi equipo.	I work with my team.	conocí a...	I met...
Viajo mucho.	I travel a lot.	fui a...	I went to...
Voy a la oficina.	I go to the office.	hablé con...	I spoke to...
¿Qué idiomas hablas?	What languages do you speak?	organicé una visita para...	I organised a visit for...
Hablo español, inglés y alemán.	I speak Spanish, English and German.	preparé un programa especial	I prepared a special programme
		viajé en helicóptero	I travelled by helicopter

Palabras muy frecuentes High-frequency words			
creo que...	I think / believe that...	un poco	a bit
mi/mis	my	¿qué?	what?
tu/tus	your	¿por qué?	why?
bastante	quite	porque	because
muy	very	por eso	so / therefore

¿Qué tal ayer en el trabajo? How did you get on at work yesterday?			
Por la mañana...	In the morning...	escribí SMS a mis amigos	I wrote text messages to my friends
Por la tarde...	In the afternoon...	hablé por Skype™	I talked on Skype™
A la hora de comer...	At lunchtime...	jugué a un videojuego	I played a video game
bebí una botella de cola	I drank a bottle of cola	llegué tarde al trabajo	I arrived late for work
comí una hamburguesa	I ate a hamburger	perdí mi trabajo	I lost my job
dormí un poco	I slept for a bit		
escuché música	I listened to music		

Opiniones Opinions			
¿Te gusta tu trabajo?	Do you like your job?	monótono	monotonous
(No) Me gusta (nada) mi trabajo porque es...	I (don't) like my job (at all) because it is...	repetitivo	repetitive
creativo	creative	Mi jefe/a es severo/a.	My boss is strict.
estresante	stressful	Los clientes (no) son simpáticos.	The customers are (not) nice.
fácil	easy	Los clientes son horrosos.	The customers are awful.
interesante	interesting		

Adjectives describe nouns. Adjective endings change according to whether the noun is masculine or feminine and singular or plural. There are different patterns of agreement, as follows:

	singular		plural	
	masculine	feminine	masculine	feminine
ending in -o	creativo	creativa	creativos	creativas
ending in -e	sociable	sociable	sociables	sociables
ending in a consonant	fácil	fácil	fáciles	fáciles
ending in -dor	trabajador	trabajadora	trabajadores	trabajadoras

¿Qué tipo de persona eres? What type of person are you?			
En mi opinión, soy...	In my opinion, I am...	organizado/a	organised
Creo que soy...	I believe I am...	paciente	patient
muy / bastante...	very / quite...	práctico/a	practical
ambicioso/a	ambitious	responsable	responsible
hablador(a)	talkative	sociable	sociable
independiente	independent	trabajador(a)	hard-working
inteligente	intelligent		

MFL Knowledge Organiser - Spanish

¿Qué te duele? What hurts (you)?			
Me duele el brazo.	My arm hurts.	Me duele la garganta.	My throat hurts.
Me duele el estómago.	My stomach hurts.	Me duele la pierna.	My leg hurts.
Me duele el pie.	My foot hurts.	Me duelen los dientes.	My teeth hurt.
Me duele la cabeza.	My head hurts.	Me duelen los oídos.	My ears hurt.
Me duele la espalda.	My back hurts.	Me duelen los ojos.	My eyes hurt.

¿Llevas una dieta sana? Do you have a healthy diet?			
Llevo una dieta (bastante) sana.	I have (quite) a healthy diet.	¿Qué bebes?	What do you drink?
¿Qué comes?	What do you eat?	Bebo...	I drink...
Como...	I eat...	agua	water
caramelos	sweets	café	coffee
fruta	fruit	leche	milk
galletas	biscuits	todos los días	every day
pan	bread	a menudo	often
pescado	fish	a veces	sometimes
pasta	pasta	tres veces al día	three times a day
pasteles	cakes	una vez a la semana	once a week
verduras	vegetables	Nunca como pescado.	I never eat fish.
		No bebo nada.	I don't drink anything.

¿Qué haces para estar en forma? What do you do to keep fit?			
Juego al baloncesto.	I play basketball.	Hago baile.	I do dance.
Juego al fútbol.	I play football.	Hago footing.	I go jogging.
Juego a la pelota vasca.	I play pelota (Basque ball game).	Hago gimnasia.	I do gymnastics.
Juego al rugby.	I play rugby.	Hago natación.	I go swimming.
Juego al tenis.	I play tennis.	Juego al rugby los martes.	I play rugby on Tuesdays.
Hago artes marciales.	I do martial arts.	Hago gimnasia dos veces a la semana.	I do gymnastics twice a week.
Hago atletismo.	I do athletics.		

¿Qué deporte prefieres? Which sport do you prefer?			
Prefiero jugar al baloncesto.	I prefer to play basketball.	Prefiero los deportes de equipo.	I prefer team sports.
Prefiero hacer baile.	I prefer to do dance.	Prefiero los deportes individuales.	I prefer individual sports.
Prefiero hacer natación.	I prefer to go swimming.	Es mi deporte favorito.	It is my favourite sport.

Describe tu rutina diaria Describe your daily routine			
Me despierto.	I wake up.	Voy a la piscina.	I go to the swimming pool.
Me levanto (enseguida).	I get up (straight away).	Voy al trabajo.	I go to work.
Me lavo los dientes.	I brush my teeth.	Voy al gimnasio.	I go to the gym.
Me ducho.	I shower.	Entreno.	I exercise / train.
Me visto.	I get dressed.	a las seis	at six o'clock
Me acuesto.	I go to bed.	a las siete y cuarto	at quarter past seven
Desayuno.	I have breakfast.	a las nueve y media	at half past nine
Ceno.	I have dinner.	a las diez menos cuarto	at quarter to ten

¿Por qué (no) comes...? Why do you (not) eat...?

Es sano / sana. It's healthy.
Son sanos / sanas. They are healthy.
Es rico / rica. It's delicious.
Es riquísimo / riquísima. It's delicious.
Es saludable / saludable. It's healthy.
Es delicioso / deliciosa. It's delicious.
Es riquísimo / riquísima. It's delicious.

Soy vegetariano / vegetariana. I am a vegetarian.
Soy vegano / vegana. I am a vegan.
Soy alérgico / alérgica. I am allergic.
Soy musulmán / musulmana. I am a Muslim.

¿Qué tal estás? How are you?			
Estoy cansado / cansada.	I am tired.	Tengo catarro.	I have a cold.
Estoy enfermo / enferma.	I am ill.	Tengo tos.	I have a cough.

Consejos para estar en forma Advice for keeping fit / in shape			
Para estar en forma...	To keep fit / in shape...	beber alcohol	drink alcohol
Se debe...	You/One must / should...	beber muchos refrescos	drink lots of fizzy drinks
beber agua frecuentemente	drink water frequently	comer comida basura	eat junk food
comer más fruta y verduras	eat more fruit and vegetables	fumar	smoke
domir ocho horas al día	sleep for eight hours a day	Soy adicto / adicta	I am addicted to...
entrenar una hora al día	exercise for one hour a day	al / a la / a los / a las...	
No se debe...	You/One must not / should not...	Voy a entrenar tres veces a la semana.	I am going to exercise three times a week.
		No voy a beber muchos refrescos.	I am not going to drink lots of fizzy drinks.

Stem-changing verbs

Stem-changing verbs, such as **jugar** (to play) and **preferir** (to prefer), have a vowel change in their stem in the 't', 'you' (singular), 'he/she' and 'they' forms of the present tense. Some people call them 'boot verbs'.

juego	I play	jugamos	we play
juegas	you play	jugáis	you (plural) play
juega	he/she plays	juegan	they play

prefiero	I prefer	preferimos	we prefer
prefieres	you prefer	preferís	you (plural) prefer
prefiere	he/she prefers	prefieren	they prefer

Negatives

To make a sentence negative, put **no** or **nunca** before the verb.

No como carne. I don't eat meat.
Nunca bebo café. I never drink coffee.

Nada means 'nothing' or 'not anything'. Use it with **no** to make a 'sandwich' around the verb.
No bebo nada. I don't drink anything.

High-frequency words	
hasta	until
ahora	now
hoy	today
ayer	yesterday
anoche	last night
para	(in order) to
porque	I think / believe that
por eso	so / therefore
sin embargo	however
donde	where

Reflexive verbs

Reflexive verbs often describe an action you do to yourself. They include a reflexive pronoun (e.g. **me, te, se**). The reflexive pronoun goes in front of the verb and changes according to who does the action.

lavarse	to get washed (to wash oneself)		
me lavo	I get washed	nos lavamos	we get washed
te lavas	you get washed	os laváis	you (plural) get washed
se lava	he/she gets washed	se lavan	they get washed

Estar

There are two verbs for 'to be' in Spanish: **ser** and **estar**. Use **estar** for temporary states, such as being ill or tired, and locations. Use **ser** for permanent states, such as physical appearance or personality. You also use **ser** for telling the time.

estar	to be	ser	to be
estoy	I am	soy	I am
estás	you are	eres	you are
está	he/she/it is	es	he/she/it is
estamos	we are	somos	we are
estáis	you (plural) are	sois	you (plural) are
están	they are	son	they are

¿Qué tal estás?	How are you?	¿Cómo eres?	What are you like?
Estoy enfermo/a.	I'm ill.	Soy alto/a.	I am tall.

En forma
¡MODULE 3!
KNOWLEDGE ORGANISER

MFL Knowledge Organiser - Spanish

Sobre su vida About his/her life		Organiza sus cosas.	
¿De dónde es?	Where is he/she from?	Organiza sus cosas.	He/She organises his/her things.
Es de...	He/She is from...	Va al insti.	He/She goes to school.
¿Dónde vive?	Where does he/she live?	¿Qué hace durante el día?	What does he/she do during the day?
Vive en...	He/She lives in...	Ayuda a su madre.	He/She helps his/her mother.
¿Con quién vive?	Who does he/she live with?	Estudia.	He/She studies.
Vive con sus padres.	He/She lives with his/her parents.	Hace los deberes.	He/She does homework.
¿Qué hace por la mañana?	What does he/she do in the morning?	Prepara la cena.	He/She prepares dinner.
Desayuna.	He/She has breakfast.		

Mis derechos My rights		Salir a la calle	
Tengo derecho...	I have the right...	salir a la calle	go out in the street
al amor y a la familia	to love and to family	vivir con mi familia	live with my family
al juego	to play	porque...	because...
a la educación	to an education	soy chico/a	I am a boy/girl
a la libertad de expresión	to freedom of expression	mi padre es muy estricto	my father is very strict
a la protección	to protection	tengo que ganar dinero	I have to earn money
a un medio ambiente sano	to a healthy environment	tengo que trabajar	I have to work
No puedo...	I cannot...	el aire está contaminado	the air is polluted
dar mi opinión	give my opinion	en mi país a veces	in my country sometimes
ir al insti(tuto)	go to school	hay violencia	there is violence
jugar con mis amigos	play with my friends	¡No es justo!	It isn't fair!
respirar	breathe	Es inaceptable.	It is unacceptable.

Un mundo mejor A better world			
Para ser un instituto verde...	In order to be a green school...	tenemos un jardín	we have a garden
apagamos la luz	we switch off the light	vamos en bici	we go by bike
conservamos electricidad	we save electricity	Para hacer un mundo mejor...	In order to create a better world...
no malgastamos agua	we don't waste water	vamos a escribir cartas	we are going to write letters for Amnesty International
plantamos árboles y flores	we plant trees and flowers	para Amnistía Internacional	for Amnesty International
reciclamos botellas de plástico	we recycle plastic bottles	vamos a organizar un evento	we are going to organise an event
reciclamos papel y vidrio	we recycle paper and glass	vamos a recaudar fondos	we are going to raise funds
reducimos el consumo eléctrico	we reduce our consumption of electricity	vamos a vender pasteles	we are going to sell cakes

¿Cómo vas al insti? How do you get to school?		Porque es... Because it is...	
Voy a caballo.	I go on a horse.	más rápido que ir a pie	quicker than walking
Voy a pie.	I go on foot. / I walk.	más verde que ir en autobús	greener than going by bus
Voy en autobús.	I go by bus.	más barato que ir en taxi	cheaper than going by taxi
Voy en barco.	I go by boat.	más práctico que ir en coche	more practical than going by car
Voy en bici.	I go by bike.	más seguro que nadar	safer than swimming
Voy en coche.	I go by car.	la única opción	the only option
Voy en metro.	I go by underground.		
Voy en tren.	I go by train.		
¿Por qué?	Why?		

Palabras muy frecuentes

mi/mis
su/sus
más... (que)
para
para mí
por ejemplo
por eso

my
his/her
more... (than)
in order to / for
for me
for example
so / therefore

High-frequency words

muy
hay
ahora
ya
en el futuro
el año pasado

very
there is / there are
now
already
in the future
last year

The first person plural (we)		
In the present tense, these are the verb endings you use to talk about what 'we' do.		
	infinitive	1st person plural (we)
regular -ar verbs	reciclar (to recycle)	reciclam os (we recycle)
regular -er verbs	vender (to sell)	vend emos (we sell)
regular -ir verbs	reducir (to reduce)	reduc imos (we reduce)
irregular verbs	hacer (to do)	hac emos (we do)
	ir (to go)	vam os (we go)
	ser (to be)	som os (we are)
	tener (to have)	ten emos (we have)

The third person singular (he/she/it)		
In the present tense, these are the verb endings you use to talk about someone else.		
	infinitive	3rd person singular (he/she/it)
regular -ar verbs	trabajar (to work)	trabaja (works)
regular -er verbs	comer (to eat)	come (eats)
regular -ir verbs	vivir (to live)	vive (lives)
irregular verbs	hacer (to do)	hace (does)
	ir (to go)	va (goes)
	ser (to be)	es (is)
	tener (to have)	tiene (has)

The comparative

To compare two things, use the comparative:

más + adjective + que... more... than...

You can sometimes use the comparative with an infinitive. In this case, the adjective does not agree with a noun.

Ir en bici es más barato que ir en autobús. Going by bike is cheaper than going by bus.

Poder

Poder (to be able to / can) is a stem-changing verb which is usually followed by an infinitive.

puedo I can podemos we can
 puedes you can podéis you (plural) can
 puede he/she can pueden they can

No puedo estudiar. I can't study. Puede jugar. He/She can play.

Las nacionalidades Nationalities	
¿Cuál es su nacionalidad?	What is his/her nationality?
Es...	He/She is...
argentino/a	Argentinian
boliviano/a	Bolivian
colombiano/a	Colombian
mexicano/a	Mexican
norteamericano/a	North American
peruano/a	Peruvian
inglés/inglesa	English
español(a)	Spanish
pakistaní	Pakistani

MFL Knowledge Organiser - Spanish

¡Mucho gusto! Pleased to meet you!

Este es mi padre.	This is my father.	¿Quieres...?	Do you want to...?
Esta es mi madre.	This is my mother.	Quiero...	I want to...
¿Tienes hambre / sed / sueño?	Are you hungry / thirsty / sleepy?	beber / comer algo	drink / eat something
(No) Tengo hambre / sed / sueño.	I am (not) hungry / thirsty / sleepy.	hablar por Skype™	speak on Skype™
		ir a la cama	go to bed
		mandar un SMS	send a text
		ver la tele	watch TV

La caza del tesoro The treasure hunt

¿Adónde hay que ir?	Where do you/we have to go?	sacar fotos de...	take photos of...
Hay que...	You/We have to...	ver...	see...
Ir al estadio Santiago Bernabéu	go to the Santiago Bernabéu Stadium	el campo de fútbol más famoso de Madrid	the most famous football pitch in Madrid
Ir al parque del Retiro	go to Retiro Park	el cuadro más famoso de España	the most famous painting in Spain
visitar el Museo Reina Sofía	visit the Reina Sofía Museum	los churros más ricos del mundo	the tastiest churros in the world
coger el teleférico	take the cable car	el león más feroz del parque	the most ferocious lion in the park
comer...	eat...	los monumentos más interesantes de Madrid	the most interesting monuments in Madrid
comprar una postal de...	buy a postcard of...		
dibujar...	draw...		

The preterite of Irregular verbs

You use the preterite to talk about completed events in the past. Irregular verbs do not follow the usual patterns.

ir (to go)	fui (I went)	fuimos (we went)
hacer (to do / make)	hice (I did / made)	hicimos (we did / made)
ver (to see / watch)	vi (I saw / watched)	vimos (we saw / watched)

Palabras muy frecuentes High-frequency words

primero	first	donde	where
luego	then	este/esta	this
después	afterwards	algo	something
más tarde	later	para	(in order) to, for
finalmente	finally	usted	you (polite form)
(o) tal vez	(or) perhaps	sobre todo	above all, especially

Tú and usted

There are four ways of saying 'you' in Spanish:

tú – you (singular, familiar)	¿Dónde vives? ('you' singular verb form)
usted – you (singular, polite)	¿Dónde vive? (same as the 'he/she' verb form)
vosotros/as – you (plural, familiar)	¿Dónde vivís? ('you' plural verb form)
ustedes – you (plural, polite)	¿Dónde viven? (same as the 'they' verb form)

Use the familiar forms with people you know well and other young people.
Use the polite forms with people you don't know well.

The words are not always used, but **usted / ustedes** is sometimes added to the end of a question:
¿Qué quiere usted? / ¿Qué quieren ustedes? What do you want?

The superlative

You use the superlative to talk about 'the (old)-est', 'the most (famous)'. It is made up of four parts:

el / la / los / las + noun + más + adjective

The adjective always goes **after** the noun it refers to and must agree with it:

el estadio más famoso	the most famous stadium
la película más antigua	the oldest film
los monumentos más famosos	the most famous monuments
las tiendas más grandes	the biggest shops


KNOWLEDGE ORGANISER

En la tienda de recuerdos In the souvenir shop

¿Qué vas a comprar?	What are you going to buy?	Es...	It's...
¿Qué quiere usted?	What would you like? (polite form)	barato/a	cheap
Quiero (comprar) algo para mi (madre).	I want (to buy) something for my (mother).	bonito/a	nice, pretty
Creo que voy a comprar...	I think that I am going to buy...	caro/a	expensive
un abanico / un collar	a fan / a necklace	feo/a	ugly
un imán / un llavero	a magnet / a key ring	precioso/a	lovely
una camiseta / una figurita / una taza	a T-shirt / a figurine / a cup	típico/a	typical, traditional
(el) turrón	nougat	útil	useful
Me gusta la taza, pero prefiero el imán.	I like the cup, but I prefer the magnet.	¿Cuánto es?	How much is it?
		Son... euros.	It is... euros.
		Es demasiado caro/a.	It's too expensive.
		No, gracias.	No, thank you.
		Perfecto, gracias.	Perfect, thank you.

Mi día favorito My favourite day

Mi día favorito fue el (martes).	My favourite day was (Tuesday).	hice / hicimos muchas cosas	I / we did lots of things
Por la mañana...	In the morning...	monté / montamos en la montaña rusa	I / we went on the roller coaster
Por la tarde...	In the afternoon / evening...	saqué / sacamos fotos	I / we took photos
bebí / bebimos horchata	I / we drank horchata	vi / vimos los delfines	I / we saw the dolphins
comí / comimos un bocadillo de calamares	I / we ate a fried squid sandwich	visité / visitamos el zoo / el parque de atracciones	I / we visited the zoo / theme park
compré / compramos una gorra	I / we bought a cap	Fue increíble / divertido / flipante.	It was incredible / fun / awesome.
fui / fuimos a la cafetería	I / we went to the café	¡Qué miedo / rico / guay!	How scary / tasty / cool!
fui / fuimos en metro	I / we went by metro / underground		

Mi último día en Madrid My last day in Madrid


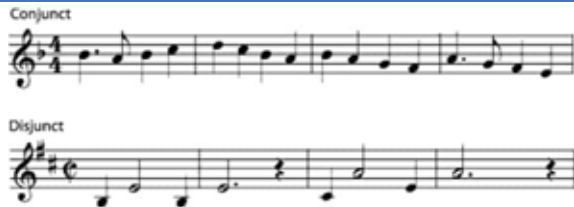


Si...	If...	sacar fotos (del Palacio Real)	take photos (of the Palacio Real)
hace buen tiempo	it's good weather	tomar el sol (en el Retiro)	sunbathe (in the Retiro)
hace frío / sol / viento	it's cold / sunny / windy	ver un partido (en el estadio Santiago Bernabéu)	watch a match (at the Santiago Bernabéu Stadium)
llueve	it's raining / it rains	visitar (el Museo del Prado)	visit (the Prado Museum)
voy a...	I'm going to...		
ir de compras (al Rastro)	go shopping (in the Rastro)		
probar (un cocido madrileño)	try (cocido madrileño stew)		

Music Knowledge Organiser



Rock Band

Exploring Popular Songs and Musical Arrangements

A. Popular Song Structure	B. Key Words	C. Lead Sheet Notation and Arrangements
<p>SONG STRUCTURE – How a song is made up of or divided into different sections (see below) and the order in which these sections occur. To work out the structure of a song, it’s helpful to analyse the LYRICS and listen to a recording for the song (for instrumental sections).</p> <p>INTRO – often shortened to ‘intro’, the first section of a song which sets the mood of the song and is sometimes, but not always, an instrumental section using the song’s chord pattern.</p> <p>VERSES – songs normally have several verses. Verses introduce the song’s theme and have the same melody but different lyrics for each verse which helps develop the song’s narrative and story. Songs made up entirely of verses are called STROPHIC.</p> <p>LINK – a optional short section often used to join different parts of a song together, often instrumental, and sometimes joins verses together or appears at other points within a song.</p> <p>PRE-CHORUS – an optional section of music that occurs before the CHORUS which helps the music move forward and “prepare” for what is to come.</p> <p>CHORUS – occurs several times within a song and contains the most memorable HOOK/RIFF. The chorus relays the message of the song and is repeated with the same melody and lyrics each time it is heard. In popular songs, the chorus is often repeated several times towards the end of the song.</p> <p>MIDDLE 8/BRIDGE – a section (often 8 bars in length) that provides contrasting musical material often featuring an instrumental or vocal solo using new musical material allowing the performer to display their technical skill on their instrument or voice.</p> <p>CODA/OUTRO – The final section of a popular song which brings it to an end (Coda is Italian for “tail”!)</p>	<p>LYRICS – The words of a song, usually consisting of VERSES and a CHORUS.</p> <p>HOOK – A ‘musical hook’ is usually the ‘catchy bit’ of the song that you will remember. It is often short and used and repeated in different places throughout the piece. Hooks can be either MELODIC, RHYTHMIC or VERBAL/LYRICAL.</p> <p>RIFF – A repeated musical pattern often used in the introduction and instrumental breaks in a song or piece of music. Riffs can be rhythmic, melodic or lyrical, short and repeated.</p> <p>MELODY – The main tune of the song often sung by the LEAD SINGER.</p> <p>COUNTER-MELODY – An ‘extra’ melody often performed ‘on top of’ the main melody that ‘fits’ with it a DESCANT or INSTRUMENTAL SOLO.</p> <p>TEXTURE – The layers that make up a song e.g., <i>Melody, Counter-Melody, Hooks/Riffs, Chords, Accompaniment, Bass Line</i>.</p>	<p>A LEAD SHEET is a form of musical NOTATION that contains only the essential elements of a popular song such as the MELODY, LYRICS, RIFFS, CHORDS (often as guitar chord symbols) and BASS LINE; it is not as developed as a FULL SCORE ARRANGEMENT and is open to interpretation by performers who need to use and adapt the given elements to create their own musical ARRANGEMENT: their “version” of an existing song.</p> <p>COVER (VERSION) – A new performance, remake or recording by someone other than the original artist or composer of the song.</p> 
D. Conjunct and Disjunct Melodic Motion		
<p>CONJUNCT MELODIC MOTION – Melodies which move mainly by step or use notes which are next to or close to one another.</p> <p>DISJUNCT MELODIC MOTION – Melodies which move mainly by leap or use notes which are not next to or close to one another.</p> <p>MELODIC RANGE – The distance between the lowest and highest pitched notes in a melody.</p> 		
E. Song Timbre and Sonority (Instruments that are used to Accompany Songs)		
 <p>Pop Bands often feature a DRUM KIT and PERCUSSION to provide the rhythm along with ELECTRIC GUITARS (LEAD GUITAR, RHYTHM GUITAR and BASS GUITAR) and KEYBOARDS. Sometimes ACOUSTIC INSTRUMENTS are used such as the PIANO or ACOUSTIC GUITAR. ORCHESTRAL INSTRUMENTS are often found in pop songs such as the STRINGS, SAXOPHONE, TROMBONE and TRUMPET. Singers are essential to a pop song - LEAD SINGER – Often the “frontline” member of the band (most famous) who sings most of the melody line to the song. BACKING SINGERS support the lead singer providing HARMONY or a COUNTER-MELODY (a melody that is often higher in pitch and different, but still ‘fits with’ the main melody) and do not sing all the time but just at certain points within a pop song e.g. in the chorus.</p> 		

Music Knowledge Organiser

Computer and Video Game Music



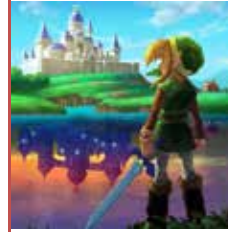
Early Computer and Video Game Music



Early video game music consisted primarily of **SOUND EFFECTS** (an artificially created or enhanced sound used to emphasize certain actions within computer and video games), **CHIPTUNES** or **8-BIT MUSIC** (a style of electronic music which used simple melodies made for programmable sound generator (PSG) sound chips in

vintage computers, consoles and arcade machines) and early sound **SYNTHESISER** technology (an electronic musical instrument that generates audio signals that may be converted to sound). **SAMPLING** (the technique of digitally encoding music or sound and reusing it as part of a composition or recording) began in the 1980's allowing sound to be played during the game, making it more realistic and less "synthetic-sounding".

How Computer and Video Game Music is used within a Game



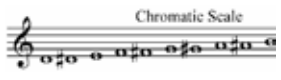



Music within a computer or video game is often used for **CUES** (knowing when a significant event was about to occur).

Video game music is often heard over a game's title screen (called the **GROUND THEME**), options menu and bonus content as well as during the entire gameplay. Music can be used to **INCREASE TENSION AND SUSPENSE** e.g. during battles and chases, when the player must make a decision within the game (a **DECISION MOTIF**) and can change, depending on a player's actions or situation

e.g. indicating missing actions or "pick-ups".

Musical Features of Computer and Video Game Music

<u>JUMPING BASS LINE</u>	<u>STACCATO ARTICULATION</u>	<u>CHROMATIC MOVEMENT</u>	<u>SYNCOPIATION</u>
Where the bass line often moves by LEAP (DISJUNCT MOVEMENT) leaving 'gaps' between notes	Performing each note sharply and detached from the others. Shown by a dot.	Melodies and bass lines that ascend or descend by semitones.	Accenting the weaker beats of the bar to give an "offbeat" jumpy feel to the music.
			

How Computer and Video Game Music is Produced



Fully-orchestrated **SOUNDTRACKS** (video game music scores) are now popular – technology is used in their creation but less in their performance. The composer uses **MUSIC TECHNOLOGY** to create the score, it is then played by an **ORCHESTRA** and then digitally converted and integrated into the game. Video game **SOUNDTRACKS** have become popular and are now commercially sold and performed in concert with

some radio stations featuring entire shows dedicated to video game music.

Character Themes in Computer and Video Game Music



Characters within a video game can also have their own **CHARACTER THEMES** or **CHARACTER MOTIFS** – like **LEITMOTIFS** within Film Music. These can be manipulated, altered and changed – adapting the elements of music – **ORCHESTRATION** (the act of arranging a piece of music for an orchestra and assigning parts to the different musical instruments), **TIMBRE, SONORITY, TEXTURE, PITCH, TEMPO, DYNAMICS** – depending on the character's situation or different places they travel to within the game.

Famous Computer and Video Game Music Composers and their Soundtracks



Koji Kondo

Super Mario Bros. (1985)
The Legend of Zelda (1986)



Michael Giacchino

The Lost World: Jurassic Park (1997)
Medal of Honour (1999)
Call of Duty (2003)



Mieko Ishikawa

Dragon Slayer (1993)



Martin O'Donnell and Michael Salvatori

Halo (2002)



Daniel Rosenfield

Minecraft (2011)



Rom Di Prisco

Fortnite (2017)

Music Knowledge Organiser

THE GUITAR

A. How to Read Guitar Chords

The name of the chord.
A small 'm' indicates a minor chord, e.g. 'Am'

'X' means do not play this

'O' indicates an 'open' string (play the string with no fingers on this string)

The 'nut'; indicates the top of the fretboard

These circled numbers tell you which finger of your left hand to use and which fret/string to place that finger on.

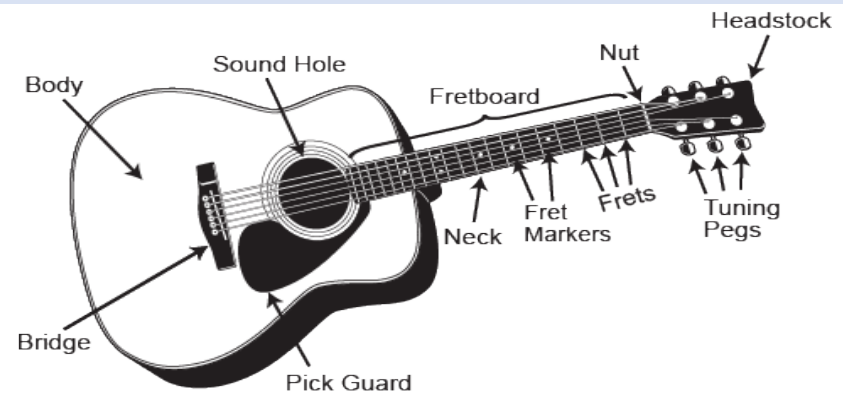
The string closest to your chin

The string closest to your feet

B. Elements of music

Dynamics	Playing strings harder/softer
Timbre (tone)	Playing strings with fingers/pick, choosing guitar amp/acoustic guitar
Pitch	Playing higher pitched strings/ moving fretted hand toward the guitar body
Articulation	Playing each note/chord individually (picking) or using techniques such as Hammer ons/pull offs for a legato sound

C. Parts of a Guitar



D. Guitar Chords

Music Knowledge Organiser






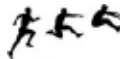






Listening and describing music

Listen to two different pieces of music or songs of your choice. They could be something that you particularly like or your favourite songs or pieces of music. Try to stay away from two songs or pieces of music in the same style or from the same artist of band/group. Instead choose two **CONTRASTING** pieces of music e.g. your favourite "pop song", a piece of "classical" music that you know, a piece of jazz or a piece of music from a film or video game that you like. Describe the two pieces of music in the boxes below.










Title: _____	Style: _____
Composer: _____	Performer(s): _____
Describe what you are hearing....	
The Dynamics	_____
The Tempo	_____
The Texture	_____
The Pitch	_____
Any other ELEMENTS OF MUSIC that you can hear (Duration, Articulation, Silence, Timbre/Sonority) or INSTRUMENTS, MOOD or ATMOSPHERE _____	
Purpose/Occasion (what is the music used for?) _____	
Why do you like this piece of music/song? _____	

Title: _____	Style: _____
Composer: _____	Performer(s): _____
Describe what you are hearing....	
The Dynamics	_____
The Tempo	_____
The Texture	_____
The Pitch	_____
Any other ELEMENTS OF MUSIC that you can hear (Duration, Articulation, Silence, Timbre/Sonority) or INSTRUMENTS, MOOD or ATMOSPHERE _____	
Purpose/Occasion (what is the music used for?) _____	
Why do you like this piece of music/song? _____	





PE Keywords

<p>Athletics – the category of sports that involve running, jumping and throwing.</p>	<p>Baton - a tube that is passed from one relay race member to another. The runner holding the baton is the current runner for that team in the race</p>	<p>Changeover – the passing of the baton from the incoming teammate to the outgoing teammate.</p> 	<p>Discus - a throwing event in track and field where a discus is thrown for distance</p> 	<p>False start – an invalid start to the race, caused by a runner setting off before the starter said 'Go'.</p>	<p>Field event – all the events that do not take place on the track, such as long, triple and high jump and shot put, discus and javelin throws.</p>	<p>Finish Line – the line on the track that marks the end of all foot races. The runner whose torso (chest) crosses the line first is the winner of the race.</p>
<p>Fosbury Flop - a technique used in the high jump where the jumper's goes head first over the bar with their back toward the bar when going over it.</p> 	<p>High Jump - a track and field jumping event. Athletes must clear a high bar without knocking it over by jumping.</p>	<p>Hurdle - an obstacle in a race that runners must jump or clear while running.</p> 	<p>Javelin - a track and field throwing event where a spear-like javelin is thrown for distance.</p> 	<p>Long Jump - jumping event where athletes compete for the longest jump in distance.</p> 	<p>Middle Distance - The middle-distance races are the 800m, the 1500m. They rely more on endurance and pacing than just pure speed. Also, the runners don't stay in a single lane for the entire race.</p>	<p>Pace - the rate at which a runner is running. It's important in long distance races to have the proper pace; slow enough so the runner doesn't tire out before the end of the race, but fast enough to win.</p>
<p>Personal best – term for the athlete's best performance in an event.</p>	<p>Relay race - a race involving multiple runners (typically 4) where each runner runs a leg of the race handing off a baton to the next runner.</p>	<p>Sandpit - an area in a jumping event (i.e. long jump or triple jump) where the athlete lands.</p>	<p>Shot put - a field throwing event where a heavy ball is thrown for distance.</p> 	<p>Sprint - a short running race where acceleration and top speed are important. In a track and field competition there are generally three different sprint distances: 100m, 200m, and 300/400m. Runners remain in the same lane.</p> 	<p>Take-off board – small wooden rectangle that is on the long/triple jump runway for athlete to jump from.</p>	<p>Triple Jump - a track and field jumping event with three distinct phases to the jump including a hop, a step, and a jump</p>
<p>Ball-to-hand - The claim that the contact between the hand and the ball is completely accidental, the arm is in a 'natural position', therefore it shouldn't warrant a free kick.</p>	<p>Bicycle kick - The movement by a player where they jump up, throw both feet in the air and hit the ball in a pedaling motion to send the ball in the opposite direction they are facing. Also known as the overhead kick.</p> 	<p>Box-to-box player - A player that can successfully play both sides (defensive and attacking) of the game from midfield.</p>	<p>Brace - A word to describe the achievement of a player that scores two goals in one game. "Scoring a brace" is the way to go when using it in a sentence.</p>	<p>Clinical finish - A top notch shot that leads to a goal. The scorer of this goal is called the clinical finisher.</p>	<p>CDM - A reliable defensive midfielder with the primary assignment of staying close to the defensive.</p>	<p>CAM - An attacking minded midfielder playing in front of the midfield just behind the strikers.</p>
<p>Chip shot - A shot that is kicked from underneath the ball to provide some arc for it to go over the opponent</p>	<p>Dive - The exaggerated falling move of a player to deceive the referee in order to win their team a foul.</p>	<p>Class act - A player/ manager that deserves praise especially with their attitude and manners off the field.</p>	<p>Clean sheet - The accolade a team/goalkeeper earns when a full game is played without conceding a goal.</p>	<p>Flick-on - A move where the offensive player hits a moving ball with their foot or head when it's passing by them without controlling it first.</p>	<p>Cracker - A breathtaking football match or an outstanding goal, mainly from a long distance.</p>	<p>Control - Getting the ball under your control i.e. you are in a position to completely influence what happens to the ball.</p>
<p>Handball - When the outfield player uses any part of the arm on the ball.</p>	<p>Dummy run - An off-the-ball run made by an attacking player to create space for their teammate with the ball. Used to trick opponents by pretending to move towards the ball.</p>	<p>Feint - The dribbling of the ball in one direction after faking the dribble in the other direction with a drop of the shoulder.</p> 	<p>First-time ball - Transferring the ball to a teammate with one single touch when a pass is received.</p> 	<p>Man on - The loud cry to inform a teammate with the ball that an opponent is approaching or dangerously close by.</p>	<p>Game of two halves - A cliché that commentator's resort to when a match has consisted of two halves with huge difference in character and score.</p>	<p>Goal Side - A defensive player places themselves between the attacker they are marking and the goal they are defending.</p>
<p>Hospital ball - A reckless pass that's within reach of two players from opposing teams that can give rise to injuries.</p>	<p>Hug the by-line - The instruction given to wing players to stay closer to side-lines to create space and stretch the pitch as wide as possible. Used when your team is in possession of the ball.</p>	<p>Howler - An inexplicable mistake by a player that generally proves costly.</p>	<p>In his/her pocket - Refers to one defensive player having dominated an opposition player.</p>	<p>Park the bus - Playing ultra-defensive not to concede any goals, chiefly applied by team with the edge on the scoreboard.</p>	<p>Nutmeg - Kicking or putting the ball through an opponent's legs.</p>	<p>Off the line - The act of saving the ball from crossing the line, clearing the ball.</p> 
<p>Penalty - When an attacking player is fouled or a defender handles the ball in the penalty area.</p>		<p>On paper - Indicates how the events should play out in theory, the expected scenario based on pre-existing statistics and conditions.</p>			<p>Play on - A potentially controversial possession where the referee does not blow their whistle after concluding there's no reason to stop the game.</p>	<p>Poacher / Fox in the box - A cunning and skilled striker that's extremely dangerous in the penalty area.</p>












PE Keywords

Put in a shift - The situation where a player fulfills their given tasks but fails to make a strong impression on the pundits or put their fingerprints on the game.	Run it off - An instruction for a player that's suffered a minor injury to carry on playing to see if they are able to continue playing for the team.	Showboat - Showing off when the team is winning by a large margin, often seen as disrespecting the opposition.	Sitter - A simple miss by an attacker that was immensely easy to score.	Step-Over - Similar to the feint. The player pretends to take the ball to the side but steps over the ball. The player then moves the ball in the opposite direction.	Switch play - Moving the ball from one side to the other in a quick fashion, mostly by a long pass. e.g., from left to right midfield.	Target man - A tall striker that's often targeted by crosses, long balls, and high passes for their aerial superiority and strength to hold the ball upfront for the team.
Theatrical - An adjective to describe a player's tendency for over-the-top reactions.	Track Back - Getting back in a defensive position when your own team has lost possession of the ball.	Treble - Winning three major competitions in a single season.	Wingback - A position in football where you are out wide or left. Your role is both as a winger when in possession but also a defender when out of possession.	(Hit the) woodwork - Having the ball strike one of the posts or crossbar of the goal. 	Base Line - The line at the back of the court that runs parallel to the net. 	
Service Box - The two boxes on either side of the net at the front of the court. The serve must hit, diagonally into this box to start the point.	Tramlines - The external court lines that run parallel to the singles lines. These lines are considered 'out' in singles, but 'in' when playing doubles.	Serve - The serve (or service) starts the point. Players will usually hit an over-arm stroke (although they can hit underarm) from behind the baseline into the service box diagonally opposite them. A player has two serves per point, called a first and a second serve. 	Forehand - The shot played when the palm of the dominant hand is facing forward. For instance, if you are right handed, the forehand will be played on the right hand side of the body. The stroke goes from low to high. 	Backhand - The shot played when the back of the dominant hand is facing forward. For instance, if you are right handed a backhand is a shot you play on the left side of the body. This is usually played with two hands to gain more control. The stroke goes from low to high. 	Volley - A stroke where a player hits the ball back over the net (using a forehand or backhand) before the ball bounces on their side of the court.	Singles - A tennis game played by two opponents.
In - A call made when a ball falls within the playing area.	Out - A call made when a ball lands outside the playing area.	Fault - When the ball does not land in the opponents court. A fault can be called if a serve, forehand, backhand or volley lands outside the playing area.	Ace - A point won by the server when the receiver doesn't touch the ball.	Game - The building blocks of a set. Each set comprises of at least six games.	Points - The aim of each tennis game is to be the first player to score four points.	Doubles + Mixed Doubles - A match between teams of two players. In doubles tennis, the tram lines come in to play.
Let - Most commonly called when a player's serve hits the net but lands in the correct service box. A let can also be called if a point is interrupted by an outside interference. In the event of a let a point is replayed.	Advantage (Rugby) - unlike most other sports, referees can play advantage after a foul for what can seem an eternity, but once he calls "advantage over" then that's that.	Match - In professional tennis a match is determined by the best of three or five sets.	Set - A set is usually comprised of six games. However, if the players are tied at five games all the set becomes the first to seven games.	Remember: in tennis, the server's score is always called first. If they win the first point of the game we say 15-love. If they lose it we say love-15.	15 - when a player wins the first point of a tennis game. If the opponent wins the next point we say 15-all.	Love - meaning zero.
Backs (Rugby League) - the group of players normally numbered Nos. 1 to 7 who do not participate in scrums, except for the scrum-half.	Blindside (Rugby League) - from a set piece, PTB, the short side of the field. Also called the Weakside.	Charge Down - the blocking of a kick by an opposition player.	Chip over - a short shallow kick usually delivered over the head of an onrushing defender to be quickly retrieved or caught by the kicker or one of his/her supporting players.	Clearance Kick (Rugby League) - a kick of the ball down field which relieves pressure on a side under heavy attack.	15 - all - when a player wins the first point of a tennis game.	30 - when a player wins two points in a tennis game.
Drop Out - the way play is re-started, using a drop-kick, after the defending side has touched the ball down behind its own try-line or when the ball has gone out over the dead-ball line.	Forward Pass - all passes must go backwards, and this is an illegal pass where the ball goes forwards. The penalty is a scrum in favour of the other side.	Dummy - a feigned pass intended to deceive an opponent about to make a tackle. 	Grubber - a kick of the ball which causes the ball to bounce and roll along the ground.	Front Row - the common name for the prop/hooker/prop combination at the front of a scrum 	Deuce - when the score is 40-40 it is called Deuce. A player must win two consecutive points from deuce to win a tennis game.	40 - when a player wins three points in a tennis game.
					Drop Goal (Rugby League) - a kick between the posts by an attacking side which, if successful, scores one point. It differs from a punt in that the ball must hit the ground before being kicked. 	Advantage - the point played after deuce. If the player with the advantage wins the point the tennis game is over.
					Half-back - the back wearing No. 7 who leads a team around the pitch	Conversion (Rugby League) - a kick at the posts after the awarding of a try, scoring two points if successful. The kick must be attempted directly from a spot perpendicular to the spot where the try was awarded. Usually taken with a place kick, it can be rushed when the kicker makes a move towards the ball. If taken as a drop kick it is uncontested.

PE Keywords

<p>High Ball - a ball kicked very high into the air placing any player attempting to catch it under extreme pressure by on rushing opposition players.</p>	<p>Knock On - losing, dropping, or knocking the ball forward from a player's hand resulting in the ball being awarded to the other team in a scrum.</p>	<p>Offsides (Rugby League) - during PTB, scrums, etc an imaginary line is present over which any player crossing before the set piece is completed commits a penalty.</p>	<p>Penalty - any number of infractions or violations which award the other team a kick.</p>	<p>Penalty Kick (Rugby League) - an uncontested kick awarded to a team for a major infraction by the other team. The kick can be taken directly at goal and scores two points if successful. If the ball is kicked to touch, then the throw-in is awarded back to the team which kicked the ball out of bounds.</p>	<p>Penalty Try - the awarding of a try due to a blatant or repeated violation by an opposing side that prevents an obvious try from being scored.</p>	<p>Play the ball (PTB) – When you are tackled and stand up to play the ball correctly with your foot.</p>
	<p>Stand off (Rugby League) - the back wearing No. 6 who leads a team around the pitch.</p>	<p>Tackle – When you halt an attackers progress by taking him to the floor.</p> 	<p>Ruck (Rugby League) – The tackle area where the PTB is.</p>		<p>Try - a score of five points awarded when the ball is carried or kicked across the tryline and touched down to the ground by a player.</p> 	<p>Try line - the goal line extending across the pitch.</p>
<p>Scrum - the formation used in the set play re-starting play after a knock-on or forward pass. The forwards from each side bind together and then the two packs come together to allow the scrumhalf with the feed to deliver the ball to the scrum. A scrum can also be awarded or chosen in different circumstances by the referee.</p>	<p>Backs (Rugby Union) - the group of players normally numbered Nos. 9 to 15 who do not participate in scrums and line-outs, except for the scrum-half.</p>	<p>Binding - the careful method players grip and grasp each other to form a secure scrum, ruck, or maul. This is a critical skill to ensure the safety of players.</p>	<p>Tap Penalty - a quickly taken penalty where a player taps the ball a couple of inches with his foot and immediately catches it and surges forward, done to catch the opposition unawares.</p>	<p>Touch, touchline - the out of bounds line that runs on either side of the pitch. The non-contact version of rugby is also commonly called touch.</p>		<p>Turnover - when one side takes possession of the ball from their opponents.</p>
<p>Drop Goal (Rugby Union) - a kick between the posts by an attacking side which, if successful, scores three points. It differs from a punt in that the ball must hit the ground before being kicked.</p> 	<p>Feed - the rolling of the ball into the scrum by the scrum-half.</p>	<p>Blindside (Rugby Union) - from a set piece, ruck or maul, the short side of the field. Also called the Weakside.</p>	<p>Forwards (Rugby Union) - the group of players normally numbered 1 through 8 who bind together into scrums, line up for line-outs, and commit themselves to most rucks and mauls.</p>		<p>Conversion (Rugby Union) - a kick at the posts after the awarding of a try, scoring two points if successful. The kick must be attempted directly from a spot perpendicular to the spot where the try was awarded. Usually taken with a place kick, it can be rushed when the kicker makes a move towards the ball. If taken as a drop kick it is uncontested.</p>	<p>Clearance Kick (Rugby Union) - a kick of the ball into touch which relieves pressure on a side under heavy attack.</p>
<p>Lineout - the set play re-starting play after the ball has been taken out or kicked to touch. Both sets of forwards will line up opposite each other with the side with throw calling a play. The throw must be directly down the middle of the two lines.</p>	<p>Drop Goal (Rugby Union) - a kick between the posts by an attacking side which, if successful, scores three points. It differs from a punt in that the ball must hit the ground before being kicked.</p> 	<p>Feeder - a common name for a rugby jersey. Also the name of a player in a lineout, usually at the 2, 4, and 6 positions, jumping to catch or intercept the throw.</p>	<p>Half-back (Rugby Union) - the back wearing No.9 who normally feeds the ball into a scrum and retrieves the ball at the base of scrums, rucks, and mauls. Can also be called the Scrum-half.</p>			<p>Free Kick - an uncontested kick awarded to a team usually for a minor penalty by the other team. The kick cannot be taken directly at the posts except by a drop goal.</p>
<p>Mark - the place indicated by the referee where the scrum should form; also a player inside his own 22 can, on catching a ball kicked by the opposition on the full, call for a "mark". If the referee agrees, the player can then re-start play in much the same way as if he had been awarded a free-kick.</p>		<p>Jumper - a common name for a rugby jersey. Also the name of a player in a lineout, usually at the 2, 4, and 6 positions, jumping to catch or intercept the throw.</p>		<p>Penalty Kick (Rugby Union) - an uncontested kick awarded to a team for a major infraction by the other team. The kick can be taken directly at goal and scores three points if successful. If the ball is kicked to touch, then the throw-in is awarded back to the team which kicked the ball out of bounds.</p>	<p>Ruck (Rugby Union) - typically after a runner has come into contact and the ball has been delivered to the ground once any combination of at least three players have bound themselves a ruck has been set. The primary difference from a maul is that the ball is on the ground.</p>	<p>Lifting - the act of lifting the lineout jumper into the air in order to more easily catch or intercept the throw.</p> 
		<p>Maul - typically after a runner has come into contact and the ball is still being held by a player once any combination of at least three players have bound themselves a maul has been set. The primary difference from a ruck is that the ball is not on the ground.</p>	<p>Offsides (Rugby Union) - during rucks, scrums, lineouts, and mauls an imaginary line is present over which any player crossing before the set piece is completed commits a penalty.</p>			<p>Scrum-half - the back wearing No.9 who normally feeds the ball into a scrum and retrieves the ball at the base of scrums, rucks, and mauls. Can also be called the half-back.</p>

Knowledge Organiser – Year 9 – Does Religion Have a Future?

Atheist		Someone who does not believe in the existence of God.
Agnostic		Someone who is unsure about the existence of God.
Theist		Someone who believes in the existence of God.
Charity		An organisation that helps people in need.
Prejudice		Thinking negatively about a group of people without knowing them.
Discrimination		Treating a person negatively based on their gender, race, religion, sexuality etc.
Homosexual		A person who is sexually attracted to the same gender.
Heterosexual		A person who is sexually attracted to the opposite gender.
Sexism		The belief some genders are superior to others.
Conflict		A serious disagreement or argument.
Reconciliation		Restoring a broken relationship.

Views on Gender Equality



There are many arguments which are both in favour and against **gender equality** in the religions of Christianity and Islam. Some people argue both religions are primarily patriarchal and that men dominate when it comes to leading worship. There are arguments which suggest women are **oppressed** within Islam due to their dress code and their role is to protect the home and children. Other people argue that religion is moving forward and there are female leaders particularly within Christianity and women are valued just the same as men in Islam even though their life roles may be different.

Views on Homosexuality

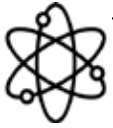


Homosexuality was legalised in Great Britain in **1967**, however gay marriage wasn't made legal until **2004**. Religious groups differ on whether they accept gay marriage or homosexual relationships at all. Within Christianity, homosexuality is taught to be sinful as taught in the Old Testament as God made humans to populate the earth. However, Christians are also taught that humans have been created in the image of God and that God loves all people without judgement. Islam has much stricter teachings against homosexuality with the Qur'an forbidding any same-sex relationship. Having said that there are gay Muslims today who are fighting to be seen as equals within their religion.

Conflict and Reconciliation

It is argued that a lot of the world's conflicts has been due to religion. Examples of this include The Crusades and The Troubles where religious groups were fighting over holy land. However, there are many interfaith groups as well as religious organisations/figures who work to end conflict and bring about reconciliation such as The Corrymeela Community and Corrie Ten Boom. They aim to reduce conflict in the world, educate people about tolerance and provide a safe space for all.

Challenges Religion Faces Today



The conflict between religion and science remains ever present with **atheist** thinkers such as **Richard Dawkins** stating, "It is **criminal to bring children up believing in faith for which there is no evidence.**" However, others argue that religion answers the questions science cannot answer and religion provides more for society in terms of **community cohesion** and promoting **tolerance**. Does society need both religion and science to fully understand the world?

What society can gain from religion



Friendship and community

Improves mental and physical health

Provides hope and comforts

Offers answers to life's big questions

How Religious Organisations Support Society



Oasis Hub Hull – Provides a non-judgemental community space for all people no matter what their background.







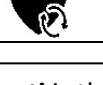
iCare Food Hub - Aim to eradicate poverty in all its forms in the UK. They provide food and support for all people.



Jami UK - Work with individuals, communities, and organisations to help prevent mental illness from developing, improve early intervention and promote wellbeing.

Sanatan Hindu Mandir – Volunteering within the community.

Knowledge Organiser – Year 9 – Religion and STEM – Compatible or Incompatible?

compatibility		When ideas coexist, for example ideas from religion and science.
evolution		Idea that humans have developed through a process of natural selection.
Trimurti		The three main gods in Hinduism – Brahma, Vishnu and Shiva
creationist		Someone who takes a literal, Biblical account of creation.
metaphorical		When a likeness or analogy is used – non-literal.
genetic engineering		Modification of organism by altering genetic content.
transplant		Changing one organ for one belonging to someone else.

In **Christianity, Judaism** and **Judaism** it is believed the universe was created in 6 days (God rested on the seventh).

-**the first day** - light was created

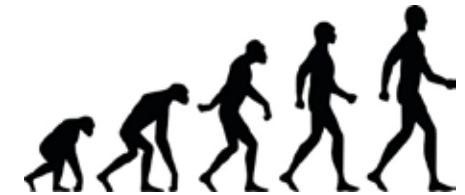
-**the second day** - the sky was created

-**the third day** - dry land, seas, plants and trees were created

-**the fourth day** - the Sun, Moon and stars were created

-**the fifth day** - creatures that live in the sea and creatures that fly were created

-**the sixth day** - animals and human created

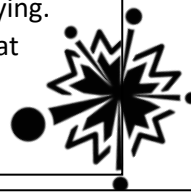


‘In the beginning God created the heavens and the earth.’ (Genesis 1:1)

Science would argue the universe started after **The Big Bang**, some **13 billion** years ago and that humans have **evolved** over millions of years due to **natural selection**. The Judeo-Christian account of where humanity originates is that God created Adam from the earth and breathed life into him. Eve was created from one of Adam’s ribs and both were given the roles of **stewards**, looking after the earth for God.

In **Hinduism** the **Trimurti** is the combination of **Brahma, Vishnu** and **Shiva**. They are responsible for creating, sustaining and destroying. This supports Hindu beliefs in **reincarnation** as it is believed that creation continually happens in a never-ending cycle.

Hindus believe the universe is **billions** of years old.










Charles Darwin is credited with developing the **Theory of Evolution**, which was outlined in his book **‘On the Origin of Species’** published in 1859. He observed that animals adapted to conditions through a process of **natural selection**. Much of his findings were based upon research conducted on tortoises on the **Galapagos Islands** and the development of beaks in birds. He concluded that humans had also developed through a process of natural selection from apes. For some this was a direct challenge to the belief that God had created humanity. For others it strengthened their faith in the wonder of God’s creation and the belief that God was the **First Cause** responsible for everything adapting to be the way it is.



There can appear to be a conflict with religion and issues in genetic engineering. For some they believe altering DNA and human genetics is **‘playing God.’** Some **humanists** may also disagree saying research in this area could be the **‘slippery slope’** where all elements of the natural world are altered by humans for the benefit of humans. They may argue nature has evolved for millions of years to be the way it is. Others may argue that research in this area can save lives and prevent illness citing religious ideas about **‘loving your neighbour as yourself’** and **‘whoever saves one life saves the whole world entire.’** Current developments with regards to animal transplants in humans may also raise concerns. Hindus may not want organs from cows used and Muslims and Jews may have issues with pigs used. However, most would say using animal organs is not the same as consuming them as food.

Knowledge Organiser – Year 9 – Is It Possible To Be Good Without A Belief In God?

secular		Not connected with religious matters.
morality		Principles concerning what is right and wrong.
Humanist		Someone who works for a better world without the need for religion.
justice		Fairness – people are treated in a fair and reasonable way.
The Decalogue		The 10 Commandments.
Mitzvot		Jewish laws and rules 613 in total.
Yamas		Hindu principles of how people should not behave.

The 10 Commandments or The Decalogue

These were etched on stone tablets by God on **Mount Sinai** and given to **Moses** as a guide for living:

1. You shall have no other gods before Me.
2. You shall make no idols.
3. You shall not take the name of the Lord your God in vain.
4. Keep the Sabbath day holy.
5. Honour your father and your mother.
6. You shall not murder.
7. You shall not commit adultery.
8. You shall not steal.
9. You shall not bear false witness against your neighbour.
10. You shall not covet.

What do these mean? Are they relevant to all?



In Judaism there are 613 mitzvot or laws that must be followed. These include:

- Not mistreating those seeking refuge.
- Not taking more food than can be eaten.
- Not mistreating animals.

There are many that also relate to religious duties which some may consider outdated but others consider the will of God and the **infallible** truth of how to live.

In many religions it is a duty to give to charity. Muslims give 2.5% of their wealth as **zakah** to the poor and needy and Jews perform **tzedakah** which is a religious duty to care for those and support the needy. Many charities familiar to people in the UK have their origins with Christianity eg: **Christian Aid**, **World Vision** and **The Salvation Army**. The **Samaritans** is based on a parable told by Jesus about caring for those in need.



Justice is the idea that everyone should be treated fairly, criminals need to be punished and justice sought for those who are treated unfairly. It is widely believed that the purpose of punishment is to achieve a number of goals. These are to **protect** the innocent, act as a **deterrent**, **retribution** (punishment needs to be seen to happen) and give those guilty a chance to **reform**.

In Christianity it is believed that God acts justly and therefore humans should seek to achieve justice for all those on earth – ‘**Act justly and love mercy**’ (Micah 6:8). In Islam **Adalat** is a key concept which is the idea that Allah always acts justly – again Muslims will ensure their lives are lived according to justice.

Many question whether acts of punishment such as the death penalty can be just – Christians may argue that people should ‘**forgive us our trespasses**’ as stated in the Lord’s Prayer but other may say ‘**an eye for an eye**’ meaning if someone has taken a life their life should be taken. In many countries religious laws have influenced the criminal justice system and in some Muslim countries **Shariah** law, which is Islamic law, is used as a basis for justice.



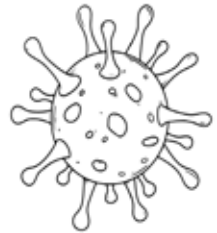
Restorative justice is the belief that in times of conflict, or when a crime has taken place, people and situations need to be restored to peace. This can sometimes involve victim and criminal meeting and trying to resolve or understand situations that have arisen. On a nation or international level it can be where different groups of people with opposing **ideologies** work together to better understand each other and reduce the likelihood of violence. Some believe religious ideas have a key part to play in restorative justice as the Bible states: ‘**first be reconciled to your brother**’ (Matthew 5) and people such as **Archbishop Desmond Tutu** worked for **reconciliation** in **South Africa** during and after the **apartheid** era and many faith leaders worked for peace in **Northern Ireland** during **The Troubles** between **Catholics** and **Protestants**.

SCIENCE



Year 9 Biology topics

Topic one: Cells and Communicable Diseases



Topic two: Supplying the Cell

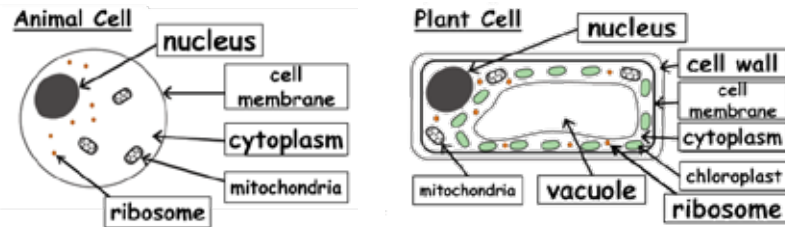


Cells and Communicable Diseases

Cells

Cells are the basic unit of all forms of life. They can be **eukaryotic** or **prokaryotic**.

Eukaryotic cells have a nucleus (e.g. animal and plant cells):

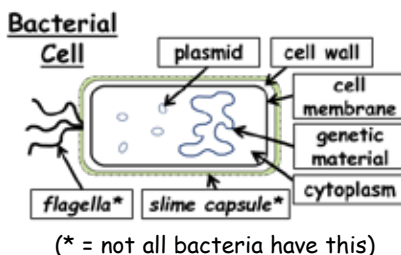


Part	Function
Nucleus	Controls all cell activity and contains the DNA
Cytoplasm	A liquid gel where most chemical reactions take place
Cell membrane	Controls the movement of substances into and out of the cell
Mitochondria	The site of respiration. Releases energy for the cell to use.
Ribosomes	Protein synthesis - they make proteins

Only in plant cells...

Cell wall	Strengthens the cell. In plant and algal cells it is made of a strong substance called cellulose.
Chloroplasts	Where photosynthesis takes place. They can trap the sunlight's energy using a green pigment called chlorophyll.
Permanent vacuole	It is filled with cell sap and helps to keep the cell turgid (swollen and rigid) to support the plant.

Prokaryotic cells are smaller and **do not have a nucleus**. Their genetic material (DNA) is free and forms a single loop. All bacteria are prokaryotes:



(* = not all bacteria have this)

Part	Function
Plasmids	Small rings of extra bacterial DNA.
Flagella*	A tail-like protein strand that lashes about, allowing the bacterial cell to move around.
Slime capsule*	For protection and to stop the bacterial cell drying out.

How do we study cells?

Microscopes are used to see and study cells. Light microscopes work by shining light through a specimen on a slide. The light is then refracted through an objective lens and an eyepiece lens to form a magnified **image** on your eye. You can find out the total magnification of a microscope by multiplying the objective lens magnification by the eyepiece lens magnification.

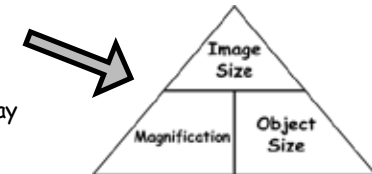
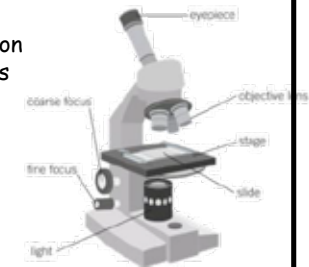
Magnification is how many times bigger the **image** is than the actual **object** you're looking at.

Magnification = Image size ÷ Object size

You may be asked to calculate a magnification of a biological **image** printed in an exam question, and may have to express your answers in standard form.

Microscopes have developed over time. The first light microscope was invented in the 1700s. The electron microscope was developed in the 1930s and provides much greater resolution than a light microscope.

The best light microscopes can achieve magnifications of x2000 but the electron microscope can achieve magnifications of x2000000. They use a beam of electrons instead of a beam of light. The increased magnification and resolution of electron microscopes allowed biologists to see and understand the small structures found **inside** cells (e.g. ribosomes).



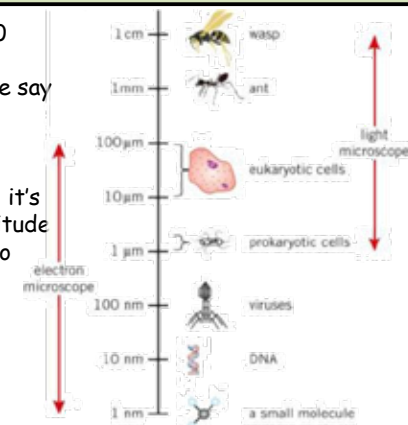
Resolution is the ability to distinguish between two separate points. The greater the resolution, the finer the detail that you are able to see.



Orders of magnitude

If something is 10 times bigger than something else, we say it is 1 order of magnitude bigger (10¹). If it is 100 times bigger then it's 2 orders of magnitude bigger (10²) and so on...

- 1 cm = 10 mm
- 1 mm = 1000 µm
- 1 µm = 1000 nm



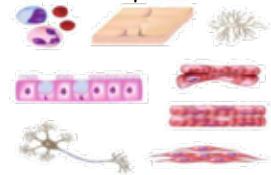
Cells and Communicable Diseases

Specialised Cells

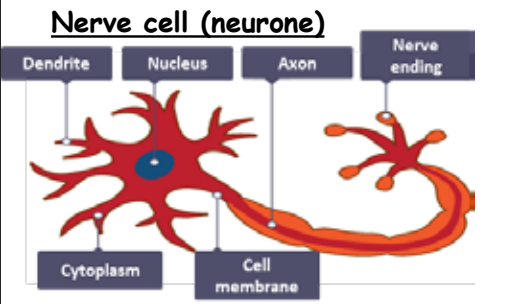
Not all cells have the basic shape and structure as shown in the simple animal/plant cell diagrams on the other page. There are actually many different types of animals and plant cells that have specific functions within an organism.

From an early stage in an organism's development cells begin to **differentiate**. Differentiation is the process by which cells will change and acquire new internal structures that will allow them to carry out a specific function. Cells that have differentiated are called **specialised cells**.

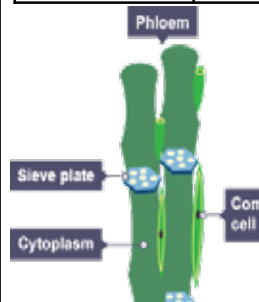
- Most types of animal cell differentiate at an early stage. In mature animals, cell division is mainly restricted to repair and replacement
- Many types of plant cells retain the ability to differentiate throughout life.



Examples

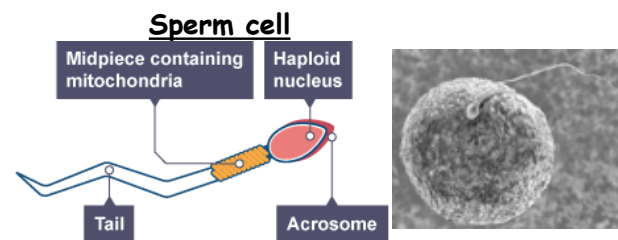


Adaptation	Explanation
Dendrites and nerve endings	Make connections allowing them to communicate with other cells
Long axon	The cell is extended by its long axon so it can connect to different parts of the body

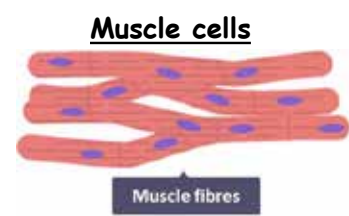


Phloem Tubes (in plants)

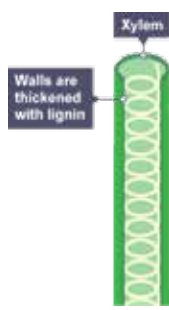
Adaptation	Explanation
Sieve plates (broken cell walls)	The holes in the sieve plates allow the movement of dissolved sugars to be transported around the plant
Have companion cells	Phloem cells don't have many internal structure of their own, so their companion cells help keep them alive.



Adaptation	Explanation
Tail	Allows them to swim to the egg cell
many Mitochondria	Releases plenty of energy from respiration to operate the tail
Acrosome	Contains enzymes that allow it to penetrate the egg cell
Haploid nucleus	(haploid='half') Has half the DNA needed to make an embryo.



Adaptation	Explanation
Cells fused together	Fused cells form muscle fibres that contract in unison to create a strong pulling force
many Mitochondria	Needed to release enough energy for muscle contraction



Xylem vessels (in plants)

Adaptation	Explanation
Dead cells fused together to form a hollow tube	Creates a single uninterrupted tube that allows water and mineral ions to move up the plant
Thick walls with spirals of lignin	Lignin makes the walls woody and therefore strong. This allows it to resist the water pressure and support the plant



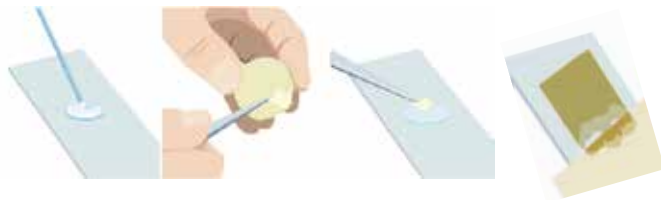
Adaptation	Explanation
Long extension of cell membrane	Increases surface area of the cell to increase the absorption of water and mineral ions from the soil
Thin walls	To not restrict the absorption of water
Large vacuole	Increases the rate of osmosis, by which water moves into the cell
Many Mitochondria	Releases energy from respiration to actively transport rare mineral ions from the soil

Cells and Communicable Diseases

Required practical: Use a light microscope to observe, draw and label biological specimens

How to prepare a stained slide of onion (plant) cells

- Use a **dropping pipette** to put one drop of **water** onto a **microscope slide**.
- Peel off a thin layer of tissue from a piece of **onion** and place on the slide.
- Put a drop of **iodine stain** onto the onion tissue.
- Lower a **cover slip** on top trying not to get any air bubbles.



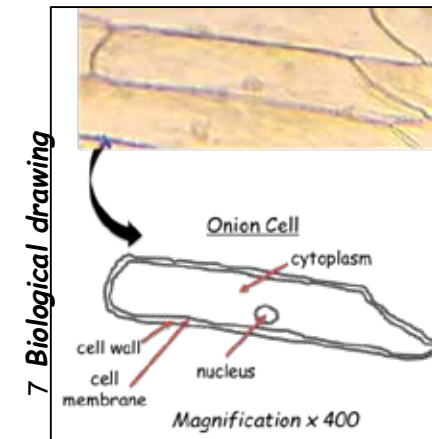
How to prepare a stained slide of cheek (animal) cells

- Use a **dropping pipette** to put one drop of **water** onto a **microscope slide**.
- **Swab** the inside of your mouth with a clean cotton bud.
- Rub the cotton bud in the drop of water to transfer the animal cells to the slide.
- Put a drop of **methylene blue stain** onto the animal cells.
- Lower a **cover slip** on top trying not to get any air bubbles.



How to view your slide under the microscope

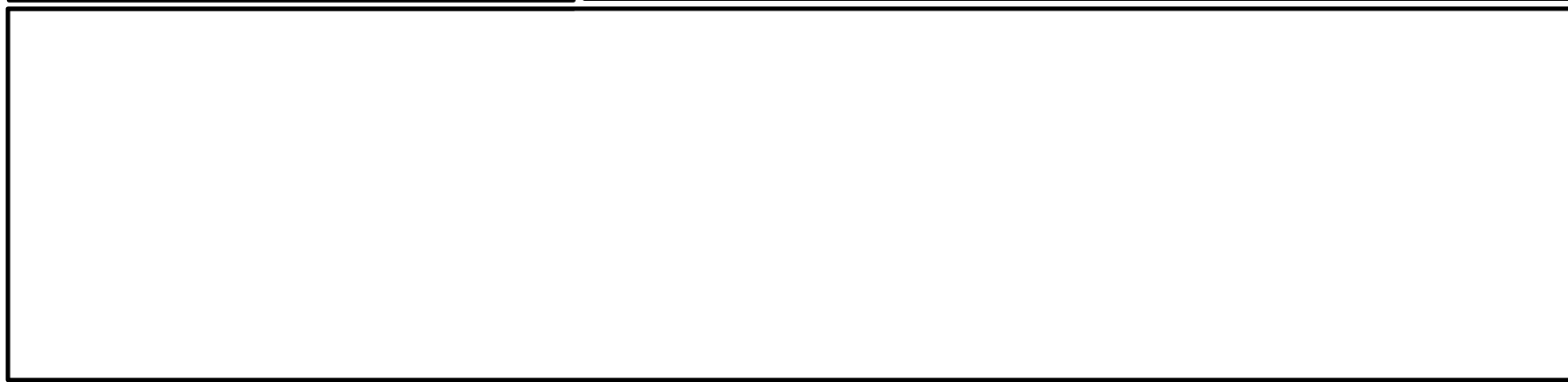
1. Put the slide on the **microscope stage**.
2. Use the **lowest power objective lens**
3. Turn the **coarse adjustment knob** to move the stage up to just below the objective.
4. Now looking through the eyepiece, use the coarse adjustment knob to move the stage downwards until the image is roughly **in focus**.
5. Adjust the focus with the **fine adjustment** until you get a clear image.
6. Now rotate the nosepiece to use a **higher power objective lens**.
7. **Draw what you see** using a pencil and label your biological drawing. Include a title and the magnification.
Remember to multiply the objective magnification by the eyepiece magnification.



Cells and Communicable Diseases

Health and Disease	
<p>Health is a state of mental and physical well-being. Diseases are a major cause of ill-health. Other factors including diet, stress and life situations can have a profound effect on health.</p>	
Communicable Disease	
<p>Communicable diseases are infectious and are caused by tiny microorganisms called pathogens. The different types of pathogens are:</p>	
Viruses	A virus 'hijacks' our cells. It gets inside cells and uses the host cell's resources to reproduce itself , damaging or even killing the host cell eventually.
Bacteria	A bacterium gets inside the body and releases toxins (chemicals that damage our tissues) and makes us feel ill.
Protists	A protist can release toxins and attack cells.
Fungi	A fungus can grow through and invade tissues, causing damage.
<p>Pathogens can be spread by direct contact, by water or by air. General ways to prevent the spread of most pathogens include washing hands thoroughly, coughing/sneezing into tissues & disposing of them straight away as well as disinfecting surfaces.</p>	

Communicable diseases you ought to learn					
Disease	Type	Symptoms	Spread by	Prevent spread by	Treatment
Measles	Virus	- Fever - Red skin rash	Inhaling droplets from sneezes/ coughs	- Vaccination - Cough/sneeze into tissues	- No cure , use painkillers
HIV (leading to AIDS)	Virus	- HIV is initially flu-like - Damages immune system causing AIDS - where the body can no longer fight off other dangerous diseases which can kill.	- Sexual Contact - In blood when drug users share needles	- Wearing condoms during sex - Not sharing needles	- No cure BUT antiretroviral drugs can stop people from developing AIDS
Tobacco mosaic virus	Virus	- Affects plants - Creates a 'mosaic' pattern of discoloration on leaves, stunting growth	- Contact with other plants , naturally or by farmers' gloves.	- Destroying infected plants - Wash infected tools /gloves	- No cure , only prevention
Salmonella food poisoning	Bacteria	- Fever - Abdominal Cramps - Vomiting - Diarrhoea	- Eating food prepared unhygienically / undercooked meat	- Vaccinate chickens - Disinfect surfaces /wash hands after touching raw meat.	- Antibiotics - Plenty of fluids
Gonorrhoea	Bacteria	- Thick yellow/green discharge from the vagina/penis - Pain when urinating	- Sexual Contact	- Wearing condoms during sex	- Antibiotics
Malaria	Protist	- Fever - Can be fatal	- Spread when mosquitos bite humans	- Destroying mosquito breeding grounds - Use mosquito nets	- Antimalarial drugs
Rose black spot	Fungus	- Affects leaves - Purple/Black spots - Turn yellow and drop off early, stunting growth	- "Rain splash" or wind spreads fungus from plant to plant	- Using fungicides - Destroying the affected leaves	- Using fungicides (chemicals that kill fungi)



Cells and Communicable Diseases

Discovering drugs

Traditionally drugs were extracted from **plants** or **microorganisms**.

Most **new** drugs are synthesized by chemists in the **pharmaceutical industry**. However, the starting point may still be a chemical extracted from a plant.

- The heart drug **digitalis** originates from foxgloves.
- The painkiller **aspirin** originates from willow trees.
- **Penicillin** was discovered by Alexander Fleming from the **penicillium** mould.



Painkillers and Antibiotics

Medicinal **drugs** are either used to **treat the cause** of a disease or **ease the symptoms**.

Painkillers treat the symptoms of an illness; they do not kill **pathogens**.

Antibiotics (e.g., **penicillin**) kill **bacteria** inside the body. They damage bacterial cells without harming your own cells. **Specific bacteria** should be treated with **specific antibiotics**.

Antibiotic resistant strains of bacteria are evolving. **Antibiotics** that used to work against a particular type of **bacteria** no longer have an effect, they do not cure the disease. This is of great concern.

Antibiotics do not kill **viral pathogens**. Viruses reproduce inside body cells so it is very difficult to develop **antiviral** drugs that will kill the **virus** *without* damaging body cells.

In clinical trials doctors use a **double-blind trial**. The patients taking part are randomly divided into groups, some are given a **placebo** (fake drug) and others are given the **new medicine**. Neither the doctor nor the patients know who is receiving what treatment to prevent bias.



Developing drugs

New medical drugs must be tested and trialled before being used to check...

- If they are safe - **toxicity**
- If they work - **efficacy**
- How much should be given - **dosage**



Preclinical testing is carried out in **laboratories** using **cells**, **tissues** then **live animals** to check for toxicity.

Drugs that are successful in move onto **clinical trials** using **healthy volunteers** then **patients**.

1. Very low doses of the drug are given at the start of the clinical trial to **healthy volunteers** to check for **side effects**.
2. A **small number** of **patients** are trialed to see if the drug treats the disease.
3. A **larger group** of **patients** are trialed to find the **optimum dose** for the drug and check it works.

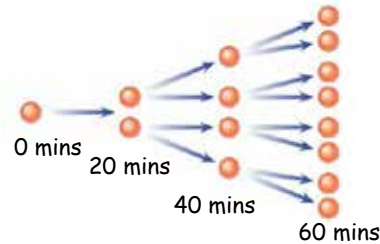
Scientist check each others work in a process called **peer review** to prevent **false claims**.

If successful, the drug can be licensed.

Cells and Communicable Diseases TRIPLE CONTENT

Required Practical: Culturing microorganisms

Bacteria multiply by binary fission as often as once every 20 minutes if they have enough nutrients and a suitable temperature.



Bacteria reproduce at regular intervals. This allows mathematical calculations to be undertaken in order to predict how many bacteria will be present in a given time.

Calculating the number of bacteria in a population

Example question: The mean division time for bacteria population A is 20 minutes. If you begin with one bacteria, calculate how many bacteria will be present after 6 hours.

Step 1: Calculate how many times the bacteria divide

In this example bacteria divides every 20 minutes, so will divide three times every hour (60/20=3). If the bacteria grow for 6 hours, each bacterium will divide 3 times per hour × 6 hours = 18 times.

Step 2: Calculate the number of bacteria in the population. Every time the bacteria reproduce, the number doubles. You can use an equation to do this.

Bacteria at the end of the growth period
= **bacteria at the beginning** × **2^{number of divisions}**

Number of bacteria at the beginning = 1

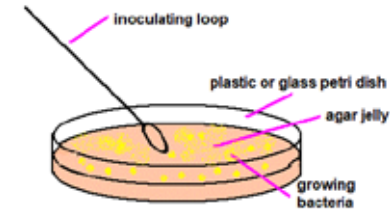
Number of divisions = 18

Using the above equation: $1 \times 2^{18} = 262,144$ bacteria

Bacteria can be grown in a nutrient broth solution or as colonies on an agar gel plate.



Petri dish setup for culturing microorganisms



© Dr Phil Brown

Uncontaminated cultures of microorganisms are required for investigating the action of disinfectants and antibiotics.

This is done by using the following aseptic techniques to avoid contamination:

Petri dish and culture media are sterilised before use.



An inoculating loop can be used to transfer bacteria. It is sterilised by heating it to red hot in a flame before and after use, in order to prevent contamination.

To inoculate the agar, the lid of the petri dish is lifted and tilted. The lid is not fully removed or placed on the desk to prevent microorganisms in the air contaminating the culture.

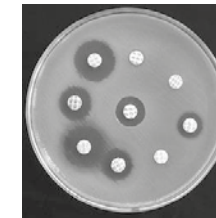


The lid of the petri dish should be secured in place by strips of tape. The lid is not completely sealed to allow oxygen in, which prevents dangerous anaerobic bacteria from growing.

The petri dish should be stored upside down to prevent condensation developing on the lid and contaminating the plate. The cultures are incubated at 25°C to reduce the change of growing harmful pathogens that could survive at human body temperature.

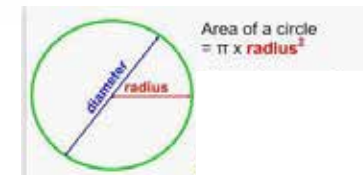


The cross-sectional areas of exclusion zones can be calculated to compare effectiveness of disinfectants or antibiotics.



The centre of the exclusion zone is difficult to estimate, so the diameter is measured and divided by 2 in order to find the radius.

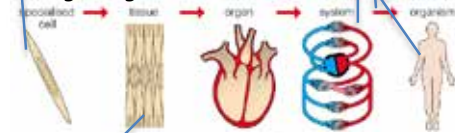
$A = \pi r^2$ is then used to calculate area of the exclusion zone.



Body Systems

Tissues & Organs

Cells: Basic building blocks of living things



Tissues: Group of cells with similar structure & function

Organs are organised into **organ systems** (e.g. digestive system) which work together to form **organisms**

Organs: Groups of tissues performing specific functions

Chemistry of Food

Carbohydrates:

- provide us with **fuel** to carry out all the reactions in our bodies.
- Contain **C, H & O** & are made of units of **sugar**, sometimes just 1 or more than 1 unit joined together.

Lipids:

- Are fats (solid) & oils (liquid)
- Most efficient **energy store** in the body & source of energy, role in **cell membranes** & as **hormones**.
- Made up of **3 fatty acids** joined to **1 glycerol**.
- **Different** combination of **fatty acids** determine nature of lipid.

Proteins-

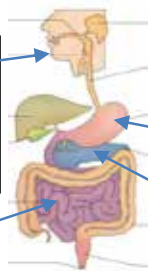
- Used for building up cells & tissues, as well as **enzymes**.
- Made up of **amino acids**. **Different** arrangements of **20 different amino acids** creates different proteins.

How the digestive system works

Amylase (a carbohydrase) breaks down **carbohydrate** & is produced by the **salivary glands**, & used in the **mouth**.

Starch (a carbohydrate) → **sugars**

Protease & lipase produced by & used in the **small intestine**



Food is broken down by **digestive enzymes** into **small, soluble** molecules that can be absorbed into the blood.

Protease breaks down **proteins** & is produced by & used in the **stomach**. **Protein** → **amino acids**

Amylase, lipase & protease produced by the **pancreas**. **Lipase** breaks down **lipids**. **Lipid** → **fatty acids & glycerol**

Making digestion efficient

The **stomach** environment is **acidic**. This kills most bacteria & is the **optimum pH** for **protease** enzymes.

The **small intestine** requires an **alkaline** environment for the enzymes here to work.

Bile made in the **liver**, & stored in the **gall bladder**, flows into the **small intestine** to **neutralise** the **hydrochloric acid** from the **stomach**.

The **bile** also breaks down large **drops of fat** into **smaller droplets**, **increasing** their **surface area (SA)**. This is called **emulsification**.

The **alkaline** conditions & **large SA** **increase** the rate of fat breakdown by **lipase**.

Factors affecting enzyme action

Enzyme-controlled reactions are affected by **temperature** & **pH**.

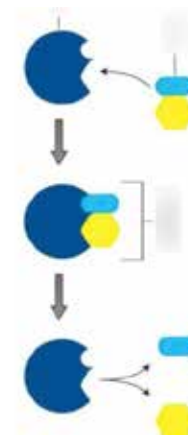
Increasing **temperature** increases the **rate** of an **enzyme-controlled** reaction, but only up to the **optimum temperature** after which the **enzyme's protein structure** is altered & the **enzyme is denatured**.

The **substrate** no longer fits in the **altered** shape of the **active site**.

A change in **pH** away from the **optimum** also alters the shape of the **active site** & therefore **denatures** the **enzyme** too.

Catalysts & Enzymes

An enzyme is a biological catalyst that **speeds up** chemical reactions.



1. **Substrate** has a **complementary shape** to the...

2. **Enzyme's...**

3. **Active site** which it fits into perfectly...

4. **Substrate** splits into **products** which leave **active site**...

5. **Enzyme** is **unchanged** & ready to use again.

Enzymes are **not** used up in a chemical reaction.

They can be used to:

- Build big molecules from small molecules
- Break down big molecules into small molecules
- Change a molecule into another molecule

Body Systems

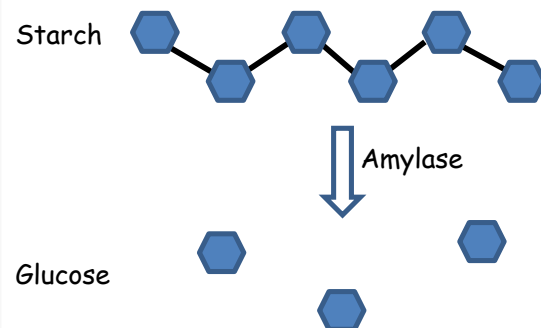
Required Practical- Food Tests

<u>Test for sugar: Benedict's test</u>	<u>Test for protein: Biuret reagent</u>	<u>Test for starch: iodine</u>	<u>Test for lipids: ethanol</u>
<p><u>Method</u></p> <ol style="list-style-type: none"> Crush food using a pestle and mortar Put your food sample into a test tube. Add a few drops of Benedict's solution to the sample in the test tube. Heat up the sample for 5 minutes. <p><u>Results</u></p> <ul style="list-style-type: none"> Colour change from blue to light green shows a little sugar is present Colour change from blue to brick red shows a lot of sugar is present (a positive result) 	<p><u>Method</u></p> <ol style="list-style-type: none"> Crush food using a pestle and mortar Put some of the food sample into a test tube. Add a few drops of biuret solution Shake the tube gently to mix. <p><u>Results</u></p> <p>Colour change from blue to lilac in presence of protein (a positive result)</p>	<p><u>Method</u></p> <ol style="list-style-type: none"> Crush food using a pestle and mortar Put some of the food sample into a test tube. Add a few drops of iodine Shake the tube gently to mix. <p><u>Results</u></p> <p>Colour change from orange to blue/black in the presence of starch (a positive result)</p>	<p><u>Method</u></p> <ol style="list-style-type: none"> Crush food using a pestle and mortar Add a few drops of distilled water Add a few drops of ethanol Shake the solution gently <p><u>Results</u></p> <p>A milky white emulsion forms in the presence of lipid (a positive result)</p>

Required Practical- The effect of pH on an enzyme

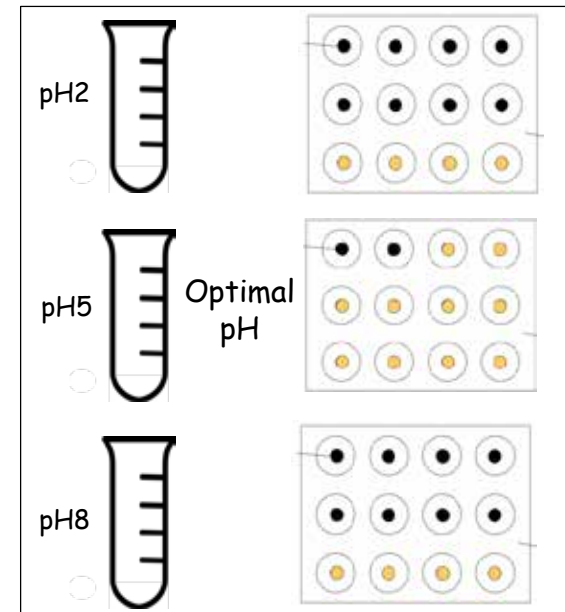
A **buffer** is a solution at a certain pH.

Amylase is an enzyme that breaks down **starch** into **glucose**



Method

- Different buffers** with different pHs are placed in separate test tubes (independent variable)
- Amylase and starch are added to each test tube.
- Every 30 seconds each** solution is tested with **iodine** in a dimple tray
- When the amylase has completed the breakdown of starch, the iodine will stop turning **black** and will remain **orange**
- The solution that contains the **buffer closest to the optimum (best) pH** for amylase, will **stop turning black the quickest**







Body Systems

The Circulatory System

Made of the blood, heart and blood vessels, it's job is to transport blood around the body, carrying oxygen from the lungs and glucose from digestion to the cells that need them, as well as to carry waste substances to be removed from the body.

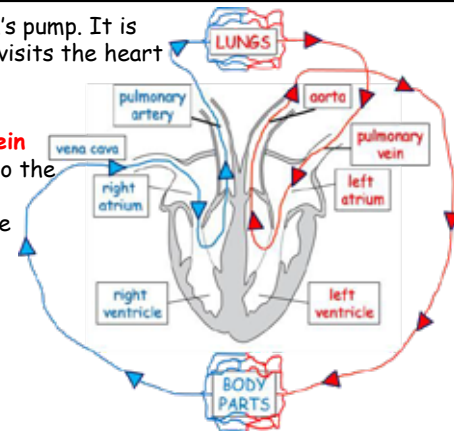
Blood is a tissue containing the following 4 components:

Component	Function
 Red Blood Cells	Carry oxygen. A biconcave shape gives them an increased SA:V ratio for diffusion of oxygen. The red pigment haemoglobin binds to oxygen.
 White Blood Cells	Make up the immune system. They attack invading microorganisms (pathogens).
 Platelets	Fragments of cells - cause clotting at the sites of wounds
 Plasma	A straw-coloured fluid in which the platelets, red & white blood cells are suspended. It carries dissolved CO ₂ and glucose.

The Heart

The heart is a muscular organ; the circulatory system's pump. It is called a double circulatory system because the blood visits the heart twice in it's journey around the body.

Blood picks up **oxygen** from the **LUNGS** and becomes **oxygenated**. It enters the heart via the **pulmonary vein** passing into the **left atrium**, before being pumped into the **left ventricle**. The **left ventricle** has a very thick muscular wall that **contracts** to pump blood out of the **aorta** and to deliver **oxygen** to all the different **body parts**. Having delivered its oxygen, it becomes **deoxygenated**, and returns to the heart via the **vena cava**, passing through the **right atrium** and **right ventricle**. It is then pumped through the **pulmonary artery** to pick up more **oxygen** from the **lungs** again.

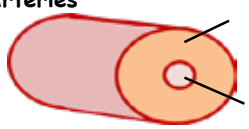
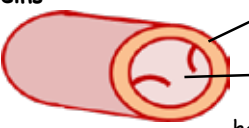


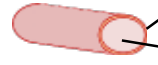


The right atrium also contains a small patch of cells that control the resting heart rate. This is called the **natural pacemaker** and is found in the **right atrium**.

Heart Diseases

In coronary heart disease layers of fatty material build up inside the coronary arteries (blood vessels supplying heart muscles with oxygen), narrowing them. This reduces the flow of blood through them, resulting in a lack of oxygen for the heart muscle.

Blood Vessels

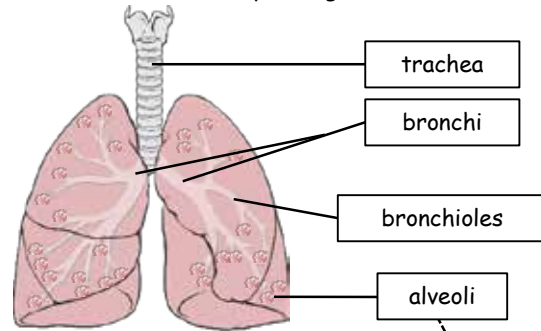
Vessel	Structure & Function
 Arteries thick muscular, elastic walls small lumen	Arteries take blood Away from the heart. They are strong and can stretch to deal with the blood at high pressure. The thick walls are made of muscle and elastic tissue.
 Veins relatively thin walls large lumens has valves	Veins take blood in to the heart. Valves prevent backflow of blood and keep blood flowing in the right direction.  (Forward-flow valves open)  (Backflow valves close)
 Capillaries Walls only 1 cell thick Very narrow lumen	Capillaries are tiny vessels found in the lungs & the body parts, being just 1 cell thick, they allow oxygen and CO ₂ to diffuse into and out of the blood.

Treatments	Treats...	How it works
Artificial Pacemakers	Irregularities in heart rate	Gives out electrical pulses to control the heart rate.
Stents	Coronary Heart Disease (CVD)	Opens up the coronary arteries to keep blood flow to the heart muscle.
Statins	High Cholesterol that can lead to CVD	reducing blood cholesterol levels slows down the rate of fatty material deposit.
Replacement valves	Faulty/Leaky Heart Valves	2 types: biological valves come from pigs/human donors, mechanical valves are built from man-made materials.
Heart Transplants	Heart Failure	From human donors. Artificial hearts temporarily used when a patient waits for a transplant, or to rest the heart as an aid to recovery.

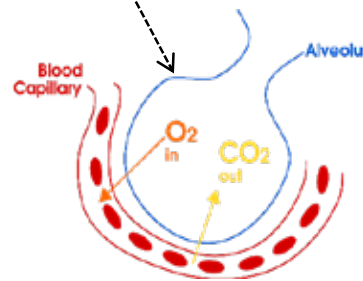
Body Systems

The Respiratory System

The respiratory system gets oxygen from the air into lungs during inhalation (breathing in) and removes waste carbon dioxide from the body during exhalation (breathing out).



Inhaled air eventually reaches the alveoli, grape-like air sacs. This is where gas exchange with the blood happens. The alveoli are well adapted for gas exchange.



<u>Adaptation</u>	<u>Explanation</u>
Thin walls	This reduces the distance that the oxygen needs to diffuse to get into the blood, increasing the rate of diffusion.
Huge surface area	The tiny size, round shape and large number of these alveoli in the lungs greatly increases the surface area for diffusion, increasing the rate of diffusion.
Surrounded by capillaries	The network of capillaries provides a constant flow of blood around the lungs, maintaining an oxygen concentration gradient, maintaining a high rate of diffusion.

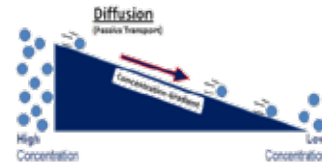
Remember these adaptations increase the rate of diffusion of waste carbon dioxide out of the blood as well!

Transport- in and out of cells

Cells must take in useful substances like glucose and oxygen for respiration, and remove waste substances such as carbon dioxide and urea. Cells must also control how much water they contain. The cells use three transport processes to do this: **diffusion, osmosis and active transport.**

Diffusion

Particles move around randomly. They bump into each other and this moves them all around

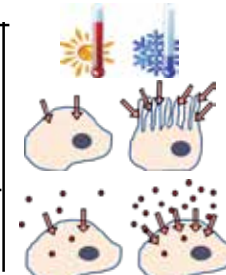


Diffusion is the net movement of particles from an area of high concentration to an area of low concentration down a concentration gradient.

(Use the diagram to the left to help you remember this important definition)

Factors that affect the rate of diffusion include:

Temperature	An increase in temperature causes particles to move around more quickly and increases the rate of diffusion.
Surface Area	If the diffusion surface has folds in it then it has a larger surface area over which diffusion can take place. This increases the rate of diffusion.
The difference in concentration	The bigger the difference in concentrations, the steeper the concentration gradient. This increases the rate of diffusion.



Active Transport

Unlike diffusion and osmosis (passive processes), active transport **requires energy.**

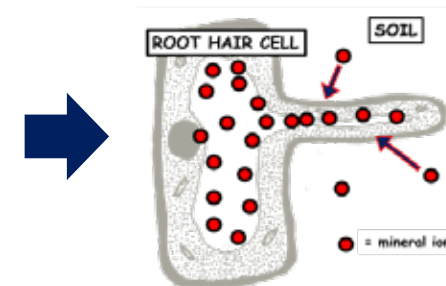


Active transport moves substances from an area of low concentration to an area of high concentration against a concentration gradient. It requires energy from respiration

Active transport allows:

- mineral ions to be absorbed into plant root hairs from very dilute (low concentration) solutions in the soil. Plants require ions for healthy growth.
- glucose molecules to be absorbed from the lower concentrations in the gut into the blood which has a higher glucose concentration.

This is achieved by special 'protein pumps' found in the cell membranes.



SCIENCE



Year 9 Chemistry topics

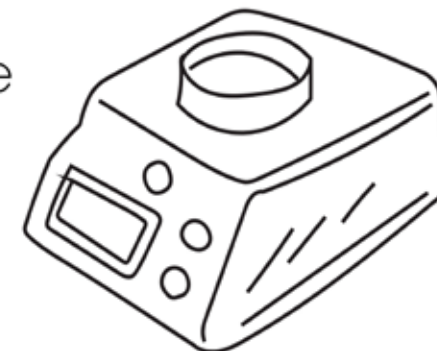
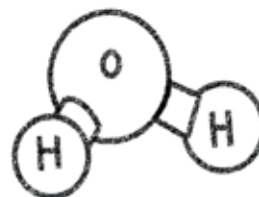


Topic one: Atomic Structure and The Periodic Table



Topic two: What is it made of ?

Topic three: The Earth's Atmosphere



Atomic Structure and the Periodic Table

Atoms, Elements and Compounds

All substances are made up of **atoms**. **Atoms** are the smallest part of an element that can exist.

Atoms have a radius of about 0.1 nm (1×10^{-10} m)

Atoms of each element are represented by a chemical symbol:

O for oxygen

Ca for calcium

If the symbol only contains 1 letter, this letter must be capital.

If the symbol contains 2 letters, the first must be capital and the second must be lower case.

An **element** is a substance made up of only **one type of atom**.

Compounds contain two more elements chemically combined in fixed proportions:

CO₂ for carbon dioxide

No small number after C means there is 1 carbon atom in carbon dioxide.

A small 2 after the O means there are 2 oxygen atoms in carbon dioxide.

Compounds can only be separated into **elements** by chemical reactions.

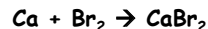
Naming compounds of 2 elements:

- The name of the metal goes first
- The name of the non-metal goes second
- The non-metal name ends in -ide

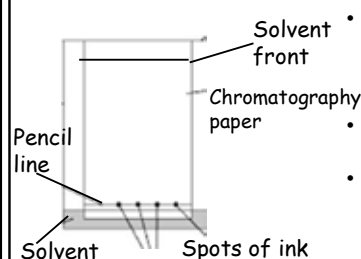
Word equation:

calcium + bromine → calcium bromide

Symbol equation:



Chromatography - for separating a mixture of substances dissolved in a solvent e.g. inks



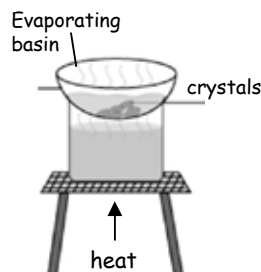
- Distance travelled by the spot depends on the **solubility** of the substance.
- Pencil line must be **above** solvent.
- Must be drawn in pencil as ink will dissolve and run up the paper.

Filtration - for separating insoluble solids from a liquid or solution.



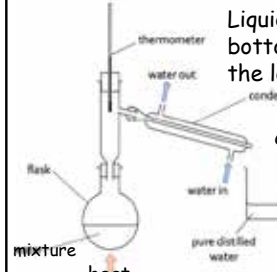
- Filter paper has tiny holes (pores) in it. Small solute molecules and dissolved substances can pass through the pores.
- Large particles of undissolved solid are too big to pass through.

Crystallisation - for forming crystals from a solution



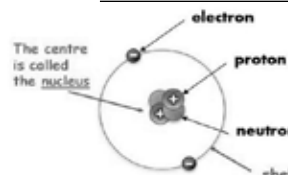
- Evaporating** water from a solution on a water bath is gentler than heating directly.
- Stop heating at the point of **crystallisation** - when crystals appear.
- Set aside so excess water can evaporate and crystals form slowly.

Distillation - for separating a mixture of liquids



- Liquids are heated in the round bottomed flask until the one with the lowest boiling point **boils**. Its vapour travels down the condenser where it **condenses**.
- The pure liquid is collected.
- Liquids with **higher boiling points** are left in the flask

Structure of the atom:



In an atom the number of **protons** is equal to the number of **electrons**.

particle	mass	charge
electron	v. small	-1
proton	1	+1
neutron	1	0

Atoms have no overall charge

Mass number (number of protons + neutrons in the atom).

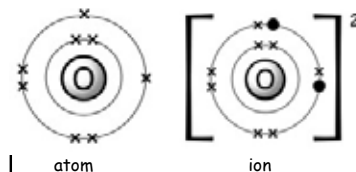


chemical symbol.

Atomic number (number of protons in the atom).

Electronic structure

Electrons are arranged around the nucleus in shells. The shell closest to the nucleus (1st shell) is filled first and can hold up to 2 electrons. The 2nd shell can hold up to 8 electrons. The 3rd shell can hold up to 8 electrons.



e.g. Oxygen atoms have 8 electrons. The electron structure is 2,6.

Ions and isotopes

If atoms lose or gain electrons they become charged.

Charged atoms are called **ions**.

They are charged because the numbers of protons and electrons are different.

E.g. the Li⁺ ion has 3 protons (positive) and 2 electrons (negative).

Atoms with the same number of protons but different numbers of neutrons are called **isotopes**.

Isotopes are atoms of the same element but with different **masses**.



Atomic Structure and the Periodic Table

Periodic Table

The **periodic table** is a list of elements arranged according to their **atomic number**.

Elements in the same **group** have the same number of electrons in their outer shell (e.g. group 1 all have 1 electron in their outer shell) and similar **properties** (e.g. the noble gases are all very unreactive gases). The number of **electrons** in an element's outer shell determines its **chemical properties**.

Metals and non-metals

- **Metals** are found on the **left** side of the periodic table and **non-metals** are found on the **right**.
- **Metals** form **positive** ions (Li^+)
- **Non-metals** form **negative** ions (O^{2-})

General physical properties	
Metals	Non-Metals
Lustrous (shiny)	Dull
Good conductor	Poor conductor
High density	Low density
Strong	Brittle
Malleable and ductile	
High melting point	Low melting point

History of the Periodic Table

Before the discovery of subatomic particles (electrons, neutrons and protons) periodic tables were arranged based on atomic weight.

Mendeleev and Newlands both suggested different periodic tables.

Newlands	Mendeleev
Ordered elements by atomic weight	
Included only the elements known at the time	Left gaps for undiscovered elements
Arranged by atomic weight only	Arranged by atomic weight and adjusted for chemical properties
Every 8 th element had similar properties (Newlands' Law Of Octaves)	Elements in groups had similar properties
Criticised for grouping elements with very different properties.	Not believed until the gaps he left for new elements proved to be correct.

Each column is a **group**

The group number tells you how many electrons are in the element's outer shell.

Each row is a **period**

The period number tells you how many shells of electrons an element has

Common content with physics:

The development of the atom model - discovery of the electron, the nucleus (alpha scattering), electron shells (Bohr), neutrons (Chadwick)

1		2		3										4	5	6	7	0											
7 Li lithium 3		9 Be beryllium 4												4 He helium 2															
23 Na sodium 11		24 Mg magnesium 12												11 B boron 5	12 C carbon 6	14 N nitrogen 7	16 O oxygen 8	19 F fluorine 9	20 Ne neon 10										
39 K potassium 19		40 Ca calcium 20		45 Sc scandium 21		48 Ti titanium 22		51 V vanadium 23		52 Cr chromium 24		55 Mn manganese 25		56 Fe iron 26		59 Co cobalt 27		59 Ni nickel 28		63.5 Cu copper 29		65 Zn zinc 30		70 Ga gallium 31	73 Ge germanium 32	75 As arsenic 33	79 Se selenium 34	80 Br bromine 35	84 Kr krypton 36
85 Rb rubidium 37		88 Sr strontium 38		89 Y yttrium 39		91 Zr zirconium 40		93 Nb niobium 41		96 Mo molybdenum 42		[98] Tc technetium 43		101 Ru ruthenium 44		103 Rh rhodium 45		106 Pd palladium 46		108 Ag silver 47		112 Cd cadmium 48		115 In indium 49	119 Sn tin 50	122 Sb antimony 51	128 Te tellurium 52	127 I iodine 53	131 Xe xenon 54
133 Cs caesium 55		137 Ba barium 56		139 La* lanthanum 57		178 Hf hafnium 72		181 Ta tantalum 73		184 W tungsten 74		186 Re rhenium 75		190 Os osmium 76		192 Ir iridium 77		195 Pt platinum 78		197 Au gold 79		201 Hg mercury 80		204 Tl thallium 81	207 Pb lead 82	209 Bi bismuth 83	[209] Po polonium 84	[210] At astatine 85	[222] Rn radon 86
[223] Fr francium 87		[226] Ra radium 88		[227] Ac* actinium 89		[261] Rf rutherfordium 104		[262] Db dubnium 105		[266] Sg seaborgium 106		[264] Bh bohrium 107		[277] Hs hassium 108		[268] Mt meitnerium 109		[271] Ds darmstadtium 110		[272] Rg roentgenium 111		Elements with atomic numbers 112 – 116 have been reported but not fully authenticated							

* The Lanthanides (atomic numbers 58 – 71) and the Actinides (atomic numbers 90 – 103) have been omitted.
Relative atomic masses for Cu and Cl have not been rounded to the nearest whole number.

Atomic Structure and the Periodic Table

Group 7 (Halogens)

- Group 7 elements are also known as the **Halogens**.
- Their chemical characteristics are due to the seven electrons in the outer shell of each element. Group 7 elements react to gain an electron to complete their outer shell.
- Halogens exist as diatomic molecules (paired atoms)
E.g. F_2 , Cl_2 , Br_2
- A more reactive halogen can displace another halogen from a compound.
E.g. potassium bromide + chlorine \rightarrow potassium chloride + bromine
- The density, boiling point and melting point of halogens **increase** down the group whereas reactivity **decreases** down the group.

Group 0 (Noble Gases)

- Group 0 elements are also known as the **Noble Gases**.
- These elements are unreactive due to having a complete outer shell of electrons which is very stable.
- The boiling point of noble gases increases down the group.

Group 1 (Alkali Metals)

- Group 1 metals are also known as the **Alkali Metals**. They are known as the alkaline metals as they produce an alkaline solution when reacting with water.
- Their chemical characteristics are due to the single electron in the outer shell of the elements. Group 1 elements lose an electron to leave a complete outer shell.
- Density and reactivity of group 1 metals **increase** down the group whereas the melting point **decreases**.

Reactions of Group 1 metals

- Group 1 elements react vigorously with **chlorine** to form chlorides, which dissolve in water to form colourless solutions.
E.g. sodium + chlorine \rightarrow sodium chloride
- Group 1 elements react with **oxygen** in the air to form metal oxides. The surface of the metal reacts quickly in air so alkali metals are usually stored in oil to prevent a reaction occurring.
E.g. potassium + oxygen \rightarrow potassium oxide
- Group 1 metals all react with **water** to produce a metal hydroxide and hydrogen.
E.g. sodium + water \rightarrow sodium hydroxide + hydrogen

The Transition Metals

- The transition metals are found in the central section of the periodic table and include chromium (Cr), cobalt (Co) and iron (Fe).
- In general transition metals are harder, stronger, denser and have higher melting points than group 1 metals.
- Compared to group 1, the transition metals are much less reactive with oxygen and water. Some do not react at all or require heating and few react with the halogens.
- They are commonly used as catalysts.
- They form coloured compounds whereas group 1 metals form white compounds.
- The same element can also form ions with different charges.
E.g. iron can form Fe^{2+} and Fe^{3+} .

Explaining trends

The reactivity of elements is closely linked to the ability of electrons to be lost or gained. The more easily an electron is lost or gained the more reactive an element.

The reactivity of Group 1 elements increases as you go down the group because:

- group 1 elements are metals, so the outer electron is lost
- the atoms get larger going down the group.
- the outer electron gets further from the nucleus going down the group and there is more shielding.
- the attraction between the nucleus and outer electron gets weaker going down the group - so the electron is more easily lost

The reactivity of Group 7 elements decreases as you go down the group because:

- group 7 elements are non-metals, so they want to gain an electron
- the atoms get larger going down the group
- the outer electron shell gets further from the nucleus going down the group and there is more shielding.
- the attraction between the nucleus and the outer shell gets weaker going down the group - so it's harder to gain an electron

What is it made of?

A **pure substance** is made up of just one type of element or compound.

A **mixture** is made up of two or more different elements or compounds that are not chemically joined together.

A **formulation** is a mixture that has been specifically designed to produce a useful product. Examples include paints and medicinal drugs.

Identifying pure substances

The melting and boiling point of a substance can be used in two ways to tell whether it is pure or not.

1) The **range** of the melting and boiling points will be very small if the sample is pure. Example:

	Pure caffeine	Impure caffeine
Melting point/ °C	234-237	180-220

2) Alternatively, once you have measured the melting or boiling point for a substance you can **compare** it to a **database** of known values.

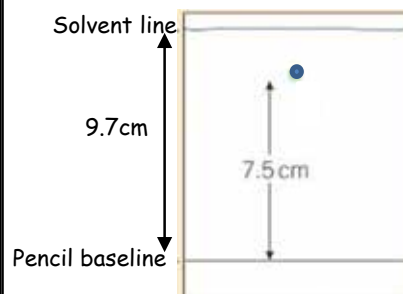
- If the melting point you recorded matches the melting point given in the database, it is pure.
- If the melting point does not match the value in the database, your sample is impure.
- Generally impure substances will have a lower melting point and a higher boiling point than the pure substance.

Chromatography is used to identify unknown compounds in a sample.

- The **mobile phase** moves and carries the different compounds in the sample through the **stationary phase**.
- In **paper chromatography**, the mobile phase is a solvent such as water which carries the sample along the paper (stationary phase).
- The **different compounds** in the sample will **travel different distances** along the paper.
- If a compound is more **strongly attracted** to the mobile phase than the stationary phase, it will **travel further** up the paper.
 - The baseline is **drawn in pencil** and not ink because ink will dissolve in water.
 - The pencil baseline must be **above** the surface of the water otherwise the sample will dissolve into the beaker of water and be lost.

Calculating the Retention Factor value:

$$R_f = \frac{\text{Distance moved by substance}}{\text{Distance moved by solvent}}$$



Example

$$R_f = \frac{7.5\text{cm}}{9.7\text{cm}} = 0.77$$

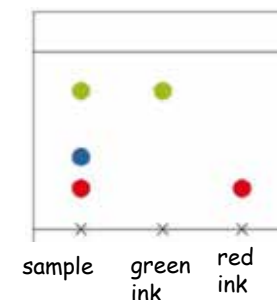
(Measure to the centre of each spot)

Identifying unknown compounds

Calculate the R_f value (see left). Then **compare** that to R_f values of known substances which are **stored in databases**.

The compounds in a mixture may separate into different spots depending on the solvent but a **pure** compound will produce a **single spot** in all solvents.

Alternatively, when we carry out the chromatography we can include known samples and see if any spots travel the same distance.



In this example, two known compounds (red and green ink) have been tested. We can use them to confirm that the unknown sample contains red and green ink because the spots in the sample have travelled the same vertical distance. The sample also contains a 3rd substance that is **not** in red or green ink.

Testing for gases

Hydrogen Test: Hold a **lit splint** near the sample of gas.
Result: Hydrogen will burn with a '**squeaky pop**' sound.

Carbon dioxide Test: Bubble gas through **limewater**
Result: If carbon dioxide is present it will turn limewater **cloudy**.

Oxygen Test: Hold a **glowing splint** near the sample of gas.
Result: If oxygen is present a glowing splint will **relight**.

Chlorine Test: Use **damp blue litmus paper**
Result: Chlorine will bleach damp blue litmus paper **white**.

What is it made of?

CONSERVATION of MASS (from C1)

The law of conservation of mass states that the total amount of substance in a chemical reaction does not change during the reaction. Another way of saying this is the total mass of **reactants** is the same as the total mass of the **products**

RELATIVE masses, A_r and M_r

We cannot weigh single atoms and molecules because they are TOO SMALL. However we can use RELATIVE masses to help us.

Each atom of an element has a **relative atomic mass, A_r** . This is how heavy the atom is compared to a single carbon atom. We assume a carbon atom has a relative mass of exactly 12.

Everything else is compared to this.

Symbols on the periodic table tell us how heavy each element is:

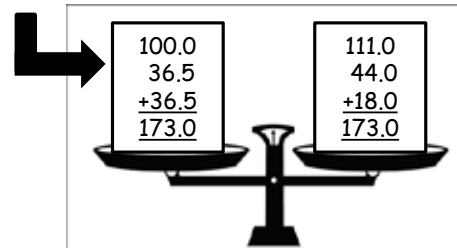
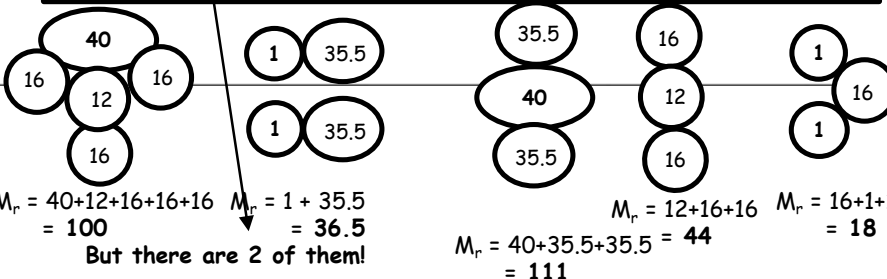
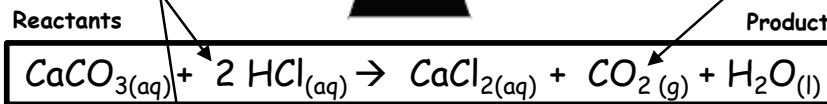
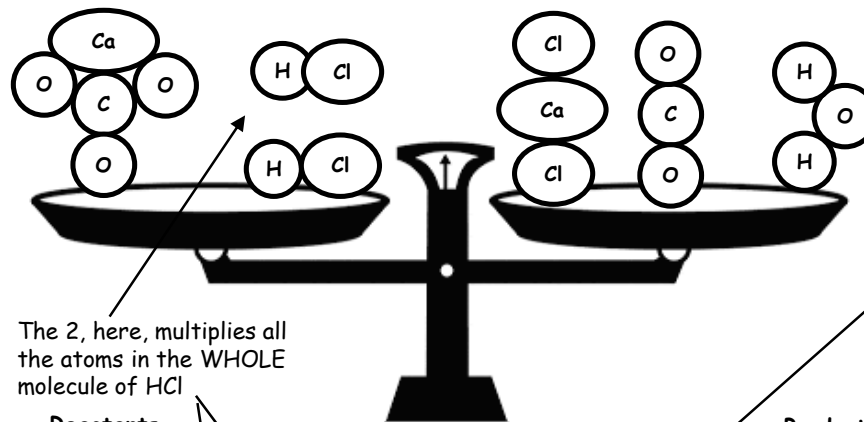
12 C carbon 6	40 Ca calcium 20	11 B boron 5
------------------------	---------------------------	-----------------------

← relative atomic mass A_r

In molecules we can add up the relative masses of EVERY ATOM to give the **FORMULA MASS, M_r**



A balanced chemical equation represents this in a different way: it uses symbols and molecular formulae to show the same balance. The numbers of each type of atom at the start and the finish are the same.



A useful check of your maths is to add up the formula masses for ALL reactants and compare to the total formula masses for ALL products. They **MUST** be the SAME!

When the law seems wrong

Sometimes it can appear that the law of conservation of mass is wrong! It can look like the total mass of substance has either increased or decreased. This occurs in **open-systems** where (usually) a gas is allowed to escape or is used in the reaction.

In this reaction one of the products, CO_2 , is a gas and can escape the reaction.

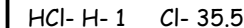
If I weigh the products after doing the reaction in an open container, it will appear that the mass has decreased.

BUT if I could collect and weigh the CO_2 and add it on, I would find the mass does balance! Phew!

PERCENTAGE MASS:

This calculation is used to determine the percentage of an element within a compound.

For example, HCl. Calculate the percentage of hydrogen in hydrochloric acid.



Relative formula mass:
 $1 + 35.5 = 36.5$

Percentage of H in HCl:

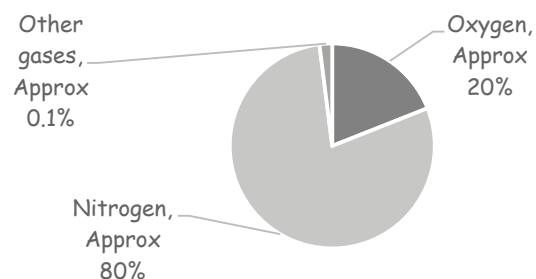
$1/36.5 = 0.027$
 $\rightarrow \% - 0.027 \times 100 = 2.7\%$ of hydrogen in hydrochloric acid.

The Earth's Atmosphere

The modern atmosphere

For 200 million years, the proportions of gases in the atmosphere have been the same as today:

- about four-fifths (approximately **80%**) **nitrogen**
- about one-fifth (approximately **20%**) **oxygen**
- small proportions of other gases, including carbon dioxide, water vapour and noble gases.

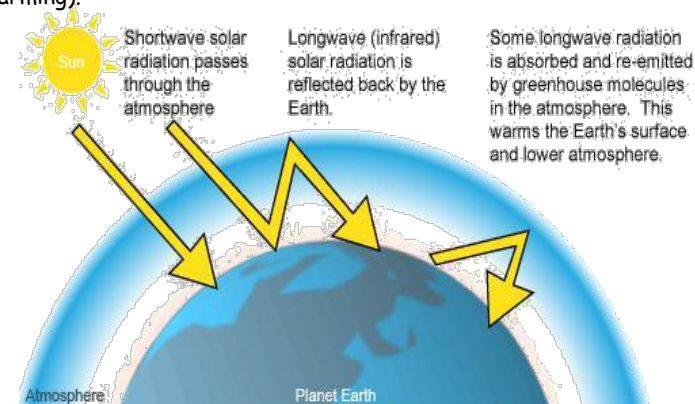


Greenhouse gases

Greenhouse gases include:

Water (H₂O) Carbon dioxide (CO₂) Methane (CH₄)

Without them, the Earth would be too cold to sustain life, but too much of them can cause Earth's atmosphere to heat up (global warming).



Greenhouse gases like CO₂ allow **shortwave** radiation (uv) from the Sun to pass through the atmosphere.

This reaches the ground, where it **heats the Earth's surface**. The Earth cools by emitting longwave radiation (infrared).

CO₂ then absorbs some of the outgoing **longwave** radiation, causing the atmosphere to warm up, as the radiation does not all escape.

The Earth's early atmosphere

It is hard to say exactly how the atmosphere has changed because it has taken 4.6 billion years.

One theory suggests that the first **billion years** of the Earth's existence included **intense volcanic activity**. This released large amounts of **carbon dioxide**, and **nitrogen** and a little **methane** (CH₄) and **ammonia** (NH₃). It may also have released the **water vapour** that later formed the oceans. There was little or no oxygen.

This would make Earth's early atmosphere like **Venus** or **Mars** today (mainly CO₂, little or no O₂)

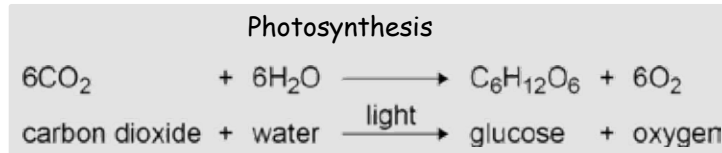
Changes from the early atmosphere to today

As Earth cooled, water vapour **condensed** and formed **oceans**.

CO₂ dissolved in the oceans which formed hard **precipitates** (solids). Some of it was used by sea creatures to make shells, and these later formed **rocks** like **limestone**.

2.7 billion years ago, **algae and then plants** began producing O₂ by **photosynthesis**, which also reduced the CO₂ in the atmosphere. Animals evolved as oxygen levels rose.








Fossil fuels (coal, oil and gas) contain large amounts of carbon, which came from CO₂ in the early atmosphere



The Earth's Atmosphere

Global Climate Change

An increase in average global temperature (**global warming**) is a major cause of **climate change** (long-term changes to earth's weather patterns). This may lead to:

-  Global weather patterns changing (including flooding in some areas and drought in others)
-  Extreme weather events (e.g. hurricanes)
-  Ice caps and glaciers melting
-  Sea-levels rising, causing flooding in coastal regions
-  Desertification
-  Reduced yields of crops
-  Habitats changing

Climate Scientists

Based on peer-reviewed evidence, many scientists believe that **human activities** will cause the **temperature of the Earth's atmosphere to increase** at the surface and that this will result in **global climate change**.

However, it is difficult to model such complex systems as global climate change. This leads to simplified models, speculation and opinions presented in the media that may be based on only parts of the evidence and which may be biased.

Scientific claims from new research that is published in journals must be **peer-reviewed**, (evaluated by other scientists who are experts in that area of science).

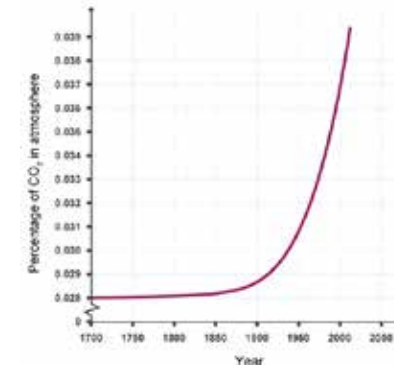
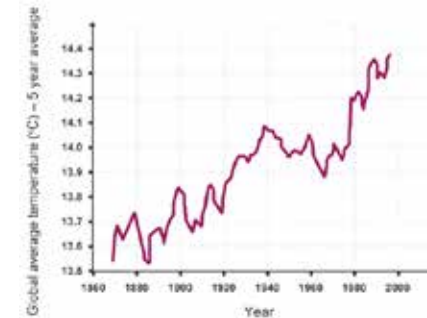
Human Activities

CO₂ levels are increased by:

- Combustion of fossil fuels
- Deforestation

CH₄ levels are increased by:

- Farming cattle
- Growing rice
- Use of landfill



Evaluating evidence

You may be given information about global climate change and be asked to describe, explain or evaluate it.

This includes describing uncertainties in the evidence.

Atmospheric pollutants from fuels

Pollutant	Cause	Problem
Carbon dioxide (CO ₂)	Complete combustion (sufficient oxygen)	Global warming
Carbon monoxide (CO)	Incomplete combustion (lack of oxygen)	Toxic gas. Colourless and odourless.
Sulfur dioxide (SO ₂)	Oxidation of sulfur impurities in fossil fuels	Acid rain & respiratory problems (Asthma)
Oxides of Nitrogen (e.g. NO or NO ₂)	Oxidation of nitrogen in air at high temperatures in a vehicle engine	
Carbon particulates (unburnt hydrocarbons)	Burning diesel	Global dimming, health problems

Carbon footprint = the total amount of carbon dioxide and other greenhouse gases emitted over the full life cycle of a product, service or event.

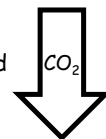
Carbon footprints can be reduced by reducing emission of CO₂ and CH₄ either:

- **Directly**, using "green" energy sources that don't emit CO₂ e.g. solar power and wind power, instead of burning fossil fuels.

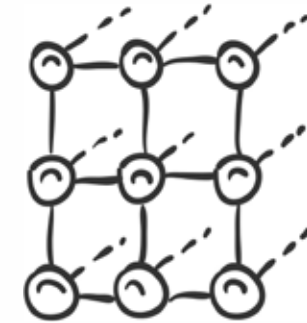
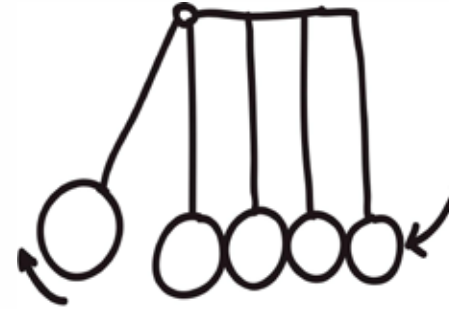
OR

- **Indirectly**, e.g. by insulating a building so it requires less heating, using local materials and products that don't get transported as far

This will then require fewer fossil fuels to be burned for electricity.



SCIENCE

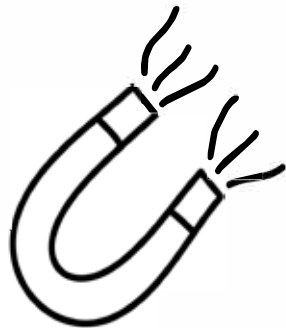


Year 9 Physics topics

Topic one: Electricity and magnetism



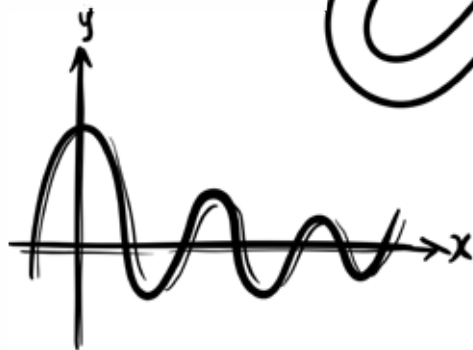
Topic two: Energy I



Topic three: Forces



Topic four: Particle model of matter



$$W = mg$$

Electricity and Magnetism

Circuit Symbols

	switch (open)		lamp
	switch (closed)		fuse
	cell		voltmeter
	battery		ammeter
	diode		thermistor
	resistor		LDR
	variable resistor		LED

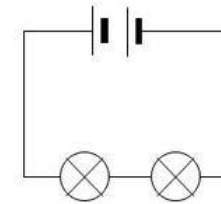
Circuit Equations

Charge flow = Current x time
 $Q = I \times t$

Energy transferred = Charge Flow x Potential Difference
 $E = Q \times V$

- Charge flow, Q , in Coulombs, C
- Current, I , in amperes, A
- Time, t , in seconds, s
- Potential difference, V , in volts, V
- Energy transferred, E , in Joules, J

Series and Circuits



A series circuit

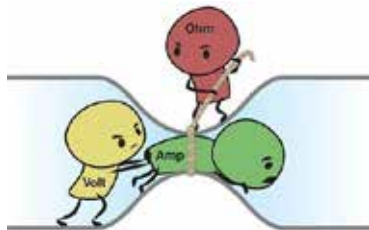
In a series circuit:

- Current is the same through each component

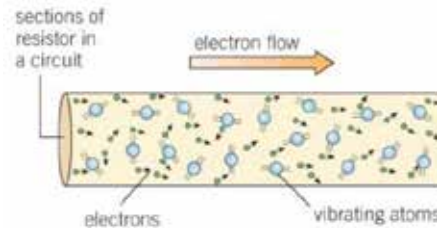
For electrical charge to flow through a closed circuit there must be a source of potential difference.

Current: The rate of flow of electrical charge.

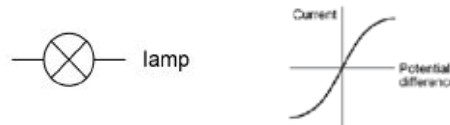
The greater the **resistance** of a component the smaller the current for a given potential difference across the component.



What causes resistance in a wire?

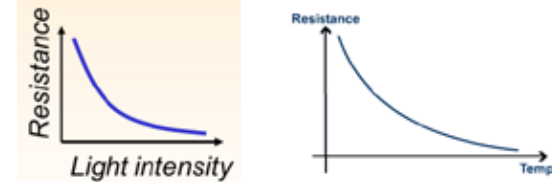


An electric current flows when electrons move through a conductor, such as a metal wire. The moving electrons can collide with the ions in the metal. This makes it more difficult for the current to flow and **causes resistance**. The longer the wire, the more collisions and so the higher the resistance.



Resistance increases as current increases.
Resistance increases as temperature increases.
The ions in the metal filament vibrate more as temperature increases. So they resist the passage of electrons more.

LDRs and Thermistors



The resistance of an LDR (light dependent resistor) decreases as light intensity increases. LDRs are used in turning on streetlights.

The resistance of a thermistor decreases as the temperature increases. Thermistors are used in thermostats.

Electricity and Magnetism

Resistance of a wire Required Practical

Aim: Investigate factors affecting the resistance of electrical circuits including the length of a wire at constant temperature and combinations of resistors in series and parallel.

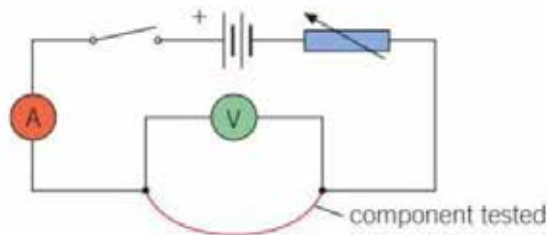
Independent Variable: Length of wire

Dependent Variable:
Current and potential difference to calculate resistance

Control variables:
Thickness of wire
Wire material
Temperature

Equation: $V = I \times R$

Equipment



Method

- Set up the circuit as per the diagram with a 10cm wire.
- Set the power supply to 2V
- Close the switch and record the current and potential difference on the ammeter and voltmeter
- Repeat for 20cm, 30cm, 40cm and 50cm.
- Calculate the resistance for each length using the equation $R = V/I$
- Plot a graph of Resistance vs Length of wire.

I-V Characteristics Required Practical

Aim: Investigate I-V characteristics of a variety of circuit elements

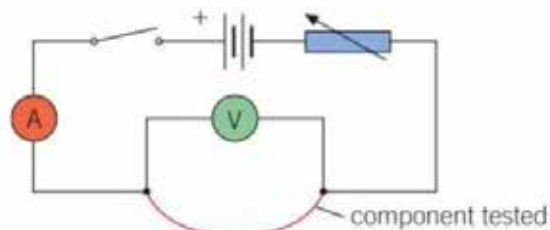
Independent Variable: Circuit component

Dependent Variable:
Current and potential difference

Control variables:
Temperature

Equation: $V = I \times R$

Equipment

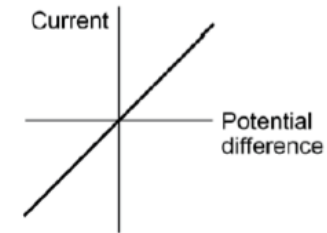


Method

- Set up the circuit as per the diagram with the component to be tested as a Fixed Resistor.
- Set the power supply to 2V.
- Close the switch and record the current and potential difference on the ammeter and voltmeter.
- Repeat for a range of potential differences, by adjusting the variable resistor.
- Reverse the direction of the power supply and repeat the experiment.
- Plot a graph of potential difference vs current.
- Repeat for a Bulb and diode.

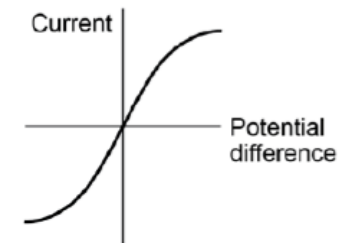
I-V Characteristics Required Practical Results

Ohms Law: The current through a resistor at constant temperature is directly proportional to the potential difference across it



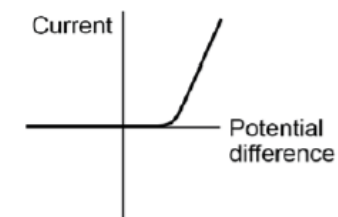
I-V Characteristics for a fixed resistor (linear)

The resistance of a filament lamp increases as the temperature of the filament increases



I-V Characteristics for a Filament Bulb (non-linear)

The current through a diode flows in one direction only. The diode has a very high resistance in the reverse direction.



I-V Characteristics for a Diode

Electricity and Magnetism

The Magnetic Force

When two permanent magnets are brought together they exert a force on each other.

Two like poles **repel**: 

Two unlike poles **attract**: 

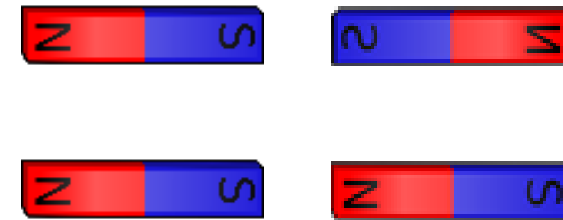
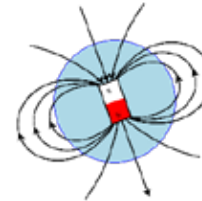
The magnetic force is a **non-contact** force.

Earth's Magnetic Field

A magnetic compass contains a small bar magnet (the compass needle) that points in the direction of the Earth's magnetic field.

The behaviour of a magnetic compass is **evidence** that the core of the Earth must be magnetic.

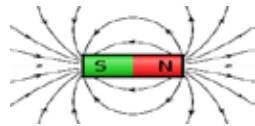
Earth has a magnetic field.



Magnetic Fields

The region around a magnet where a force acts on another magnet or magnetic material is called the **magnetic field**.

For a bar magnet the magnetic field looks like this:



The strength of the magnetic field depends upon the distance from the magnet. The field is strongest at the poles of the magnet.

The **direction** of a magnetic field line is always from **North** to **South**.

The direction of the magnetic field at any point shows the direction of the force that would act on a north pole placed at that point.

We can plot the field pattern of a magnet using a **plotting compass**.



Place the plotting compass near a pole. Draw a dot next to the North arrow. Now move the plotting compass to the other side of the dot and repeat.

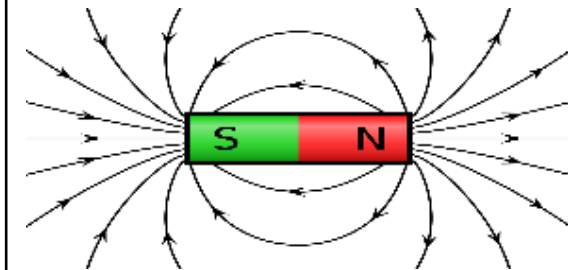
Permanent and Induced Magnets

A **permanent magnet** produces its own magnetic field and always has a North and a South pole.

An **induced magnet** is a material that becomes magnetic when it is placed in a **magnetic field**. When removed from a magnetic field an induced magnet loses most of its magnetism quickly.

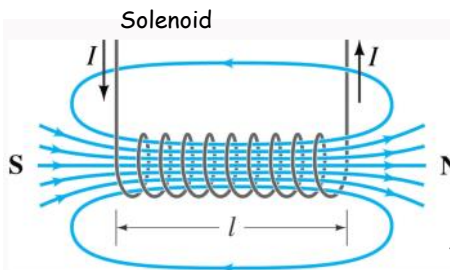
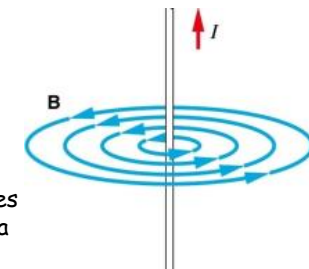
Induced magnetism always creates a force of **attraction**.

Induced magnets are also called magnetic materials. They are made from **iron, steel, cobalt** and **nickel**.



Electromagnetism

When a current flows through a wire a magnetic field is produced. The strength of the field depends on the current in the wire and the distance from the wire.








Shaping the wire into a **solenoid** increases the strength. The magnetic field inside a solenoid is **strong and uniform**.

An **electromagnet** is a solenoid with an iron core. Adding an iron core increases the strength of the magnetic field.

To increase the strength of an electromagnet, **increase the current** or **add more turns** to the solenoid.

Energy

Energy Store	Description
Kinetic Energy 	The energy stored by objects that are moving
Gravitational Potential Energy 	The energy stored in objects raised above ground
Chemical Energy 	The energy stored in fuels, food and batteries
Thermal Energy 	The energy stored by hot objects
Elastic Potential Energy 	The energy stored by stretched or squashed objects

System Change	Decreasing Energy Stores	Increasing Energy Stores
Tennis Ball Projected Upwards	Kinetic	Gravitational Potential
A vehicle slowing down	Kinetic	Thermal
A battery powered drill is turned on	Chemical	Kinetic, Thermal
A person sliding down a zip-wire	Gravitational Potential	Kinetic, Thermal

Energy transferred = Charge x Potential difference

$E = QV$

Energy Transferred= J, joules
Charge = C, coulombs
Potential Difference= V, volts

Efficiency

The efficiency of an energy transfer can be calculated using:

Efficiency = $\frac{\text{Useful Energy Output}}{\text{Total Energy Input}}$ or $\frac{\text{Useful Power Output}}{\text{Total Power Input}}$


Efficiency has no unit.

A system is an object or group of objects.

Conservation of energy:
In a closed system, energy cannot be created or destroyed. The total energy is constant.

In all system changes, energy is dissipated so that it is stored in less useful ways (wasted energy). Dissipated energy usually ends up a thermal store in the surroundings.

These unwanted energy transfers can be reduced using, for example, **lubrication** (to reduce friction) or **insulation** (to reduce the rate of thermal energy transfer).



Calculating Energy Store Changes

Equations to Remember:

Note, work done and all forms of energy have the unit Joules, J.

Work done = Force x Distance
 $W = F \times s$

Force in Newtons, N.
Distance in metres, m

Kinetic Energy = $\frac{1}{2} \times \text{mass} \times \text{speed}^2$
 $E_k = \frac{1}{2} \times m \times v^2$


Mass in kilograms, kg
Speed in metres per second, m/s

Gravitational Potential Energy = mass x gravitational field strength x height
 $E_p = m \times g \times h$

Mass in kilograms, kg
Height in metres, m
g in Newtons per kilogram, N/kg
g = 9.8 N/kg on Earth - you don't need to recall this.

Energy = Power x Time
 $E = P \times t$

Power in Watts (W)
Time in seconds (s)



Given on data sheet

Elastic Energy = $\frac{1}{2} \times \text{spring constant} \times \text{extension}^2$
 $E_e = \frac{1}{2} \times k \times e^2$

Spring constant in Newtons per metre, N/m
Extension in metres, m

Energy

1

Thermal Insulation

Aim: Investigate the effectiveness of different materials as thermal insulators, or how the thickness of a material affects the rate of energy transfer.

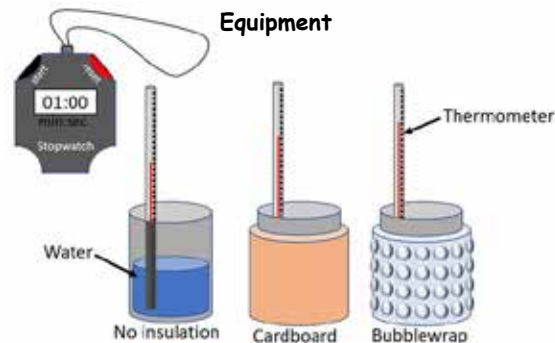
Independent Variable: Material

Dependent Variable:
Temperature change

Control variables:
Thickness of the material
Volume of hot water
Time the water is allowed to cool
The container
Starting temperature of water

Equation: Not applicable

Equipment



Method

- Cover the container in an insulating material.
- Pour 200ml of water into the beaker using a measuring cylinder.
- Measure the starting temperature using a thermometer.
- Time 10minutes using a stopwatch.
- Measure the end temperature using a thermometer and calculate the temperature difference
- Repeat for other insulating materials.

2

Thermal Insulation

Aim: Investigate the effectiveness of different materials as thermal insulators, or how the thickness of a material affects the rate of energy transfer.

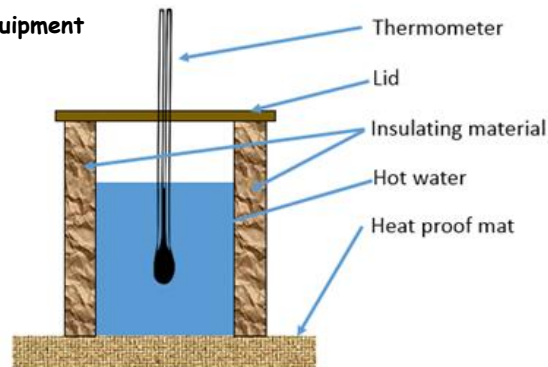
Independent Variable: Thickness of material

Dependent Variable:
Temperature change

Control variables:
Material
Volume of hot water
Time the water is allowed to cool
The container
Starting temperature of water

Equation: Not applicable

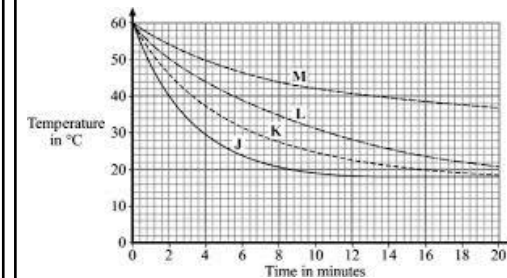
Equipment



Method

- Cover the container in one layer of insulating material.
- Pour 200ml of water into the beaker using a measuring cylinder.
- Measure the starting temperature using a thermometer.
- Record the temperature every 30seconds for 10minutes using a stopwatch.
- Repeat for other 2,3,4 & 5 layers of insulating material
- Plot a graph of temperature against time for each thickness.

Thermal Insulation Results



The thicker the material the slower the rate of energy transfer (heat loss) from the container.

In the above example M has the thickest insulation

Energy

Energy Resources

Uses of energy resources include:

- Transport
- Electricity Generation
- Heating



For example:

Coal is used for electricity generation.

Gas is used for heating and electricity generation

Petrol is used for transport

Wind power is used for electricity generation

Renewable and Non-renewable

A renewable energy resource is one that is being (or can be) replenished as it is used. This means that they won't run out.

Renewable energy resources include:

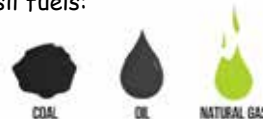
- The Sun (using solar panels or heaters)
- Wind (using wind turbines)
- Wave (using water waves)
- Tidal (using the flow of the tides)
- Geothermal (using hot rocks below Earth's surface)
- Hydroelectric (using the flow of water down a dam)
- Biofuel (burning biomass from plants or animal waste)



Non-renewable resources include fossil fuels and nuclear. One day they will run out.

There are three fossil fuels:

- Coal
- Oil
- Gas



Environmental Issues

Different environmental impacts are caused by energy resources:

Fossil Fuels

When burned (combustion) fossil fuels release **carbon dioxide**, which is a **greenhouse gas**.

Greenhouse gases increase **global warming**, which causes extreme weather events, rising sea levels and damage to species.

Combustion of fossil fuels also releases **sulfur dioxide**, which causes **acid rain**.

Renewables

Renewable resources can cause damage to habitats and species when the land is cleared to build them.

Nuclear Fuel

Nuclear power produces radioactive waste that needs to be stored underground for hundreds of years.

Science can teach us about environmental issues but cannot always deal with the problems because of political, social, ethical or economic considerations.

Energy Resource	Renewable	Reliable	Emits Carbon Dioxide
Fossil Fuels	No	Yes	Yes
Nuclear Fuel	No	Yes	No
Biofuel	Yes	Yes	Yes
Wind	Yes	No	No
Hydro-electricity	Yes	Yes	No
Geothermal	Yes	Yes	No
The Tides	Yes	Yes	No
The Sun (solar)	Yes	No	No
Water Waves	Yes	No	No

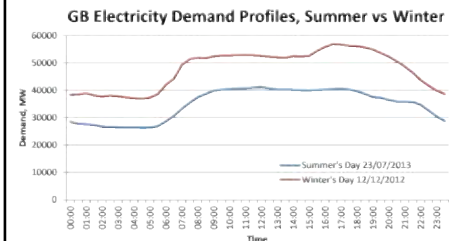
Reliable

A reliable energy resource is one where we can predict how much energy it will produce in a set time period.

Many renewable energy resources are not reliable because they depend on the weather. For example, wind, solar.

Patterns and Trends in Energy Use

Demand for power varies by time of day and season.



Some power stations are always on, they include nuclear & coal.

Power stations that can be turned on quickly include gas and hydroelectric. They can be turned on when needed.

Evaluate means to give advantages and disadvantages

Always say whether a resource is renewable, reliable and emits carbon dioxide first.

Other important points include:

Nuclear: an advantage is you get a large amount of energy from a small mass of fuel

Hydroelectric: can be used to store energy

Forces I

Scalars and vectors

Physical quantities that have both magnitude (size) and direction **VECTORS**

E.g Force ,velocity , acceleration

Physical quantities that have magnitude (size) and NO specific direction are called **SCALARS**

E.g mass, temperature , time

Vectors can sometimes be represented by an arrow. The length of the arrow represents the magnitude and the direction of the arrow is the direction of the vector

A force is a push or a pull that acts on an object due to the interaction with another object. All forces are either:

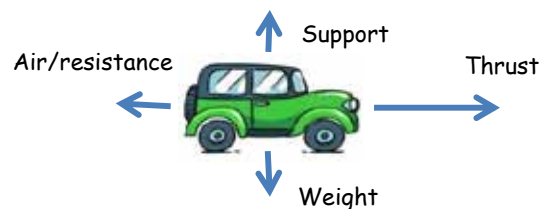
Contact forces -These require the objects to be physically touching.

E.g Friction , air resistance , tension and the normal contact force

Non-contact forces - the objects are physically separated and do not need to touch each other.

E.g Gravitational force (weight) , electrostatic force and magnetic force.

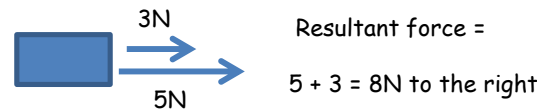
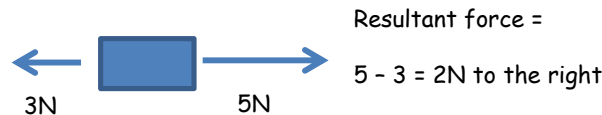
We can draw **free body diagrams** to show the forces acting on an object



Resultant Forces

When two or more forces act on an object , the resultant force is the overall effect of those forces

- 1) When forces act in opposite directions, take the smaller force away from the bigger force to find the resultant
- 2) When forces act in the same direction add the forces together to find the resultant force



Resultant forces cause objects to **accelerate** in the direction of the resultant force

Stopping distance

The **stopping distance** of a vehicle is the sum of the distance the vehicle travels during the driver's reaction time (**thinking distance**) and the distance it travels when the brakes are being applied (**braking distance**)

A driver's reaction time (and thus the thinking distance) can be affected by tiredness drugs and alcohol. Distractions and speed may also affect the driver's ability to react

The braking distance of a vehicle can be affected by adverse road and weather conditions (such as wet or icy conditions) poor conditions of the vehicle (such as poorly maintained brakes or tyres) and the speed of the vehicle.

When the brakes are applied , work done by the friction force between the brakes and the wheel reduces the kinetic energy of the vehicle and the temperature of the brakes increases. The greater the speed of a vehicle the greater the braking force needed to stop the vehicle in a certain distance. The greater the braking force the greater the deceleration of the vehicle. Large decelerations may lead to brakes overheating and/or loss of control.

Forces I

Equations to Remember:

Force = mass x acceleration

$$F = m \times a$$

This is the equation form of Newton's 2nd Law.

Weight = mass x gravitational field strength

$$W = m \times g$$

Gravitational field strength on Earth is 9.8 N/kg . This will be given to you in questions

Force applied = spring constant x extension

$$F = k \times e$$

This is the equation form of Hooke's Law.

Stopping distance = thinking distance + braking distance

(HIGHER ONLY)

Momentum = mass x velocity

$$p = m \times v$$

Force , F , in Newtons , N.

Mass, m , in kilograms , kg.

Acceleration, a , m/s² .

Weight , W , in Newtons , N.

Spring constant, k, in Newtons per metre , N/m

Extension, e , in metres , m.

Velocity, v, in metres per second, m/s.

Momentum, p, in kilogram metres per second , kg m/s.

Mass and weight

The **weight** of an object is the force acting on it due to gravity. It is directly proportional to the mass of the object.

The **mass** of an object depends on the quantity of matter in it.

The weight of an object depends on the **gravitational field strength** at the place where the object is. Thus if an object is taken to a different planet its weight would change (as the gravitational field strength would be different) but its mass would remain the same.

Power is defined as the rate at which energy is transferred, or the rate at which work is done. An energy transfer of 1 joule per second is equal to a power of 1 watt.

This equation can be used when calculating work done when a force moves an object.

$$\text{Work done} = \text{Force} \times \text{Distance } W = F \times s$$

Force in Newtons, N.

Distance in metres, m

Particle Model of Matter

Density of Materials

Density is defined by the equation: $\rho = \frac{m}{V}$

Density, ρ in kilograms per metre cubed, kg/m^3

Mass, m in kilograms, kg

Volume, V in metres cubed, m^3

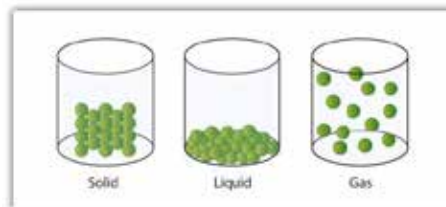
1 $\text{kg} = 1000 \text{ g}$

1 $\text{m}^3 = 1 \times 10^{-6} \text{ cm}^3$

1 $\text{cm}^3 = 1 \text{ ml}$

Particle Model

Solids, liquids and gases can be represented:



In a solid, particles are arranged in rows and vibrate about a fixed position.

In a liquid, particles are closely packed but not arranged in rows.

In a gas particles are in constant random motion.

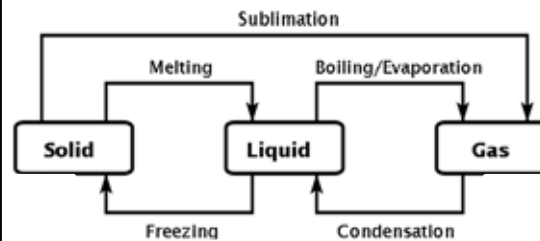
Gases have a **low density** because there are large gaps between particles.

Particle Model and Pressure

The higher the temperature of the gas, the higher the **kinetic energy** of the particles and the **faster** they move.

Increasing the temperature, at constant volume, increases the pressure as when particles move faster, they collide with the walls more often.

Changes of State



Changes of state are **physical changes** because the material recovers its original properties if the change is reversed (unlike chemical changes).

Mass is **conserved** in a change of state.

Pressure in Gases (Triple Only)

A gas can be **compressed** or **expanded** by pressure changes. The pressure produces a net force at right angles to the walls of the container or any surface.

Increasing the volume, at constant temperature, causes pressure to decrease as particles collide less often.

Boyle's Law:

$$P \times V = \text{constant}$$

Or

$$P_1 \times V_1 = P_2 \times V_2$$

Pressure, P in Pascals, Pa

Volume, V in metres cubed, m^3

Doing **work** on a gas increases the **internal energy** of the gas and can increase the temperature.

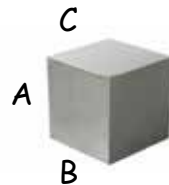
For example, doing work on the gas in a bike pump can lead to an increase in temperature.

Particle model of Matter- Density Required Practical

Density Required Practical - Use appropriate apparatus to make and record the measurements needed to determine the densities of regular and irregular solid objects and liquids.

The methods below go into more detail for each of the three objects - regular and irregular solids, and liquids. Each method has similarities - measure the volume, measure the mass, then calculate density.

A **regular solid object** is one where the volume can be calculated from the dimensions. For example, a cube or cuboid.



Steps

1. Measure the **mass** of the object using a **balance**.



2. Measure the **length** of the sides of the object using a **ruler**.

3. Calculate **volume**, by multiplying the three side lengths together. E.g. $A \times B \times C$

4. Calculate density using:

$$\rho = \frac{m}{V}$$

An **irregular solid object** is one where the volume cannot be calculated from the dimensions. For example, a pebble or chess piece.



Steps

1. Measure the **mass** of the object using a **balance**.



2. Fill a displacement can with water.



3. Carefully drop the irregular object into the displacement can.

4. Measure the **volume** of water that leaves the can, using a **measuring cylinder**. This is equal to the **volume** of the irregular object.



5. Calculate density using:

$$\rho = \frac{m}{V}$$

To measure the density of a **liquid**, we need to be careful that we do not include the mass of the container holding the liquid.

For the method below, the container is a measuring cylinder.

Steps

1. Measure the **mass** of a measuring cylinder using a **balance**.



2. Add a set **volume** of liquid such as 20 ml.

3. Measure the **mass** of the cylinder with the liquid in it, using a **balance**.



4. Subtract the **mass** of the empty cylinder to get the **mass** of liquid.

5. Calculate density using:

$$\rho = \frac{m}{V}$$