



# Wadham School



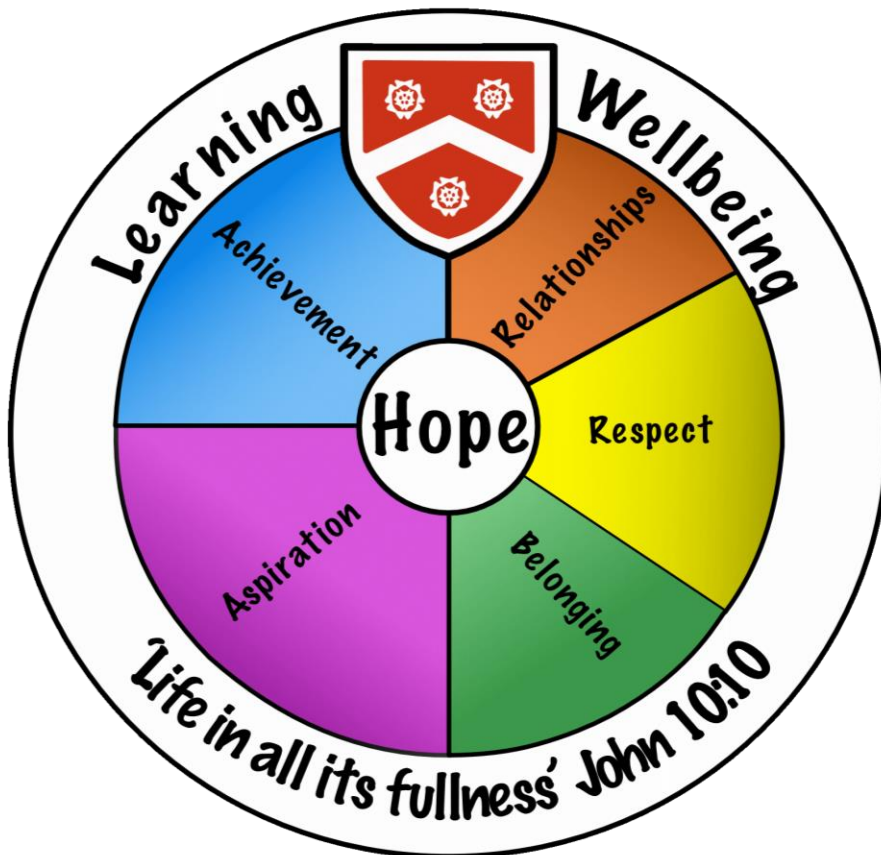
*A Church of England Community School*

## **Knowledge Organisers**

### **Year 11**

### **Autumn 2**

### **2023-2024**











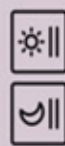









Name.....

Tutor group.....

*“Life in all its fullness” John 10:10*

# How to use Knowledge Organisers?

# How to use a knowledge organiser – step by step guide

	Look, Cover, Write, Check	Definitions of Key Words	Flash Cards	Self Quizzing	Mind Maps	Paired Retrieval
Step 1	<p>Look at and study a specific area of your KO.</p> 	<p>Write down the key words and definitions.</p> 	<p>Use your KO to condense and write down key facts or information onto flash cards.</p> 	<p>Use your KO to create a mini quiz. Write down your questions using your KO.</p> 	<p>Create a mind map with all the information you can remember from your KO.</p> 	<p>Ask a friend or family member to have the KO or flash cards in their hands.</p> 
Step 2	<p>Cover or flip the KO over and write down everything you can remember.</p> 	<p>Try not to use your KO to help you.</p> 	<p>Add pictures to help support. Then self-quiz using the flash cards. You could write questions on one side, and answers on the other!</p> 	<p>Answer the questions and remember to use full sentences.</p> 	<p>Check your KO to see if there are any mistakes on your mind map.</p> 	<p>They can test you by asking you questions on different sections of your KO.</p> 
Step 3	<p>Check what you have written down. Correct any mistakes in green pen and add anything you have missed. Repeat.</p> 	<p>Use your green pen to check your work.</p> 	<p>Ask a friend or family member to quiz you on the knowledge.</p> 	<p>Ask a friend or family member to quiz you using the questions.</p> 	<p>Try to make connections, linking the information together.</p> 	<p>Write down your answers,</p> 



# HOW TO USE KNOWLEDGE ORGANISERS TO CHECK YOUR UNDERSTANDING

## 1 READ

CHOOSE A 'CHUNK' OF KNOWLEDGE ...  
BUT DON'T CHOOSE TOO MUCH (2 - 9 FACTS)  
WRITE DOWN YOUR LIST OF FACTS / DEFINITIONS  
READ AND HIGHLIGHT KEYWORDS  
RE-READ FOR A FEW MINUTES

Atoms and Elements	
Element	Contains one type of <b>atom</b>
Compound	Contains two or more types of atom, chemically bonded

## 2 COVER

NOW COVER THE DEFINITIONS - CAN YOU STILL REMEMBER THEM?

Atoms and Elements	
Element	
Compound	

## 3 WRITE

NOW WRITE THE DEFINITIONS/FACTS AS ACCURATELY AS YOU CAN

Atoms and Elements	
Element	Contains one type of atom
Compound	Contains two or more

## 4 CHECK

CHECK WHAT YOU GOT RIGHT AND WRONG

Atoms and Elements	
Element	Contains one type of atom
Compound	Contains two or more types of atom, chemically bonded

Contains one type of atom  
Contains two or more types of atom bonded

## 5 CORRECT

IT IS REALLY IMPORTANT TO CORRECT ANY MISTAKES AND ADD ANYTHING YOU MISSED

Atoms and Elements	
Element	Contains one type of atom
Compound	Contains two or more types of atom, chemically bonded

Contains one type of atom  
Contains two or more types of atom bonded  
**chemically**

# Beliefs and World Views – Full Course

R&P Knowledge organiser: Crime and Punishment					
1	Addiction	Being addicted to/dependent on a particular substance; can be a cause of crime.	17	Mental illness	A medical condition that can cause changes to a person's behaviour; can be a cause of crime.
2	Community service	Punishment involving the criminal doing a set number of hours of physical labour/work.	18	Murder	Unlawfully killing another person.
3	Corporal punishment	Punishment in which physical pain is inflicted on the criminal.	19	Poverty	The state of being without the things needed for a reasonable quality of life; can be a cause of crime.
4	Crime	Action which breaks the law; can be against the person (e.g. murder), against property (e.g. vandalism), or against the state (e.g. treason).	20	Principle of utility	The concept of acting out of the greater good for the most people.
5	Death penalty	Capital punishment; the execution of a criminal which is allowed by the state.	21	Reformation	Aim of punishment; helping the criminal see how and why their behaviour was wrong.
6	Deterrence	Aim of punishment; the threat of punishment as a way to put a person off committing crime.	22	Retribution	Aim of punishment; getting the criminal back for their crimes.
7	Evil intentions	Having the desire to deliberately cause suffering or harm to another.	23	Unjust law	A legal requirement within a society that is believed to be unfair.
8	Forgiveness	Letting go of blame against a person for wrongs they have done.	Key Quotes		
			"You shall not murder" Exodus 20:13 (10 commandments)		
9	Greed	Wanting or desiring something or more of something.	"So in everything, do to others what you would have them do to you" –Jesus Matthew 7:12		
10	Hate crime	A crime committed because of prejudice views about a person or group.	"We must obey God rather than men." Acts		
16	Law	The rules a country demands its citizens follow, the breaking of which leads to punishment.			

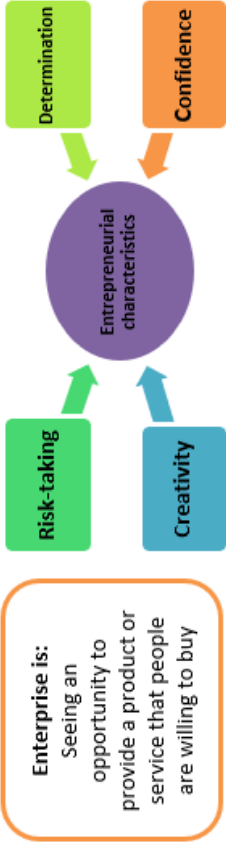


# Beliefs and World Views – Short Course

R&P Knowledge organiser: Christian beliefs					
1	Ascension	The event forty days after the resurrection when Jesus returned to glory in heaven.	17	Resurrection	Being raised from the dead; the event when it is believed that God raised Jesus from the dead.
2	Atonement	The belief that reconciliation between God and humanity that was brought about by the death of Jesus as a sacrifice.	18	Salvation	Being saved. Saving of the soul and being able to enter eternal life in heaven.
3	Christ	The leader promised by God to the Jews; Christians believe Jesus to be the Christ.	19	Sin	Behaviour which is against God's laws and wishes/against Christian principles of morality.
4	Creation	Bringing the world into existence; the belief that the world is God's loving creation.	20	The Son	The second Person of the Trinity; Jesus believed to be God incarnate.
5	Crucifixion	The death of Jesus; a form of the death penalty used by the Romans.	21	Son of God	A title used for Jesus; the second Person of the Trinity.
6	Evil	The opposite of good; a cause of suffering and against the will of God.	22	Suffering	An effect of evil; undergoing pain and hardship.
7	The Father	The first Person of the Trinity, the belief in God as creator and sustainer of the universe.	23	Trinity	The belief that God as One includes three Persons: the Father, Son and Holy Spirit.
8	Grace	The unconditional and generous love that God shows to people who do not deserve it.	24	Word	In the Bible, John 1 describes God creating the world through his eternal Word.
9	Holy Spirit	The third Person of the Trinity; believed to be present with believers since Pentecost and active on earth.	Key Quotes		
10	Incarnation	Belief that God took on human form in the person of Jesus.	1	John 1:1-3	"In the beginning was the Word, and the Word was with God and the Word was God, He was with God in the beginning"
11	Jesus	Believed by Christians to be the Son of God			
12	Judgement	The belief that God will decide whether each person should receive eternal life or eternal punishment based on their life.	2	John 1:14	"The word became flesh and made his dwelling among us"
13	Just	Fair or equal treatment, a state of justice. Belief about the nature of God as treating all people justly.	3	John 14:6	"I am the way, the truth and the life. No one comes to the father except through me"
14	Omnipotent	Belief that God is all powerful	Key Teachings		
15	The Oneness of God	The belief that God is one singular divine being (who can be manifest in the Three Persons of the Trinity).	1	Parable of the sheep and goats	A parable Jesus told where on judgement day God separates everyone into those who helped others (sheep) and those who didn't (goats). The sheep are rewarded with heaven.
16	Original sin	Belief human nature is flawed, and that we all have the tendency to sin; traditional belief held by some Christians that this came from Adam & Eve's fall.			

# Business

## 1:1 Role of Business Enterprise and Entrepreneurship



Risk	Reward
<ul style="list-style-type: none"><li>▪ <b>Financial</b> Possibility of losing money</li><li>▪ <b>Health</b> The strain of being in charge can affect health</li><li>▪ <b>Strained relationships</b> Starting a business is time consuming</li></ul>	<ul style="list-style-type: none"><li>▪ <b>Financial</b> Some successful entrepreneurs can make a lot of money</li><li>▪ <b>Independence</b> Some people like to be their own boss</li><li>▪ <b>Self-satisfaction</b> Some people like to see and idea work</li></ul>

**Entrepreneur**  
A person who takes the risk of starting and running a business

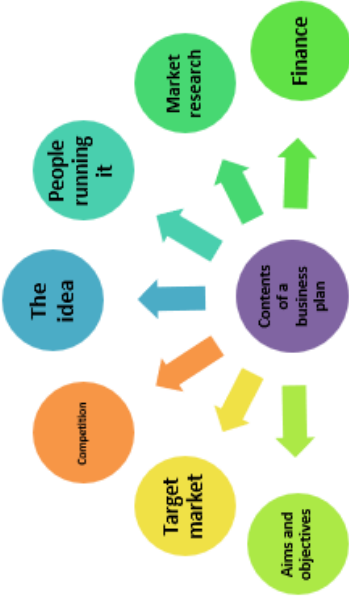
**Enterprising characteristics**  
Features of an entrepreneur

## 1:2 Business Planning

**Purpose of a business plan:**

- To reduce the risk of starting a business
- To help a business succeed

**A business plan:**  
details how a business aims to achieve its objectives



**Role of a business plan:**

- Identify markets
- Helping with finance
- Identifying resources needed
- Achieving aims and objectives

**Business plan**  
A simple plan which sets out the details of the business

**Finance**  
The money needed to start the business

## 1:3 Business Ownership

### Sole trader

Advantages	Disadvantages
<ul style="list-style-type: none"><li>▪ Easy to set up</li><li>▪ Little finance required</li><li>▪ Full control</li><li>▪ Keep all the profits</li><li>▪ Financial information is private</li></ul>	<ul style="list-style-type: none"><li>▪ Unlimited liability</li><li>▪ Business stops if ill or on holiday</li><li>▪ Long working hours</li><li>▪ Shortage of capital</li><li>▪ Skills shortage</li><li>▪ No continuity</li></ul>

### Partnership

Advantages	Disadvantages
<ul style="list-style-type: none"><li>▪ More capital available</li><li>▪ Easy to set up</li><li>▪ More skills available</li><li>▪ Shared workload</li><li>▪ Financial information is private</li></ul>	<ul style="list-style-type: none"><li>▪ Shared profit</li><li>▪ Unlimited liability</li><li>▪ Shortage of capital</li><li>▪ Slower decision making</li><li>▪ No continuity</li></ul>

### Private Limited Company (LTD)

Advantages	Disadvantages
<ul style="list-style-type: none"><li>▪ Limited liability</li><li>▪ Continuity</li><li>▪ Can raise capital more easily</li><li>▪ Control over share sale</li></ul>	<ul style="list-style-type: none"><li>▪ Financial information available to the public</li><li>▪ Complex and expensive to set up</li><li>▪ Sale of shares is restricted</li><li>▪ Dividends to be paid</li></ul>

### Public Limited Company (PLC)

Advantages	Disadvantages
<ul style="list-style-type: none"><li>▪ Can raise large amounts of capital</li><li>▪ Easier to borrow money</li><li>▪ Limited liability for shareholders</li></ul>	<ul style="list-style-type: none"><li>▪ Possibility of a takeover</li><li>▪ Complex and expensive to set up</li><li>▪ Hard to manage as so large</li><li>▪ Financial information available to the public</li></ul>

### Unlimited liability

Responsibility for the debts of the business rests with the owners

### Capital

Money raised to start or develop a business

### Deed of partnership

A document setting out the operations of the partnership

### Sleeping partner

Someone who only invests in a partnership

### Limited liability

Responsibility for the debts of the business is limited to the amount invested

### Shareholders

Owners of a limited company

### Dividend

Money paid to shareholders from business profits

# Business

## 5:1 The Role of the Finance Function

### Finance function

Is the finance department and is only found in larger businesses

It is vital for any business to have accurate financial data. Without accurate data wrong decisions could be made which affect the business negatively.

### When will financial info be useful in business decision-making?

When a business decides to become more environmentally friendly

There may be increased costs to monitor, it may need extra finance - finance function will provide this

When the business is thinking about changing production methods

A prediction in changes of costs will be needed from the finance function as well as what extra finance will be needed and how the changes might affect cash flow

When the business wants to change the way it markets its products

The finance department would provide information about the costs of these new advertising methods and may need to raise extra finance

### Financial information

Includes details of profit, loss, cash flow, break-even, profit margin and average rate of return. These can be used to help make business decisions.

## 5:3 Revenue, Costs and Profit

	Calculation
Revenue	Quantity sold x selling price
Variable costs	Quantity sold x variable cost per unit
Total costs	Fixed costs + variable costs
Gross profit	Revenue - cost of sales
Net profit	Gross profit - expenses
Gross profit margin	$\text{Gross profit} \div \text{revenue} \times 100$
Net profit margin	$\text{Net profit} \div \text{revenue} \times 100$
Profit	Revenue - costs

Businesses will need to interpret these figures to help make business decisions

### Revenue

Money from sales

### Average rate of return

A method of measuring and comparing the profitability of an investment over its life

### Loss

Occurs in a business

when costs are

greater than revenue

### Expenses

The costs of operating the business

### Profitability ratios

Calculations which help to interpret financial data

## 5:2 Sources of Finance

### Owners' capital

Advantages	Disadvantages
<ul style="list-style-type: none"> <li>No need to repay the money</li> <li>No interest has to be paid</li> <li>No cost to raise the finance</li> <li>Readily available</li> </ul>	<ul style="list-style-type: none"> <li>The owner might not have enough savings to cover the whole finance</li> <li>May leave the owner short in personal situations</li> </ul>

### Retained profit

Advantages	Disadvantages
<ul style="list-style-type: none"> <li>No interest has to be paid</li> <li>No need to repay the money</li> <li>No cost to raise the finance</li> <li>Readily available</li> </ul>	<ul style="list-style-type: none"> <li>Business might not have enough profit to cover the whole finance</li> <li>May leave the business short in the future in emergency situations</li> </ul>

### Loan

Advantages	Disadvantages
<ul style="list-style-type: none"> <li>Repayment is spread over time</li> <li>business knows exactly how much has to be repaid and when</li> <li>Money is available quickly</li> </ul>	<ul style="list-style-type: none"> <li>Interest has to be paid</li> <li>Business may need to risk an asset as security</li> <li>Bank will want to see a business plan to ensure they can afford the loan</li> </ul>

### Issuing shares

Advantages	Disadvantages
<ul style="list-style-type: none"> <li>A lot of finance can be raised from many investors</li> <li>Money does not have to be paid back</li> <li>No interest is payable</li> </ul>	<ul style="list-style-type: none"> <li>Dividends may have to be paid to shareholders</li> <li>Shareholders are entitled to have a say in the running of the business</li> <li>The business may be taken over by a competitor</li> </ul>

### Interest

The amount of money that has to be paid back on borrowed money

### Sale of assets

Items sold by the business

### Crowd funding

Money raised through an appeal to public

### Overdraft

An arrangement with a bank to spend more money than it has in its account

### Retained profit

Profit not distributed to owners

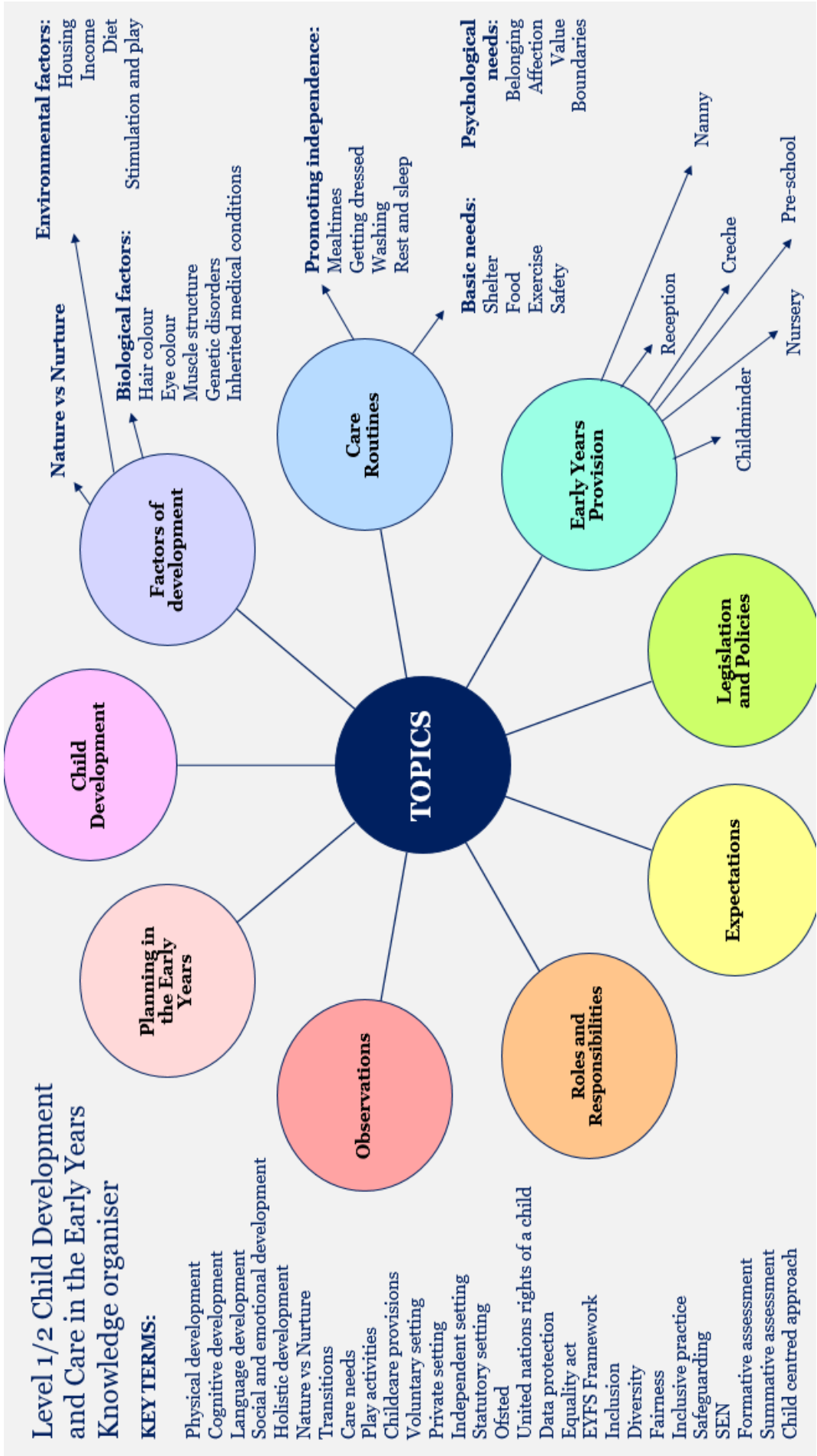
### Loan

Sums borrowed for a certain period at an agreed rate of interest

### Owners' capital

Money from savings put into the business by the owner

# Child Development





# Creative Imedia

## Entertain

### Description:

- This is to provide a narrative/plot/storyline that entices the user to consume the content.

### Examples:

- Films
- TV shows
- Books
- Apps
- Video games

## Advertise/Promote

### Description:

- This is to persuade the consumer into committing to a product or service.

### Examples:

- Posters
- Billboards
- TV advertisements
- Radio advertisements
- Banners on webpages
- Social media posts

## Educate

### Description:

- This is to provide consumers with information that enables them to learn/gather new information

### Examples

- Text books
- YouTube videos
- Online learning platforms

## Job roles:



Content creator  
Copywriter  
Campaign manager  
Photographer  
Web developer  
Web designer  
Animator  
Games developer

## Quantitative data

### Definition/Meaning

Data that is measured numerically. Commonly made up closed questions that restrict the respondents to a fixed set of options.

### Examples

Do you have a dog as a pet?	Yes	No
Mark your answer in the appropriate box:		
Do you have a driver's license?	Yes	No
Mark your answer in the appropriate box:		
Do you collect social security benefits?	Yes	No
Mark your answer in the appropriate box:		
What is your gender?	Male	Female
Mark your answer in the appropriate box:		

Binary answer  
(Yes/No)

proximus

0% 100%

English

How likely are you to recommend Proximus to other companies, colleagues, or commercial partners?

Certainly not 0 1 2 3 4 5 6 7 8 9 10 Certainly

Likert scale

Other examples include: Questions with one answer and ones with multiple answers.

## Qualitative data

### Definition/Meaning

This provides a more detailed description of data. Commonly made up of open questions that allows respondents to elaborate further.

### Examples

#### Examples of Open-Ended Questions

- What were the challenges you faced with us?
- What did you like the most about us?
- Is there anything else we should know?
- How would you describe your experience with us?
- What can we do better to improve your experience with us?
- What is the primary reason for your score?
- Would you recommend us to others? Please share the reason.
- What was missing in the experience you had with us?
- What are the factors that usually influence your purchase?
- What are one or more things that may stop you from making a purchase with us?

# Creative Media

## Illustrator/graphics artist

### Responsibilities:

- combining hand-drawing and painting with digital media to create complete illustrations.
- refining designs.
- using various colours, graphics and effects to better convey each concept.

### Phase of production

- Pre-production

## Scriptwriter

### Responsibilities:

- developing believable plots and character.
- preparing short summaries of your ideas and selling (known as 'pitching') them to producers or development executives.

### Phase of production

- Pre-production

## Web designer

### Responsibilities:

- creating website designs.
- producing sample sites.
- meeting with clients to discuss requirements and/or project progress.
- digital retouching and image editing.

### Phase of production

- Pre-production, Production

## Animator

### Responsibilities:

- creating a series of images known as frames, to simulate movement.
- develop timing and pacing of motion.
- work with the story editors to merge various layers of animation.

### Phase of production

- Production

## Graphics designer

### Responsibilities:

- design graphics for use in media products such as magazines, labels, advertising etc..
- developing concepts, graphics and layouts for product illustrations, company logos and websites.

### Phase of production

- Pre-production, Production

## Content creator

### Responsibilities:

- create content for websites including social media.
- using assets such as text, video and audio designed for a particular audience.
- aiming to generate interest/raise awareness for a brand.

### Phase of production

- Production

## Copywriter

### Responsibilities:

- creates text for advertising/marketing purposes.
- writing content used in print media, radio advertising, product descriptions and social media posts.

### Phase of production

- Production

## Photographer

### Responsibilities:

- captures high-quality images.
- collaborate with client to ensure right content is captured.
- sell their content in stock image libraries for others to purchase.

### Phase of production

- Production, Post-production

# Creative Imedia

## Camera angles

### Description:

- This is determined by the position of the camera and the direction it is pointing to.

### Examples:

- Eye-level shot
- Low angle
- High angle
- Dutch angle
- Shoulder level
- Hip level
- Ground level

## Camera movements

### Description:

- This also determines the position of the camera but may also use additional equipment to allow them to position the cameras where humans can't.

### Examples:

- Dolly and Track
- Pan
- Zoom
- Crane
- Handheld
- Pedestal

## Components of a work plan

### Activity

A task within a task – known as a sub-tasks.

### Resources

The hardware, software and people required to complete the task.

### Contingencies

A plan put in place to deal with any unexpected events.

### Milestone

A significant achievement within the project.

### Tasks

The main parts of the project that need to be completed.

### Timescales

The time given to each activity/task to be completed.

### Workflow

The sequence/order in which the activities are carried out.

20

## Components of an asset log

### No/Asset ID

A count of how many assets are recorded or to give an asset a unique ID which is useful if the log contains a large volume of assets.

### Filename

So the user knows what the file is called if they need to use it.

No.	Filename	Description	Properties	Source	Legal issues	Use
1	Pizza.jpg	Image of a pizza.	800 x 1022 96 DPI	<a href="https://clipart.world/pizza-clipart/simple-pizza/">https://clipart.world/pizza-clipart/simple-pizza/</a>	Should only be for personal use.	To be used in the YePizza logo.
2	Pizza paddle.jpg	Pizza paddle	450 x 450	<a href="https://www.123rf.com/photo_134983275_pizza-cooking-shovel-icon-isometric-style.html?vti=nbubvprvystl89e1e66y-1-2">https://www.123rf.com/photo_134983275_pizza-cooking-shovel-icon-isometric-style.html?vti=nbubvprvystl89e1e66y-1-2</a>	Subscription required to download which will remove the watermark.	To be used in the YePizza logo.
3	Phone icon.png	Image of a phone	320 x 431	Client image	Not applicable	To be used to represent contact details on a poster.
4	Wood_fire_pizza.jpg	Image of a pizza that has been in a wood fire oven.	6016 x 4016 96 DPI	<a href="https://www.pexels.com/photo/baked-pizza-on-pizza-peel-in-oven-905847/">https://www.pexels.com/photo/baked-pizza-on-pizza-peel-in-oven-905847/</a>	Free to use	To be included in the promotional poster.
5	Tomatoes.jpg	Image of fresh tomatoes	640 x 320	I took the image myself	Free to use as I'm the original owner.	To be included in the promotional poster to promote how fresh the ingredients are.

### Description

To provide a description of what the asset is so the user knows what it is before they open it.

### Properties

The resolution and dimensions if it's a digital graphic in case it needs repurposing.

### Source

Where the asset has come from by recording the URL.

### Legal issues

To record any legal considerations such as whether they need to ask permission to use the asset.

### Use

What it will and what it could be used for.




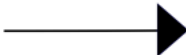

## Who would use the asset log?

Graphic artist, Web designer, Games programmer, Animator

22

# Creative Imedia

## Flow chart symbols

	<b>Start/Stop:</b> This signals the beginning and the end of a flow chart.		<b>Decision:</b> This is used to represent selection and the outcomes when a certain condition is met.
	<b>Input/Output:</b> Used if data is being inputted into the system. If any data needs to be displayed then output could be used.		<b>Arrow:</b> This is used to connect the symbols together and to show the direction the flow chart is going.
	<b>Process:</b> This is used to process instructions. It could be used to process calculations or run events.	<b>Why use flow charts?</b> <ul style="list-style-type: none"><li>• Easy to show the layout each page.</li><li>• Show how all the pages/screens link together.</li><li>• It can show how functional the website is.</li></ul>	

## Key term:

**Defamation** the action of damaging the good reputation of someone; slander or libel. Slander is a verbal statement and Libel is a written statement.

### Slander

#### Description:

The action or crime of making a false spoken statement damaging to a person's reputation.

### Libel

#### Description:

A published false statement that is damaging to a person's reputation; a written defamation.

## Data protection

#### Description:

A piece of legislation that aims to protect a person's personal data.

#### Principles:

- Used for a specific purpose (as shown above)
- Relevant and not more than needed (as shown above)
- Accurate and kept up to date.
- Not kept longer than necessary (e.g. user closes account)
- Stored securely

## Trademarks

#### Description:

A sign or logo that identifies a brand or company as a unique entity. This is represented by the TM symbol. The R symbol protects words and phrases.

## Using copyrighted materials

#### Examples:

- Ask permission from the copyright holder.
- Creative commons licensing
- Royalty free – pay a fee to gain a licence to use the image and remove the watermark.
- Stock libraries – assets that are free to use.



# Creative Imedia

## Copyright

### Description:

- Copyright is the legal right to protect the original work of the people whom it may belong to.
- Copyright can protect....

Books

Music

Art

Images

Sound

Software

### Fair use

This is when copyrighted material may be used for news reporting, commentary or educational purposes.

## Creative commons licence

### Description:

This license allows copyrighted material to be more freely distributed.



**Attribution:** Material can be copied, modified and used. However, the original creator must be given credit.



**Non-commercial:** Material can be copied, modified and used as long as there is no intention to make money from it.



**Share-a-like:** Material can be modified and used but must be covered by a similar license.



**No derivative works:** Material can be copied and used, but it cannot be modified.

## BBFC

### Description:

- The British Board of Film Classification who regulate media content and classify films that are distributed in the UK.

## Ofcom

### Description:

- The Office of Communications regulate all broadcasted content across UK television channels.

## ASA

### Description:

- The Advertising Standards Agency regulate all broadcast and non-broadcast content across the UK.

## PEGI

### Description

- Pan European Game Information have classified all video game content in the UK. It used to be the role of the BBFC.

## Location recce checklist

### Safety

They can check for an potential trip hazards, potential obstructions when carrying equipment around, risk of electrocution.

### Sound

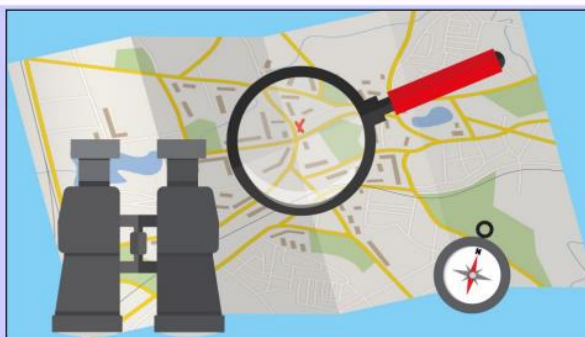
Checking for any background noise that might affect the recording such as road traffic, trains, planes etc..

### Lighting

Does the location have lots of natural lighting?  
Will there be a problem when it gets dark?  
What sort of lighting can the camera crew use?

### Facilities

Toilets, areas for employees to have breaks, place for catering facilities, can people park? Is there parking that allows heavy equipment to be transferred?



### Power outlets

Are there enough sockets to plug them in? Is there enough distance between the outlet and where the equipment needs to go? Will the unit cope with the watts generated by the equipment?

# Design and Technology

<div><div>Wasting</div><div><div><b>Wasting timber by hand</b></div><div>Most solid woods can be easily wasted and shaped using a range of workshop tools.</div><ul style="list-style-type: none"><li>• <b>Sawing:</b> tenon saw, bench saw, coping saw, jigsaw.</li><li>• <b>Filing:</b> rasp, bastard, second cut, half round, round.</li><li>• <b>Chiselling:</b> chisels are used along with vices and mallets to remove areas that have been pre-cut.</li><li>• <b>Planing:</b> shape and finish edges using a plane or spoke-shave. Edges require no further finishing after planing.</li></ul></div></div> <div><div><b>Wasting timber using machinery</b></div><div>Using machinery to waste timber can speed up the manufacturing process and give accurate results.</div><ul style="list-style-type: none"><li>• <b>Turning:</b> lathes, used with special chisels, allow the shaping along the profile of a piece of solid wood, or laminated MDF as it is spun. Formers for vacuum forming can be made in this way.</li><li>• <b>Drilling:</b> chain drilling solid wood and sheet materials can speed up the wasting progress. A series of holes are drilled along a path, the waste is then removed using a coping saw or chisel.</li></ul></div> <div><div><b>Wasting timber using CAD/CAM</b></div><div>Sheet timber lends itself to being wasted on flat-bed machinery. CAD files can be easily prepared to control these machines.</div><ul style="list-style-type: none"><li>• <b>Laser cutters:</b> can quickly cut thin sheet timber such as MDF and plywood. Precision features such as joints can be cut accurately on a laser cutter.</li><li>• <b>Computer controlled routers and milling machines:</b> can effectively translate a computer design into a component. Double-sided tape is often used to secure the timber to the machine's</li></ul></div>
--



# Knowledge Organiser Timber

## Resistant Materials

Hardwood
Timber from a deciduous tree. They are slower growing and more expensive.
<b>ash:</b> a pale and attractive hardwood. Tough, flexible. Open grained. <b>Used in</b> furniture, steam bending, wood turning.
<b>balsa:</b> soft and lightweight, the wood is actually from a deciduous flowering plant, not a tree. Very light in colour with a distinct, straight grain. <b>Used in</b> model making, prototypes, craft, model aeroplanes.
<b>beech:</b> hard, tough, strong/close grained, white/pinkish brown. Prone to warping. <b>Used in</b> functional furniture, chairs, tables, tools, veneers.
<b>Iroko:</b> African tropical hardwood. Deep reddish brown, is a less ecologically damaging alternative to mahogany. Also known as African Teak. <b>Used in</b> boat-building, decorative furniture, traditional musical instruments.
<b>mahogany:</b> fairly strong, medium weight, durable. Interlocking grain. Pink reddish brown. Prone to warping. <b>Used in</b> indoor furniture, panelling, veneers
<b>oak:</b> strong, heavy, durable, hard and tough. Open grained. Light brown. Finishes well. Expensive. <b>Used in</b> construction, high-class furniture, boat building, veneers.
<b>teak:</b> very strong, hard, durable. Natural oils make it resistant to moisture. Golden brown. Very expensive. Blunts tools easily. <b>Used in</b> quality furniture, outdoor furniture, boat building, veneers.
<b>walnut:</b> an extremely durable, tight-grained wood. Its hard, dense grain make it ideal for machining and joint making. Polishes to a high quality finish. <b>Used in</b> restaurant tabletops, cabinet making, decorative features such as handle, banisters, veneers and inlays in plywood

Softwood
Timber from an evergreen or coniferous tree. Fast growing.
<b>Douglas Fir:</b> pale to medium red/brown colour. Works well. Straight grained, dries quickly, fast growing. <b>Used in</b> construction, railway sleepers, joinery, flooring, decking.
<b>Paraná Pine:</b> fairly strong and durable. Straight grain. Pale yellow, red/brown streaks. Almost knot free. Tends to warp. <b>Used in</b> best quality indoor joinery, staircases, built-in furniture.
<b>Scots Pine:</b> pronounced straight grain. Light brown/yellow in colour. Polishes well. <b>Used in</b> general construction work and joinery.
<b>spruce:</b> fairly strong with small, hard knots. Creamy white, resistant to splitting. Not very durable. <b>Used in</b> general indoor work such as stud-walls, shelves.
<b>Western Red Cedar:</b> straight silky grain, dark reddish brown. Lightweight and not very strong. Natural oils make it durable against weather.

Properties of Timber and Sheet Materials		
Property	Definition	Found in
<b>hardwood</b>	Timber from a deciduous tree.	oak, ash, mahogany, walnut, beech, balsa
<b>softwood</b>	Timber from an evergreen or coniferous tree.	pine, red deal, cedar
<b>tight-grained</b>	Timber with a high ring count, slower growing and denser.	oak, beech
<b>loose-grained</b>	Timber with a low ring count- faster growing.	scots pine, red deal
<b>dense</b>	Can be deformed without losing toughness.	oak, beech
<b>straight-grained</b>	Timber which has grown straight, has a uniform grain.	oak, beech, red deal
<b>knot</b>	Irregularity in wood grain, where a branch or offshoot existed.	spruce, ash, some plywood
<b>weather resistant</b>	A tight-grained timber has good water and heat resistance.	oak, beech, ash, plywood
<b>stiff</b>	A timber that does not bend easily.	oak, ash, beech, plywood, MDF
<b>easy to work</b>	A timber that is either low or medium density. Easy to cut and shape.	red deal, scots pine, balsa, MDF
<b>lightweight</b>	A timber that is light in weight.	balsa, plywood, MDF
<b>attractive grain</b>	When polished or varnished, a timber's grain is eye-catching.	walnut, oak, ash, some plywood

Timber products	
Sheet materials manufactured from layers or particles of wood including MDF, plywood and hardboard.	
<b>MDF:</b> mid-brown colour. Will swell if exposed to moisture. Sheets can be heavy. Smooth finish. No grain. Available in a wide range of sheet sizes and thicknesses. <b>Used in</b> flat-pack furniture, vacuum-form moulds, product modelling, architectural models. Often covered in veneer for a natural timber appearance.	<b>hardboard:</b> Made from wood chip and pulp, cheaper substitute to plywood. Used when space filling as opposed to requiring strength. No regular grain. <b>Used in</b> countertops, flooring, flat-pack furniture.
<b>veneer:</b> very strong, hard, durable. Natural oils make it resistant to moisture. Golden brown. Very expensive. Blunts tools easily. <b>Used in</b> table tops, flat pack furniture, plywood, cabinet-making.	<b>plywood:</b> Reddish brown or white in colour. Layered in odd numbered sheets. Strong. Susceptible to splintering. <b>Used in</b> sheds and cladding, furniture, flooring, boats (marine ply).



# English Language

ENGLISH LANGUAGE PAPER 1 KNOWLEDGE ORGANISER					
WORD CLASSES (QUESTIONS 2 AND 4)		OTHER SUBJECT TERMINOLOGY		METHODS: LANGUAGE DEVICES	
SIMPLE KEY TERMS		PHONOLOGY (STUDY OF SOUNDS)			
Noun	A word that refers to a person, place or thing.	Alliteration	The occurrence of the same sound at the beginning of adjacent or closely connected words.	Simile	Comparison of one thing with another thing using the words 'like' or 'as'.
Verb	A word used to describe an action, state or occurrence.	Assonance	Resemblance of sound between syllables of nearby words, arising particularly from the rhyming of two or more stressed vowels, but not consonants	Metaphor	A figure of speech in which a word or phrase is applied to an object or action to which it is not literally applicable.
Adjective	A word that describes or clarifies a noun.	Sibilance	Sibilance 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.	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.
Adverb	A word or phrase that modifies the meaning of an adjective or verb, expressing manner, space, time or degree.	Onomatopoeia	The formation of a word from a sound associated with what is named	Personification	The attribution of a personal nature or human characteristics to something non-human, or the representation of an abstract quality in human form.
Pronoun	A word that takes the place of a noun.	Consonance	The recurrence of similar-sounding consonants in close proximity	Symbolism	The use of symbols to represent ideas or qualities.
OTHER KEY TERMS		Plosives	Denoting a consonant that is produced by stopping the airflow using the lips, teeth, or palate, followed by a sudden release of air.	Hyperbole	Exaggerated statements or claims not meant to be taken literally.
Dynamic Verb	A verb that shows continued or progressive action on the part of a subject. They occur over a span of time.	Monosyllabic	A word or utterance consisting of one syllable.	POINT OF VIEW (QUESTIONS 3 AND 4)	
Static Verb	Verbs that express a state rather than an action. They usually relate to thoughts, emotions, relationships, senses etc.	METHODS: TYPES OF IMAGERY (QUESTIONS 2 AND 4)			
Concrete Noun	Nouns you can physically see and touch.	Visual imagery	Imagery pertaining to graphics, visual scenes, pictures, or the sense of sight.	<ul style="list-style-type: none"><li>different types of narration e.g. first person, second person, third person; third person narrative that privileges the perspective of a given character; third person narrative with character as the centre of consciousness; singular or multiple narrators</li><li>events seen from different points of view (e.g. physical, ideological, perceptual); points of view which are privileged, those which are marginalized, those which create narrative gaps</li><li>categories of speech and thought (e.g. direct, indirect and narrator's representation of speech/thought acts); patterns of or changes in a character's speech/thought across or at certain points of the extract</li></ul>	
Abstract Noun	Words that name things you cannot physically see or touch.	Auditory imagery	Imagery pertaining to sounds, noises, music, or the sense of hearing.		
SENTENCE FORMS (QUESTIONS 2 AND 4)		Olfactory imagery	Imagery pertaining to odours, scents, or the sense of smell.		
Exclamative	A sentence type used to express surprise about something unexpected or extraordinary.	Gustatory imagery	Imagery related to the sense of taste.	NARRATIVE STRUCTURE (Q3+4)	
Interrogative	An interrogative sentence is a sentence whose grammatical form shows that it is a question.	Tactile imagery	Imagery pertaining to physical textures or the sense of touch.	<ul style="list-style-type: none"><li>Simple chronology, framed narratives, use of flashbacks, cyclical structure, shifts in time and place, use of multiple narrators, foreshadowing, analeptic (flashback)/proleptic (flash forward) narrative, stream of consciousness</li><li>episodic novel, epistolary structure, autobiographical or diary form</li><li>changing narrators/perspective/tense</li></ul>	
Imperative	Imperative sentences are used to issue a command or instruction, make a request, or offer advice.	Synaesthesia	A technique adopted by writers to present ideas, characters, or places in such a manner that they appeal to more than one sense, like hearing, sight, smell, and touch at a given time.		



# English Language

<b>Declarative</b>	A declarative sentence (also known as a statement) makes a statement and ends with a full stop. It's named appropriately because it declares or states something.	<b>METHODS: TYPES OF CHARACTER</b>		<ul style="list-style-type: none"><li>• how authors privilege certain events by their position in the narrative</li><li>• the privileged position of beginnings and endings in terms of narrative structure and their importance in introducing and concluding key aspects of setting, character, themes and context</li><li>• development of an incident, an idea or the story, suspense, tension</li><li>• contrast, twist, change, shift in tone, climax, anti-climax, using a specific method to introduce an idea/setting/character</li></ul> <p>Micro structure: sentence structures (short/compound/clauses)/patterns (repetition/listing/dash/anaphora/semantic field)</p>
<b>STYLE (QUESTION 4)</b>		<b>Protagonist/Antagonist</b>	Leading character or major character/opposing force. Usually brings conflict to main character.	
<b>Irony</b>	A rhetorical device, literary technique, or event in which what appears, on the surface, to be the case, differs radically from what is actually the case	<b>Foil</b>	A character who contrasts another character.	

# English Literature

Social and Historical Context			
Capitalism/Socialism	World War One and Two	Titanic	The Great Depression
<p>Capitalism is a system where businesses, property and industries (etc.) are privately owned in order for the owners to profit.</p> <p>Socialism is a system where everyone who contributes to the production of something own it. Rather than for profit, its aim is the equal distribution of wealth.</p> <p>When Priestley was writing, socialism was very new and popular. Like many writers of his time (including Bernard Shaw and H.G. Wells, whom Mr Birling refers to insultingly in act one), Priestley was broadly socialist in his political views.</p> <p>In the UK general election of 1945, held two months after the end of the Second World War in Europe, he took advantage of his fame as a writer and broadcaster to campaign for the Labour Party.</p>	<p>The First World War took place from 1914 to 1918. The Second World War later took place from 1939 to 1945, meaning the play is set before both wars but written after both. Priestley could use his experience of living through this time of great change.</p> <p>At the time Priestley was writing, people were recovering from 6 years of warfare. Due to the wars, class distinctions had massively reduced as rationing was put in place and suffering did not discriminate. There was a great desire for change after the wars. Immediately after WW2, the Labour party won a landslide victory over Winston Churchill's conservatives.</p> <p>Women also earned a more valued place. As many British men went away to fight, their positions in work had to be filled by women. This helped change perceptions. Men had to acknowledge the fact that women were just as capable as them. Many women enjoyed a newfound freedom that working and earning money allowed them.</p>	<p>RMS Titanic was a British passenger liner ship that sank in the North Atlantic Ocean in the early hours of 15 April 1912, after colliding with an iceberg during her maiden voyage from Southampton to New York City. The Titanic was the largest ship afloat at the time she entered service. There were an estimated 2,224 passengers and crew aboard, and more than 1,500 died.</p> <p>The passengers of the Titanic were split into three classes. This was determined not only by the price of their ticket but by wealth and social class. Those travelling in first class, most of them the wealthiest passengers on board, included prominent members of the upper class such as businessmen and politicians. Second class passengers were middle class such as professors and authors. Third class passengers were mostly emigrants moving to the US. First-class was designed to be luxurious, with an on-board gym, swimming pool, libraries, and high-class restaurants.</p>	<p>The Great Depression was the worst economic downturn in the history of the developed world, lasting from 1929 to 1939. It began after the stock market crash of October 1929 in America. It then affected countries across the world over the coming years.</p> <p>The period between 1912 and 1945 was a time of great austerity: WWI, for example, meant that income tax was doubled, meaning less in wages for workers.</p> <p>The 1930s saw the great depression with very high unemployment. In some towns and cities in the north east, unemployment reached as high as 70% as shipbuilding fell by 90%</p>
J. B. Priestley			
Dramatic Devices Used			
John Boynton Priestley was born in Yorkshire, UK in 1894. He knew early on that he wanted to become a writer, but decided against going to university as he thought he would get a better feel for the world around him away from an academic community. Priestley fought in World War 1, he joined the army and escaped death many times. After the war, he gained a degree from Cambridge University, moving to London to become a writer. He wrote successful articles and published his first novel in 1929. He wrote his first play in 1932 and went on to write 50 more. Much of his writing was controversial. He included new ideas and strong political messages. Priestley wrote 'An Inspector Calls' after the First World War and like much of his work it contains controversial, political messages. He set 'An Inspector Calls' in 1912 because that era represented the opposite of what people were hoping for in 1945. As a socialist, Priestley became very concerned about the consequences of social inequality. During 1942, he and others set up a new political party, the Common Wealth Party, which argued for public ownership of land, greater democracy, and a new		Lighting	A change in lighting shows the change in atmosphere that the Inspector brings, indicating the truth being revealed.
		Doorbell	The doorbell interrupts Birling's speech on his capitalist ideas that community is 'nonsense'. The inspector disrupts this.
		Photograph	The Inspector only shows the photograph to one person at a time. This means that no one character can ever be sure that they have seen the same photograph as any other character.
		Dramatic Irony	Birling's first speech is full of inaccuracies. This makes us question the reliability of his capitalist judgements. Mrs Birling's hypocrisy is also shown through the use of dramatic irony.
		Contrasts	Priestley juxtaposes the beliefs of Birling and the Inspector. He links Sheila and Eva to highlight the differences in their lives because of their different social classes.

# English Literature

'morality' in politics. The party merged with the Labour Party in 1945, but Priestley was influential in developing the idea of the Welfare State which began to be put into place at the end of the war.

Cliff hangers	Act 1 ends with the Inspector saying 'Well?' to Gerald. Act 2 ends as Eric reappears, just as we realise he is the father.
Entrances	The timing of Mrs Birling, the Inspector and Eric's entrances are significant.
Twist	The final denouement is a shocking surprise to the characters on stage and the audience - a 'twist in the tale'.

## The Plot

ACT 1	<p>There is a light-hearted atmosphere at dinner as the Birling family celebrate the engagement of Sheila to Gerald Croft. However, there are hints that not everything is as perfect as seems. Mr Birling, for example, is a bit too anxious to impress Gerald, Eric seems nervous and Sheila jokes with Gerald that he did not come near her the previous summer.</p> <p>Mr Birling is in good spirits and makes a number of speeches. One of his main themes is that a man needs to look after himself and his own family and not worry about the wider community. As he is telling them this, the door bell rings. Inspector Goole enters. Although Mr Birling tries to take control, the Inspector announces that he has come to investigate the suicide of Eva Smith, a young working-class girl who died that afternoon in 'the infirmary'.</p> <p>Mr Birling recognises the girl from a photograph and admits that he fired her from his factory when she became one of the ring-leaders of a strike asking for higher wages. Birling does not feel guilty; he cannot see that he has any responsibility for what happened to her afterwards.</p> <p>The Inspector then questions Sheila Birling. Sheila is distressed as she hears more about the girl's tragic story and the description of her suicide. When the Inspector reveals that Eva's next job was at a big shop called Milwards, but that she was sacked after a customer complained about her, Sheila becomes more distressed. When she too is shown a photograph of the girl, Sheila admits that it was her fault that Eva was sacked. She is horrified by what she did and feels guilty.</p>
ACT 2	<p>When the Inspector then reveals that Eva went on to change her name to Daisy Renton, Gerald Croft's reaction reveals that he too knew the girl. Gerald tries to exclude Sheila and cover up his involvement. However, Gerald admits that he knew Daisy Renton. He had met her in 'the Palace Bar', and let her stay in the flat of a friend of his when he discovered she was penniless. She became his mistress although Gerald broke off the relationship when he had to go away on business, giving her some money to see her through for a few months. Sheila is upset and disappointed; Gerald had told her he was busy at work when in fact he was having a relationship with this girl.</p> <p>Inspector Goole then moves onto Mrs Birling, who is convinced that she has no connection with the girl. After showing her a photograph of the girl Mrs Birling has to admit that she had seen the girl two weeks previously. The girl - now pregnant - had come to ask for financial assistance from the Charity Organisation where Mrs Birling was chairwoman. Mrs Birling had denied the girl any support, and refuses to feel any remorse. In fact, she is proud that she did her duty and blames the man who got Eva Smith pregnant.</p> <p>Sheila urges her mother to stop talking, as she and the audience have realised at this point that Eric is involved. Just as Mrs Birling blames the father of the baby, Eric re-enters the room.</p>

# English Literature

ACT 3	<p>The relationships in the family begin to break down. The Inspector interrupts the family argument to question Eric who then admits his relationship with the girl. He met her in the same place as Gerald and in his drunkenness, forced himself on her. Soon afterwards she discovered that she was pregnant. Eric offered to marry her, but she did not accept as she knew Eric did not love her. Eric stole money from Mr Birling's office to try and support her.</p> <p>Mr Birling's reaction shows that he is more concerned about covering up his involvement and avoiding a scandal. The Inspector delivers a strong message about each character's guilt in the affair. He warns what will happen if people do not realise that we are all responsible for each other and then leaves.</p> <p>The family begin to wonder about the Inspector. Gerald has discovered that there is no Inspector Goole in the police force. When they telephone the infirmary, they realise that there hasn't been a suicide case for months.</p> <p>Mr Birling is thrilled as he now thinks that they are relieved of any responsibility or guilt. Sheila and Eric, on the other hand, still feel guilty and insist that nothing has changed - each of them still committed the acts that the Inspector had accused them of.</p> <p>At this point, the telephone rings. Mr Birling answers it and tells the family it was the police on the line: an inspector is on his way to ask questions about the suicide of a young girl...</p>
-------	---



# English Literature

Main Characters			
Character	Summary	Words to describe	Key Quotations
Inspector Goole	<p>The Inspector is in his fifties, dressed in a plain dark suit. He initially seems to be an ordinary police inspector, but (as his name suggests) he could be something more ominous, perhaps even supernatural. Inspector Goole questions the Birplings (Mr Birling, Mrs Birling, Eric Birling, Sheila Birling) and Gerald Croft.</p> <p>The Inspector is a powerful, manipulative and interesting character and is Priestley's voice in the play. He represents Priestley's strong moral views. His job is to make the characters change their attitudes, face up to what they have done and start taking responsibility for each other - see his final message in the play.</p> <p>By the end of the play it is revealed that he isn't actually an Inspector. It is not clear who he is, Priestley leaves it up to the audience to decide. His name 'Goole' suggests a supernatural or ghost like element, and he seems to know what the characters will say before they do - many believe he represents the conscience of the characters/audience.</p>	<p>Noble, humbled, socialist, authoritarian, omniscient, influential, moral, Priestley's mouthpiece.</p>	<ul style="list-style-type: none"> <li>'need not be a big man'</li> <li>'creates at once an impression of solidity and purposefulness'</li> <li>'speaks carefully'</li> <li>'she'd swallowed a lot of strong disinfectant. Burnt her inside out, of course'</li> <li>'A chain of events'</li> <li>'A girl died tonight.. in misery and agony - hating life'</li> <li>'If there's nothing else, we'll have to share our guilt.'</li> <li>'you slammed the door in her face.'</li> <li>'One Eva Smith has gone - but there are millions and millions of Eva Smiths and John Smiths still left with us'</li> <li>'We are members of one body'</li> <li>'if men will not learn that lesson, then they will be taught it in fire and blood and anguish.'</li> </ul>
Arthur Birling	<p>Mr Birling is the head of the household. He has made himself wealthy as a business man and has some reputation in the town. He is the owner of Birling and Co., a factory which employs girls to work on machines. He believes that his workers' pay is fair and is oblivious to the fact that his actions have consequences. Arthur is the husband of Sybil Birling who is his 'social superior' and it is hinted that he is self-conscious about being from a more working-class background.</p> <p>At the start of the play he comes across as arrogant, making long speeches about his (wrong) predictions for the future. He also makes claims about how a man should look out for himself and not waste time helping others. Birling does not change or learn any lessons during the course of the play. He is mostly concerned with covering up a 'scandal' and is delighted when he thinks the Inspector was fake at the end of the play. He is firmly capitalist, and right-wing in his political views. He values wealth and social status and is a social climber.</p>	<p>Arrogant, controlling, avaricious, ignorant, obstinate, static, uncaring, unapproachable, capitalist.</p>	<ul style="list-style-type: none"> <li>'rather portentous man'</li> <li>'I'm talking as a hard-headed, practical man of business.'</li> <li>'lower costs and higher prices'</li> <li>'The Germans don't want war'</li> <li>'community and all that nonsense'</li> <li>'If you don't come down sharply on some of these people, they'd soon be asking for the earth.'</li> <li>'I can't accept any responsibility'</li> <li>'Is there any reason why my wife should answer questions from you, Inspector?'</li> <li>'not the kind of father a chap could go to when he's in trouble'</li> <li>'There'll be a public scandal.'</li> <li>'Probably a Socialist or some sort of crank'</li> <li>'we've been had'</li> <li>'the famous younger generation who know it all.'</li> </ul>

# English Literature

Sybil Birling	Sybil Birling is an unsympathetic woman with some public influence, sitting on a charity committee. She is described as a rather cold woman and is her husband's social superior. She is the only one of all the Birlings to almost resist The Inspector's attempts to make her realise her responsibilities. She has a lack of understanding of how other people live and thinks that all classes behave in a certain way. (she won't believe that the a lower class girl would refuse to take stolen money). She only sees what she wants to see. she tells Sheila and Eric off for things that she considers impolite whilst turning a blind eye to Eric's drinking. Her cold nature causes her to blame the father of the child because she doesn't know the father is her own son. She does not learn from the Inspector. The speed at which she recovers after the inspector leaves reflects her coldness and lack of conscience.	Snobbish, stubborn, conceited, obstinate, pre-judiced, arrogant, cruel, ignorant, oblivious.	<ul style="list-style-type: none"><li>• 'rather cold woman and her husband's social superior'</li><li>• 'Arthur, you're not supposed to say such things'</li><li>• 'Please don't contradict me like that.'</li><li>• 'Girls of the class'</li><li>• 'disgusting affair'</li><li>• 'I think she only had herself to blame.' 'I didn't like her manner.'</li><li>• 'I consider I did my duty'</li><li>• 'Go and look for the father of the child. It's his responsibility.'</li><li>• 'As if a girl of that sort would ever refuse money!'</li><li>• 'I don't believe it. I won't believe it..'</li><li>• '[shocked] Eric! You stole the money?'</li><li>• 'He certainly didn't make me confess.'</li><li>• '[triumphantly] Didn't I tell you?'</li></ul>
---------------	---	--	---

# English Literature

Main Characters continued			
Character	Summary	Words to describe	Key Quotations
Sheila Birling	Sheila Birling is Arthur and Sybil's daughter and is in her early twenties. At the start of the play, she is celebrating her recent engagement to Gerald Croft. She comes across initially as naïve and childish. She is very shocked to hear the news of Eva Smith's death, she is also very regretful of her own involvement in the suicide. As the play continues, she matures. She shows an assertive side by standing up to her mother and father and she also shows that she is insightful and intelligent - she can see where the Inspector's investigation is going and tries to warn the others. By the end of the play she has grown up and has realised that her actions can have grave consequences. She learns her lesson. She takes responsibility and changes; she also tries to encourage the members of her family to do the same.	Immature, spoilt, envious, petulant, naïve, altruistic, compassionate, penitent, guilty.	<ul style="list-style-type: none"> <li>'very pleased with life'</li> <li>'all last summer when you never came near me'</li> <li>'don't be an ass, Eric'</li> <li>'Now I really feel engaged.'</li> <li>'But these girls aren't cheap labour - they're people. [recognises it with a little cry]'</li> <li>'[miserably] So I'm really responsible?'</li> <li>'I'll never, never do it again to anybody.'</li> <li>'You mustn't build up a kind of wall between us and that girl.' / 'the Inspector will just break it down.'</li> <li>'I remember what he said' / 'It frightens me the way you talk'</li> </ul>
Eric Birling	Eric is the son of Mr and Mrs Birling and works for his father. He is in his early twenties and we discover early on that Eric has a drinking problem and that he has been drinking steadily for almost two years. Eric is quite naïve, unlike Gerald. His involvement with Eva is used to convey how higher classes abused their power over the working class. When he realises his part in Eva's death, he is clearly distressed and understands the gravity of the situation, he can't understand why the others don't. By the end of the play, like his sister, he becomes aware of own responsibilities, he is ashamed and seems to be capable of changing for the better.	Immature, reckless, dishonest, naïve, shy, lacks confidence, culpable, penitent, altruistic, humbled, transformed.	<ul style="list-style-type: none"> <li>'not quite at ease, half shy, half assertive'</li> <li>'She's got a nasty temper sometimes'</li> <li>'Why shouldn't they try for higher wages?'</li> <li>'You know, don't you?' (to Sheila about drink) 'Why you little sneak!'</li> <li>'I was in that state when a chap easily turns nasty'</li> <li>'I wasn't in love with her or anything - but I liked her - she was pretty and a good sport.'</li> <li>'she treated me - as if I were a kid.'</li> <li>'[unhappily] My God - I'm not likely to forget'</li> <li>'I still feel the same about it.'</li> </ul>
Gerald Croft	Gerald Croft is a handsome, upper class man. His parents are above the Birlings socially, and possibly disapprove of his engagement to Sheila as they don't attend the dinner. At the start of the play, Gerald comes across as confident and charming. This changes after his affair with Eva Smith is revealed. He initially tries to cover it up but becomes more open and honest and we hope that he will change. However, he lets the audience down in the final act by trying to get the family out of trouble, he doesn't learn or change. He represents the selfish attitudes of the upper class, how ingrained these attitudes were in the upper class and how difficult it was to change them.	Charming, compassionate, arrogant, manipulative, ingratiating, static, unchanging, complacent.	<ul style="list-style-type: none"> <li>'easy well-bred young man-about-town'</li> <li>'You couldn't have done anything else.'</li> <li>'I think Miss Birling ought to be excused from any more questioning'</li> <li>'gave me a glance that was nothing less than a cry for help'</li> <li>'I was sorry for her'</li> <li>'I'm rather more - upset - by this'</li> <li>'that man wasn't a police officer.. I'm almost certain'</li> <li>'Everything's all right now Sheila. What about this ring?'</li> </ul>
Eva Smith	Although we never meet Eva, Priestley uses Eva as an important symbol. Eva represents ordinary people who can be destroyed when society fails to them. She promotes the idea that we have collective social responsibility through the other characters' treatment of her. Despite	Vulnerable, poor, determined, hardworking, impoverished.	



# English Literature

	her lower social class and death, Eva has the upper hand in the play as she is the one who has shown the others who they really are.	exploited, symbolic, victim.	
Edna	Edna, the parlour maid, is a reminder of the presence of the lower classes, whom families like the Birlings inconsiderately keep as servants. She is the only lower class character to appear on stage and highlights the Birlings' wealth as well as the themes of inequality, power, responsibility and class	Poor, invisible, ignored.	
<b>KEY THEMES:</b> Capitalism v Socialism	Eva Smith, a worker, is mistreated first by her capitalist boss (Arthur Birling). From there, she suffers four further injustices that give a very negative impression of capitalism. In his final speech, the Inspector warns that it is only through socialism ('one body') that mankind can hope to prevent such tragedies in the future. The characters who appear to change for the better, Sheila and Eric, also seem to show a transition from more capitalist to more socialist views.		
Social Responsibility	Priestley is interested in our personal responsibility for our own actions and our collective responsibility to society, to take care of one another through a shared responsibility. In 1912 there was no welfare state in Britain. Poor people often depended on charity. But wealthy people, such as Mrs. Birling, in the play, usually controlled the charity. Priestley wanted to create a change in society and make the upper class feel more responsible for the rest of society. Quality of life was low after the war, Priestley believed both the rich and poor would benefit from a focus on looking out for one another. Priestley shows different attitudes towards social responsibility in the play. Mr Birling thinks that the idea of social responsibility is 'nonsense whereas the inspector acts as Priestley's mouthpiece. Sheila and Eric appear to learn their social responsibilities.		
Social Class	Before World War Two, Britain was divided by class. The war helped bring these two classes closer together however Priestley wanted to highlight that inequality between the classes still existed and that the upper-classes looked down upon the working-class in post-war Britain. J B Priestley is trying to show that the upper class are unaware that the easy lives they lead rest upon hard work of the lower classes. Priestley was also interested in how a person's class determines the decisions they make. Through the play, we see only rich, middle and upper class characters (other than the maid). We see through each interrogation, these classes' treatment of the working class (Eva). Especially through Mrs Birling, we see some of the stereotypical attitudes towards these classes. Sheila and Eric display the naivety and ignorance that comes with growing up middle class. The younger generations are more accepting of socialist ideas and are more willing to change. Sheila and Eric accept their part in Eva's death and feel guilty and responsible. They offer the chance for a positive future. The older generation, Mr Birling and Mrs Birling, and in many ways Gerald Croft, strongly believe in capitalism and caring only for themselves. The parents are unable to admit responsibility and their behaviours and attitudes seem fixed in their ways.		
Age/ generation divide	Gerald Croft is caught in the middle, being neither very young nor old. In the end he sides with the older generation, perhaps because his upper class roots influence him to want to keep the status quo and protect his own interests.		



# Engineering

## Understanding the physical properties of materials

Understanding that materials can be defined by a range of properties, for example:

- **tensile strength** – the ability of a material to resist stretching or breaking when pulled
- **compressive strength** – a materials ability to withstand loads without changing its shape
- **hardness** – this is a materials ability to resist changing shape when impacted by another object
- **toughness** – the ability of a material to absorb energy (impacts) before it starts to deform (change shape)
- **malleability** – the materials ability to be repeatedly hammered, pressed, bent or rolled into thin sheets
- **ductility** – the ability of a material to be drawn or plastically deformed without breaking
- **conductivity** – a measure of how well the material conducts heat or electricity
- **corrosive resistance** – how well the material can withstand damage caused by chemicals or oxidation
- **elasticity** – the ability of a material to limit distorting and return to its original shape and size
- **environmental degradation** - how the physical environment is degraded, damaged or compromised through a range of situations such as air pollution, water contamination etc.

## Physical properties required for specific products (examples)

### Mobile phones

- **compressive strength** to resist weight put on the phone casing
- **corrosive resistance** to limit damage to the phone casing from chemicals such as hairspray, sun cream or other daily exposures.

### Security alarm

- **compressive strength** in its casing to avoid deformation from high winds
- **hardness** to avoid possible vandalism or attempts to gain access to the circuit.

### Bicycles

- **ductility** to allow the tubular forms of the frame to be created (drawn)
- **toughness** to absorb impact, for example when children drop bikes on the floor or during a crash in a race
- **compressive and tensile strength** to absorb the shifting weight of the cyclist on the bike.

### Children's play area

- **toughness** to absorb impact when children climb frames and obstacles
- **elasticity** when children climb ladders and ropes or walk across suspended bridges
- **compressive strength** to withstand loads of several children standing in a small area or climbing on frames
- **tensile strength** when children hang or swing on sections of the play area.

## How materials are tested to determine their physical properties

Testing is undertaken in engineering to determine the physical properties of materials.

Destructive testing will test the material, part or product until it breaks or is destroyed. Non-destructive testing is used to evaluate the property of the material without causing it damage.

**Tensile testing** - the material or part is clamped in two locations, usually on opposite ends, and increasing pulling force is applied in opposing directions to measure stretching.

**Hardness testing** - this is tested by indenting the material with a known hard material such as diamond. The force used to create this is measured to determine hardness.

**Toughness testing** – this is undertaken by allowing a pendulum with a mass on the base to strike the side of the material or part. The extent to which the shape bends (deflects) dictates its level of toughness.

**Malleability testing** is done by applying a stamping action (pressing) on the material to see how much the malleable material will flatten without breaking.

**Ductility testing** is performed in a similar manner to tensile strength testing, where the material is drawn apart.

**Conductivity testing** is done by passing an electrical current through the metal material and measuring its resistance.

**Elasticity** is another stretching test but measures a material's ability to be stretched without permanent deformation.

# Engineering

## Planning manufacture

Before any manufacturing can take place, a plan is needed to determine each stage or step of the process.

The plan should include:

- the materials to be used to produce the engineered product
- what equipment will need to be used
- what tools will be needed
- the sequence (order) that manufacturing needs to take place in.

The sequences need to consider in what order parts are manufactured, as some parts require others to be made to ensure they join correctly, etc. This is also known as prioritising.

## Equipment selection

Equipment should be classed as any powered machinery that will be used in the production of an engineered outcome.

Equipment choices should give justifications for their selection and should refer to engineering drawings or other provided sources.

Typical equipment may include:

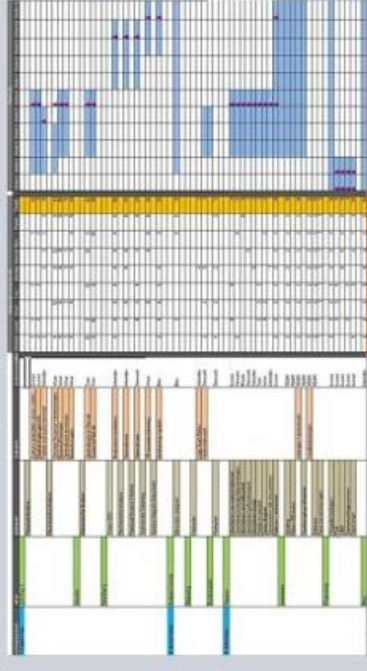
- centre lathe
- drills
- miller
- laser cutter
- bandsaw
- linisher
- brazing hearth

## Planning and sequencing

Plans for manufacture should be presented in a way which is easy to find key information at a glance. Planning information could include tables such as a GANTT chart or other lists or appropriate documents.

Manufacturers should be able to understand from the provided information, the sequence of manufacture and the time it should take to produce the part, which tools and equipment should be required for each stage and any processes such as the use of jigs or templates.

Planning and sequencing should also consider the use of CAM (where appropriate), including 3D printing and laser cutting.



Typical engineering GANTT chart

## Contingency planning

Planning should also include contingencies to overcome problems that may arise during production. What happens if a machine breaks down or people become ill?

Contingency planning should include ways that problems can be overcome, giving examples of scenarios and possible contingencies.





## Year 11 French Autumn Term 2: Un oeil sur le monde



Le français	L'anglais
<b>Qu'est-ce qui te préoccupe?</b>	<b>What concerns you?</b>
Ce qui m'inquiète le plus, c'est le réchauffement climatique.	What worries me the most is global warming.
Il faut qu'on fasse de plus pour sauver la planète.	We have to do more to save the planet!
<b>À ton avis, quel est le plus grand problème environnemental pour la planète?</b>	<b>In your opinion, what is the biggest environmental problem for our planet?</b>
À mon gré, le plus grand problème environnemental, c'est la sécheresse.	In my opinion, the biggest environmental problem is drought.
Les récoltes meurent à cause du manque d'eau - c'est vraiment inquiétant.	The crops are dying due to a lack of water - it's really worrying.
<b>Qu'est-ce qu'on peut faire pour protéger l'environnement ?</b>	<b>What can we do to protect the environment?</b>
D'abord, on devrait trier les déchets et baisser le chauffage.	Firstly, on have to sort rubbish and lower the heating.
En plus, on peut refuser les sacs en plastique et utiliser les transports en commun plus souvent.	In addition, we can refuse plastic backs and use public transport more often.
<b>Qu'est-ce que tu as fait hier chez toi pour aider la planète ?</b>	<b>What did you do yesterday at home to help the planet?</b>
Hier, je suis allé(e) au collège à vélo plutôt qu'en voiture.	Yesterday, I went to school by bike rather than by car.
C'était un peu lent mais c'était totalement mieux pour la planète.	It was a bit slow but it was much better for the planet.
<b>Qu'est-ce que tu vas faire au collège pour sauver la planète?</b>	<b>What are you going to do at school to save the planet?</b>
L'année prochaine, j'ai l'intention d'organiser une manifestation au collège.	Next year, I intend to organise a protest at school.
On va aussi recycler plus efficacement et donner de l'argent à une association caritative.	We are also going to cycle more efficiently and give some money to a charity.
<b>Est-ce que tu penses que les grands événements sont bons pour l'environnement?</b>	<b>Do you think that big events are good for the environment?</b>
D'un côté, les grands événements utilisent trop d'énergie et il y a toujours trop de déchets.	On the one hand, big events use too much energy and there is always too much rubbish.
En outre, les ouvriers sont normalement exploités et j'estime que ce n'est pas juste!	In addition, workers are normally exploited and I think that it isn't fair!
<b>Quels sont les avantages des grands événements?</b>	<b>What are the advantages of big events?</b>
Les grands événements permettent aux gens de passer un bon moment et unissent les personnes.	Big events allow people to have a good time it they unite people.
Aussi, ils mettent en avant la culture et la ville hôte.	Also, they promote culture and the host town.
<b>Tu es déjà allé(e) à un festival de musique ou un concert?</b>	<b>Have you ever been to a music festival or concert?</b>
Il y a trois mois, je suis allé(e) à Glastonbury, ce qui était une expérience inoubliable.	Three months ago, I went to Glastonbury, which was an unforgettable experience.
J'ai vu Taylor Swift et Beyoncé avec mes amis et nous avons pris notre pied!	I saw Taylor Swift and Beyoncé with my friends and we had a ball!
<b>Tu achètes des produits issus du commerce équitable?</b>	<b>Do you buy fairtrade products?</b>
Malheureusement, je n'ai pas beaucoup d'argent et je trouve ces produits assez chers.	Unfortunately, I don't have lots of money and I find these products quite expensive.
Mais, à l'avenir, je vais m'efforcer d'acheter plus produits parce que trop de travailleurs sont exposés à des risques.	But in the future, I am going to strive to buy more products because too many workers are exposed to risks.
<b>Tu voudrais faire du travail bénévole un jour?</b>	<b>Would you like to do voluntary work one day?</b>
Absolument! J'estime que c'est important de participer à la vie en société.	Absolutely! I think that it's important to participate in life in the community.
J'espère travailler dans un refuge pour les animaux ou participer à des projets de conservation.	I hope to work in an animal refuge or participate in some conservation projects.

Le présent	Le passe composé	Le futur	Le conditionnel	L'imparfait
Je recycle	J'ai recyclé	Je vais recycler	Je recyclerais	Je recyclais
Tu recycles	Tu as recyclé	Tu vas recycler	Tu recyclerais	Tu recyclais
Il/elle recycle	Il/elle a recyclé	Il/elle va recycler	Il/elle recyclerait	Il/elle recyclait
Nous recyions	Nous avons recyclé	Nous allons recycler	Nous recyclerions	Nous recyions
Ils/elles recyclent	Ils/elles ont recyclé	Ils/elles vont recycler	Ils/elles recycleraient	Ils/elles recyclaient

**Top tip:** remember your adverbs of time and frequency! Put them at the beginning of your sentence to add extra detail.

**hier** = yesterday

**normalement** = usually

**demain** = tomorrow

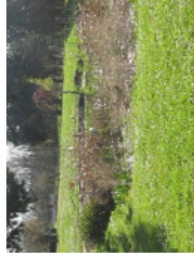
# Geography



By Rob Gamesby  
<http://www.coolgeography.co.uk>

## The Living World

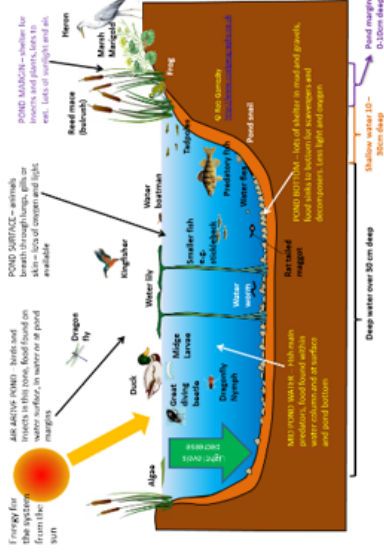
An **ecosystem** is a natural system that comprises a **community of plants and animals** that interact with each other and their physical environment. **Non-living elements** (soils, rocks, water, sunlight etc.) and **living elements** (plants, animals, bacteria etc.). Scale – Pond(local), Regional (sand dunes, woodland or forest), **global scale (biomes)**- tropical rainforests, deserts and tundra environments.



### Small scale ecosystems – Freshwater ponds

- Animals and plants living in deeper water at the bottom of the pond will have less light and Oxygen to cope with and ADAPT to.
- Living things at the edges of a pond (the margins) have more light and Oxygen, but also have to cope with more wind etc.

PRODUCERS use energy from the sun, and convert it into sugars (or glucose). CONSUMERS then get their energy by eating the producers for their sugars.

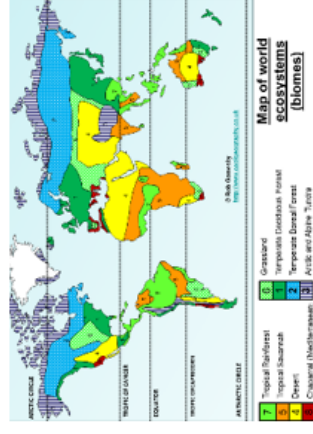


**LINKS** - energy flows from one food source to another. **TROPHIC PYRAMID** composed of many primary producers, a smaller number of primary consumers, and even smaller number of secondary consumers and a tiny number of tertiary consumers. Food chains – food moves up the line from producer to tertiary consumer.



However, this is too simplistic.

Animals might eat many other plants and animals, not have just one source of food. It is better to consider the flows as a **FOOD WEB**; that considers all of the connections between the plants and animals within an ecosystem like a pond. Decomposers – bacteria and insects etc. that decompose dead material.



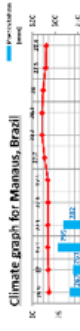
**The distribution and characteristics of large scale natural global ecosystems** – large scale ecosystems location is determined largely by climate – how much precipitation and sunlight is available? What is the relief of the area like? Wind? E.g. temperate deciduous forest. Climate is reasonably stable with not great variation throughout the year. Deciduous forests have trees with broadleaves (e.g. Oak) that are shed in the autumn months. Disappear in the interiors of continents as temperatures become more extreme and precipitation levels fall. Lots of other biomes as shown on the map



# Geography

## Tropical rainforests - distinctive characteristics.

Tropical rainforests - great **biodiversity**, Located across the **Equatorial regions**. Four square miles of tropical rainforest have 1500 flowering plant species and 750 types of trees



**Factor 1 – Climate – Loads of rain** - over 2000mm of rainfall per year. Rainfall in each month. Temperatures are very even, averaging 27°C every day with very little variation. Allows for incredible plant growth.

**Factor 2 – soils and nutrients** - very deep, some of the deepest in the world. **Latosol**, a typical tropical forest soil. High rainfall weathers the rock below and masses of vegetation allow deep soils to form. **Very nutrient poor** as you go down through the soils as rainwater **LEACHES** the nutrients and minerals out of the soil. Soils are often red in colour as they are rich in iron. **NUTRIENT**

**CYCLING** very important. This is a good example of the **INTERDEPENDENT** (where things rely upon each other) nature of the forest. As vegetation dies it is quickly decomposed by insects, bacteria and fungi. This releases nutrients into the surface of the soil which is taken up quickly by the plants.

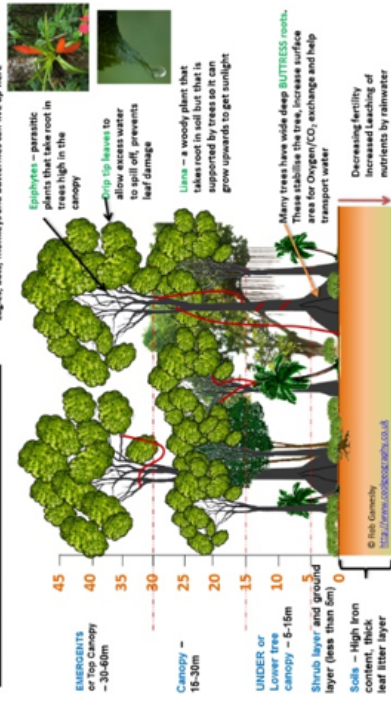
**Factor 3 – water recycling** - roots of plants take up water from the ground, rain is intercepted, water then evaporates into the atmosphere and forms clouds to make the next day's rain.

**Factor 4– Stratification (layers) - Competition** between plants for light and space. Adaptations such as buttress Roots, Lianas, epiphytes, drip tips to cope.

**Factor 5 – competition and interdependence – food webs in Tropical forests**

**Factor 6 – people - indigenous groups** e.g. **Kayapo** in Brazil use forests for food, water and shelter. Under pressure due to subsistence and commercial farming, logging, road building, mineral extraction, energy development, settlement, and population growth.

## The Structure of a Rainforest



**Deforestation** cutting down of forest for other uses – impacts include;

- **Environmental** – loss of biodiversity & genetic resources, loss of forest cover, increased soil erosion, loss of nutrient cycle, damage to water cycle
- **Economic** – **better transport, more raw materials** e.g. **coal, more farm products, more wood, greater energy production, boosts GDP**

## Changing rates of deforestation.

1. Forests lost across South America, Africa and Oceania. Deforestation is still occurring, the AMOUNT of deforestation is in decline.
2. In many countries, there is less deforestation happening however, **in some tropical countries the rate of deforestation is increasing rapidly** as those countries use their forest resources.
3. Indonesia has seen the greatest increase, as they replace forests with palm oil plantations. This has threatened the Orang-utan.

# German



## Year 11 German Autumn Term 2: Menschliche Beziehungen



Deutsch	Englisch
<b>Wer ist dein/e bester/beste Freund/in?</b>	<b>Who is your best friend?</b>
<b>Wie kommst du mit deinen Freunden/ deiner Familie aus?</b>	<b>How do you get on with your friends/ your family?</b>
Meine beste Freundin / mein bester Freund ist ...	My best friend is ...
Vor allem finde ich..... (name) äußerst nett.	Above all, I find ...(name) utterly nice.
Allerdings kann er/sie manchmal frech sein.	However, he/she can be quite cheeky.
Ich denke, dass ..... (name) ein guter Freund / eine gute Freundin ist, weil er/sie immer Zeit für mich hat.	I think that ... is a good friend because he/she always has time for me.
Heutzutage gehe ich meistens mit .... (name) aus.	Nowadays, I mostly go out with ...(name)
In der Grundschule war ... mein bester Freund (m)/ meine beste Freundin (f).	In primary school,... was my best friend..
Ein guter Freund/ eine gute Freundin muss die gleichen Interessen haben,	A good friend must have the same interests.
<b>Kannst du deine Familie beschreiben?</b>	<b>Can you describe your family?</b>
<b>Streitest du dich oft mit deinen Geschwistern?</b>	<b>Do you often argue with your siblings?</b>
<b>Gibt es Regeln in deiner Familie?</b>	<b>Are there rules in your family?</b>
Meine Familie ist mein Leben	My family is my life.
Ich streite mich mit ..., weil er/sie nervig ist.	I argue with ... because he/she annoying.
Ich verstehe mich gut mit ..., denn er/sie ist ...	I get on well with ... because he/she is ...
Als ich ein Kind war, habe ich mich oft mit meiner Schwester/ meinem Bruder gestritten.	When I was younger, I often argued with my sister/ my brother.
Wenn ich älter bin, möchte ich heiraten/ eine Familie haben.	When I am older I would like to get married/ have a family.
Ich habe eine gute Beziehung mit meiner Mutter/ meinem Vater.	I have good relationship with my mother/ my father.
Mein Stiefbruder geht mir auf die Nerven.	My step brother gets on my nerves.
<b>Wer ist dein Vorbild?</b>	<b>Who is your role model?</b>
...ist mein Vorbild und ich bewundere ihn/sie sehr.	..is my role model and I admire him/her a lot.
Er/sie ist ganz begabt, erfolgreich und fleißig.	He/she is quite talented, successful and hard-working.
Vorbilder sind für mich wichtig, weil sie vielen Leuten helfen.	Role models are important to me because they help lots of people.
<b>Wie war dein Leben als Kind?</b>	<b>How was your life as a child?</b>
Als ich ein Kind war, durfte ich nicht allein in die Stadt gehen.	As I child, I was not allowed to go into town alone.
Jetzt kann ich spät ins Bett gehen.	Now, I can go to bed late.

Präsens	Perfekt	Futur	Konditional	Imperfekt
Ich bin	Ich bin gewesen	Ich werde sein	Ich würde sein	Ich war
Du bist	Du bist gewesen	Du wirst sein	Du würdest sein	Du warst
Er/sie ist	Er/sie ist gewesen	Er/sie wird sein	Er/sie würde sein	Er/sie war
Wir sind	Wir sind gewesen	Wir werden sein	Wir würden sein	Wir waren
Sie sind	Sie sind gewesen	Sie werden sein	Sie würden sein	Sie waren

**Top tip:** include intensifiers to strengthen adjectives. Put them before the adjective.

sehr = very  
ganz = really  
ziemlich = quite  
ein bisschen = a bit  
zu = too

**Pronunciation:** w = "vv" v = "f" ie = "ee" ß = "ss" eh = "ay" ä = "eh"

# History

## Knowledge Organiser – Topic One: Medieval Medicine 1250-1500

Medieval Britain		Key Words	
1	Medieval Britain is the period between <b>1250-1500</b> also known as the 13 <sup>th</sup> -16 <sup>th</sup> century or the Middle Ages.	9	<b>Superstition</b> A belief, not based on knowledge, but on the supernatural. For example witchcraft or astrology
<b>Key events</b>		10	<b>Purging</b> To rid the body of an ‘excess’ like blood or vomit
2	<b>1123</b> Britain’s first hospital, St Bartholomew’s was set up in London	11	<b>Leeching</b> The use of leeches for bloodletting
3	<b>1350</b> Average life expectancy is 35 years of age	12	<b>Cupping</b> Using glass cups to draw blood to the surface
4	<b>1348-49</b> The Black Death kills 1/3 of England’s population	13	<b>Fasting</b> To avoid eating or drinking
5	<b>1388</b> Parliament passes the first law requiring streets and rivers to be kept clean by the people	14	<b>Pilgrimage</b> A journey to a religious shrine and relics to show your love of God and to cure an illness
<b>Key Concepts</b>		15	<b>Mass</b> Public worship in the Roman Catholic Church
6	<b>The Medieval Church</b> –The official religion of medieval Britain was Roman Catholic. Daily life and power was dominated by the Church, they controlled education and many people feared God.	16	<b>Astrology</b> Study of the planets and their effect on humans
7	<b>The Four Humours.</b> First suggested by Greek doctor Hippocrates. <b>Black Bile, Yellow Bile, Blood and Phlegm.</b> These humours linked to elements and seasons. Hippocrates believed that if these humours became unbalanced you would get ill. To get better, you needed to balance them. Galen, a Greek doctor working in Rome continued the theory and added his own ideas. His ‘ <b>Theory of Opposites</b> ’ to heal illness suggested using hot to cure cold.	17	<b>Miasma</b> Bad air which was blamed for spreading disease
8	<b>Medieval Power</b> The emphasis in Medieval Britain was on authority. The King had total power, but the Church had considerable control. People followed authority and would not question the views of King/Church as it would mean risking their lives.	18	<b>Apothecary</b> A medieval pharmacist or chemist
		19	<b>Wise Woman</b> A female healer, who used folk medicine and herbal remedies to cure illnesses.
		20	<b>Vademecum</b> A medieval medical book carried by doctors
		21	<b>Urine Chart</b> Used to examine urine to define an illness
		22	<b>Physician</b> A male medically trained doctor
		23	<b>Barber Surgeon</b> Untrained surgeon, who practiced basic surgery
		24	<b>Dissection</b> To cut open a human and examine the insides
		25	<b>Epidemic</b> A widespread outbreak of a disease
		26	<b>Trepanning</b> Cutting a hole in the skull
		27	<b>Amulet</b> A charm that bought protection from disease
		28	<b>Black Death</b> A term to describe the bubonic plague
		29	<b>Monastery</b> A building where monks live, eat and pray



# History

Knowledge Organiser – Topic Three: Medicine in 18<sup>th</sup> and 19<sup>th</sup> century Britain

18 <sup>th</sup> and 19 <sup>th</sup> century Britain		Key Words	
1	This was a time of breakthroughs in medicine in England. There were many scientific discoveries but also many Public Health problems.	12	<b>Vaccine</b> The injection into the body of killed or weakened organisms to give the body resistance against disease
<b>Key events</b>		13	<b>Smallpox</b> A dangerous disease causing fever that was beaten by vaccination
2	<b>1798</b> – Edward Jenner developed the first vaccine for Smallpox	14	<b>Anaesthetic</b> Drugs given to make someone unconscious before or after surgery
3	<b>1847</b> – James Simpson developed chloroform as an anaesthetic	15	<b>Infection</b> The formation of disease causing germs
4	<b>1854</b> – John Snow’s maps proved the source of cholera	16	<b>Cholera</b> A bacterial infection caused by drinking water
5	<b>1861</b> – Louis Pasteur’s germ theory was published	17	<b>Germ Theory</b> The theory that germs cause disease
6	<b>1867-</b> Lister used antiseptic to prevent infection	18	<b>Antiseptic</b> Chemicals used to destroy bacteria and prevent infection
7	<b>1875</b> – The Public Health Act. Local councils had to provide sewers, drainage and fresh water as well as medical officers	19	<b>Medical Officer</b> A person appointed to look after the public health of an area
8	<b>1882</b> Robert Koch identified bacteria that caused specific diseases	20	<b>Contagion</b> The passing of disease from one person to another
<b>Key Concepts</b>		21	<b>Epidemic</b> A widespread outbreak of a disease
9	<b>Nursing</b> – Nurses are responsible for the care of patients in hospital. Before 1800, hospitals were dangerous places where death was very likely. The development of nursing changed that.	22	<b>Sanitation</b> Providing disposal of human waste and dispensing clean water to improve public health
10	<b>Breakthrough</b> – a scientific discovery that dramatically alters the way people understood disease – <u>e.g.</u> the discovery of bacteria. This then helps the problem to be solved.	23	<b>Workhouses</b> Accommodation for poor people who could not afford to pay for rent and food.
11	<b>Public Health</b> – when the government takes measures to prevent diseases spreading and to help the population become healthier. The government increasingly took on this role after the development of germ theory	24	<b>Dispensary</b> A place where medicines are given out
		25	<b>Voluntary hospital</b> Hospitals supported by charitable donations
		26	<b>Chloroform</b> A liquid whose vapour acts as an anaesthetic and produces unconsciousness
		27	<b>Industrial Revolution</b> A period of British history when industries (e.g. coal, steel) transformed society



# History


## Knowledge Organiser – Topic Four: Medicine in modern Britain, 1900-Present

Modern Britain		Key Words	
1	From 1900-Present, there have been massive changes in medicine and treatment	12	<b>X-Ray</b> Technology using <u>particular light rays</u> . Used in WW1 to locate bullets in the body.
<b>Key events</b>		13	<b>Transplant</b> When a faulty or damaged organ (e.g. liver) is swapped with a healthy one through surgery
2	<b>1900</b> – life expectancy was still below 50 years of age	14	<b>Radiotherapy /Chemotherapy</b> Treatment of a disease, such as cancer, by the use of chemicals
3	<b>1911</b> – National Insurance Bill introduced – gave help if workers were sick or unemployed	15	<b>Superbugs</b> Bacteria that are not affected/destroyed by antibiotics or cleaning
4	<b>1914-1918</b> World War One leads to developments in surgery and treatment	16	<b>Gene therapy</b> Medical treatment using normal genes to replace defective ones.
5	<b>1928</b> – Fleming discovered penicillin	17	<b>Dialysis</b> Technology that replicates the function of the kidneys
6	<b>1938</b> – Florey and Chain developed use of penicillin	18	<b>Polio</b> A contagious disease that can cause paralysis and death
7	<b>1948</b> – The NHS begins following the Beveridge report (1942)	19	<b>Penicillin</b> The first antibiotic drug produced from the mould of penicillin to treat infections
8	<b>1953</b> – Crick and Watson discovered the structure of DNA	20	<b>Pacemaker</b> Implanted technology that regulates heartbeat
<b>Key Concepts</b>		21	<b>Antibiotics</b> A drug made from bacteria that kill other bacteria and so cure an infection or illness
9	<b>War</b> – World War One and World War Two forced developments in treatment and surgery – e.g. plastic surgery and the use of antibiotics in WW2.	22	<b>Magic bullets</b> A chemical that kills a particular bacteria and nothing else
10	<b>Technology</b> – huge improvements in technology greatly improved the understanding and treatment of disease – e.g. X-ray, DNA, Pacemakers, dialysis and keyhole surgery	23	<b>Electron microscope</b> Developed 1931. Allows doctors to see cells in fine detail.
11	<b>National Health Service</b> - After WW2, the government introduced the NHS in 1948. This offered free healthcare at the point of delivery. The expansion of who could vote and the shared experience of suffering in WW2 bought about this development.	24	<b>DNA</b> Deoxyribonucleic acid, the molecule that genes are made of
		25	<b>Cancer</b> A group of related diseases. Cells divide and spread into the surrounding tissue.

# History


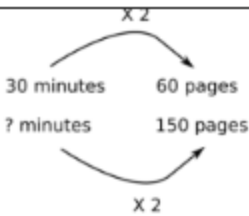
## Knowledge Organiser - The historic environment: The British sector of the Western Front 1914-18: injuries, treatment and the trenches

### The Western Front

1	<b>The Western Front</b> is a stretch of land through France and Belgium where most of the fighting took place during WW1. It is where most of the main battles occurred.	
2	<b>August 1914</b> The war begins	
3	<b>August-September 1914</b> The first trenches are built on both sides of the war	
4	<b>October-November 1914</b> First Battle of Ypres	
5	<b>April-May 1915</b> Second Battle of Ypres	
6	<b>February-December 1916</b> Battle of Verdun	

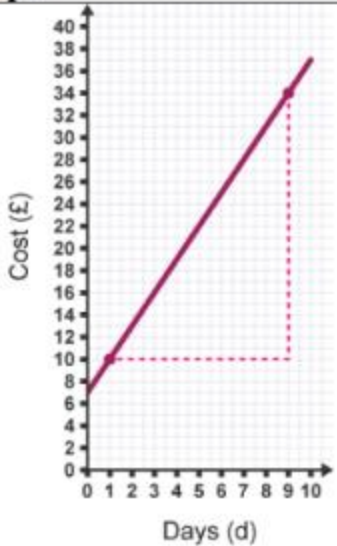
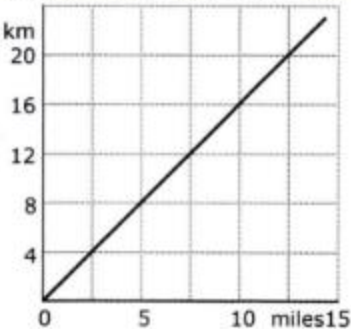
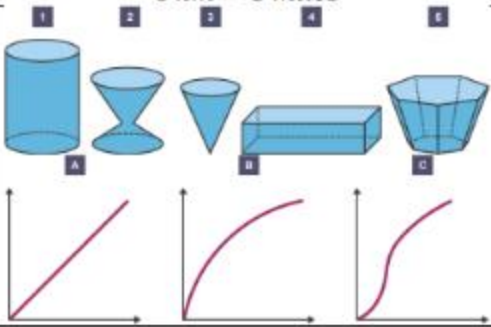
7	<b>July-November 1916</b> The Battle of the Somme	
8	<b>July-November 1917</b> Third Battle of Ypres	
9	<b>November-December 1917</b> Battle of Cambrai	
10	<b>Summer and autumn 1918</b> The final months of the war	
<b>Key Words</b>		
11	<b>Battalion</b>	A large body of troops, forming part of a brigade
12	<b>Trench</b>	Long, narrow ditches dug into the ground where soldiers lived all day and night
13	<b>Artillery</b>	Large-caliber guns used in warfare on land
14	<b>Shrapnel</b>	Fragments of a bomb, shell or other object thrown out by an explosion
15	<b>Triage</b>	The system of splitting the wounded into groups according to who needed the most urgent attention
16	<b>Evacuation</b>	In this context, meaning the clearing of a body (dead or alive) from the battle ground to seek medical attention
17	<b>Antiseptic</b>	A type of surgery that kills germs in wounds
18	<b>Aseptic</b>	A type of surgery that prevents germs reaching wounds
19	<b>Blood transfusion</b>	An injection of a volume of blood, previously taken from a healthy person, into a patient
20	<b>Chlorine gas</b>	A biological weapon first used by the Germans at the Second Battle of Ypres
21	<b>Trench foot</b>	A painful condition of the feet caused by the cold, deep water and mud of the trench
22	<b>Infection</b>	The process of infecting or state of being infected
24	<b>Terrain</b>	The type of ground (hilly, muddy, flat, easy to walk on)

# Mathematics

Topic/Skill	Definition/Tips	Example
1. Ratio	Ratio compares the size of <b>one part</b> to <b>another part</b> .  Written using the ':' symbol.	$3 : 1$ 
2. Proportion	Proportion compares the size of <b>one part</b> to the size of the <b>whole</b> .  Usually written as a fraction.	In a class with 13 boys and 9 girls, the proportion of boys is $\frac{13}{22}$ and the proportion of girls is $\frac{9}{22}$
3. Simplifying Ratios	<b>Divide</b> all parts of the ratio by a <b>common factor</b> .	$5 : 10 = 1 : 2$ (divide both by 5) $14 : 21 = 2 : 3$ (divide both by 7)
4. Ratios in the form $1 : n$ or $n : 1$	<b>Divide</b> both parts of the ratio by one of the numbers to make <b>one part equal 1</b> .	$5 : 7 = 1 : \frac{7}{5}$ in the form $1 : n$ $5 : 7 = \frac{5}{7} : 1$ in the form $n : 1$
5. Sharing in a Ratio	<b>1. Add</b> the total parts of the ratio. <b>2. Divide</b> the amount to be shared by this value to find the value of one part. <b>3. Multiply</b> this value by each part of the ratio.  Use only if you <b>know the total</b> .	Share £60 in the ratio $3 : 2 : 1$ .  $3 + 2 + 1 = 6$ $60 \div 6 = 10$ $3 \times 10 = 30, 2 \times 10 = 20, 1 \times 10 = 10$ £30 : £20 : £10
6. Proportional Reasoning	Comparing two things using <b>multiplicative reasoning</b> and applying this to a new situation.  Identify one multiplicative link and use this to find missing quantities.	
7. Unitary Method	Finding the <b>value of a single unit</b> and then finding the necessary value by <b>multiplying</b> the single unit value.	3 cakes require 450g of sugar to make. Find how much sugar is needed to make 5 cakes.  $3 \text{ cakes} = 450\text{g}$ So $1 \text{ cake} = 150\text{g}$ ( $\div$ by 3) So $5 \text{ cakes} = 750 \text{ g}$ ( $\times$ by 5)
8. Ratio already shared	Find what <b>one part</b> of the ratio is worth using the <b>unitary method</b> .	Money was shared in the ratio $3:2:5$ between Ann, Bob and Cat. Given that Bob had £16, found out the total amount of money shared.  $\text{£}16 = 2 \text{ parts}$ So $\text{£}8 = 1 \text{ part}$ $3 + 2 + 5 = 10 \text{ parts}$ , so $8 \times 10 = \text{£}80$
9. Best Buys	Find the <b>unit cost</b> by <b>dividing the price by the quantity</b> . The <b>lowest</b> number is the best value.	8 cakes for £1.28 $\rightarrow$ 16p each ( $\div$ by 8) 13 cakes for £2.05 $\rightarrow$ 15.8p each ( $\div$ by 13) Pack of 13 cakes is best value.

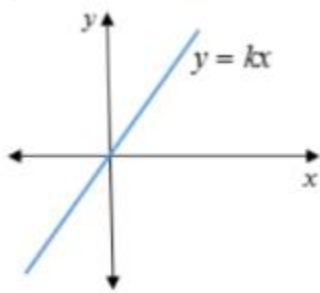
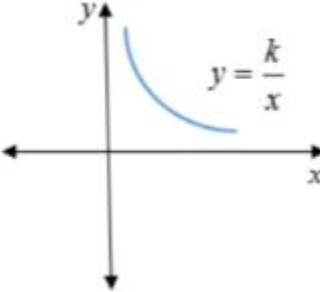
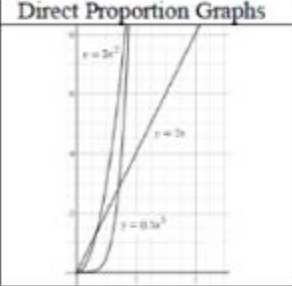
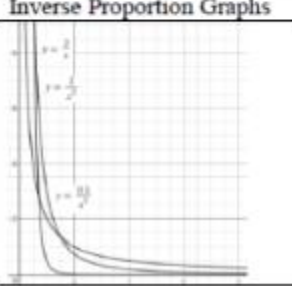


# Mathematics

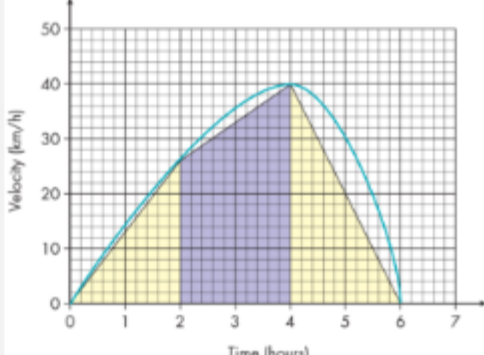
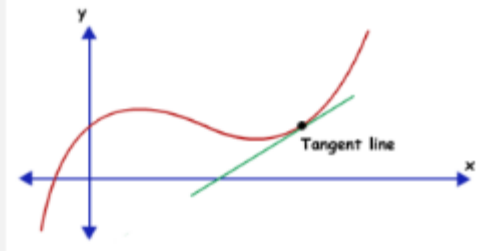
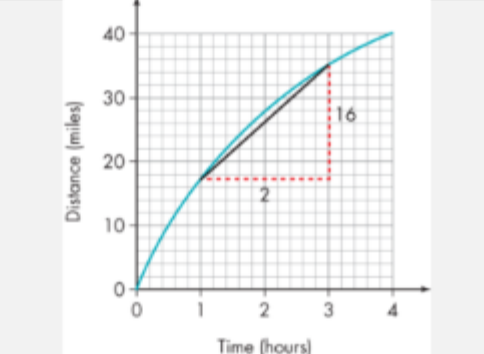
Topic/Skill	Definition/Tips	Example
1. Real Life Graphs	<p>Graphs that are supposed to model some real-life situation.</p> <p>The actual meaning of the values depends on the labels and units on each axis.</p> <p>The <b>gradient</b> might have a contextual meaning.</p> <p>The <b>y-intercept</b> might have a contextual meaning.</p> <p>The <b>area</b> under the graph might have a contextual meaning.</p>	<div></div> <p>A graph showing the cost of hiring a ladder for various numbers of days.</p> <p>The gradient shows the cost per day. It costs £3/day to hire the ladder.</p> <p>The y-intercept shows the additional cost/deposit/fixed charge (something not linked to how long the ladder is hired for). The additional cost is £7.</p>
2. Conversion Graph	<p>A line graph to <b>convert one unit to another</b>.</p> <p>Can be used to convert units (eg. miles and kilometres) or currencies (\$ and £)</p> <p>Find the value you know on one axis, read up/across to the conversion line and read the equivalent value from the other axis.</p>	<div><p>Conversion graph miles ↔ kilometres</p></div> <p>8 km = 5 miles</p>
3. Depth of Water in Containers	<p>Graphs can be used to show how the depth of water changes as different shaped containers are filled with water at a constant rate.</p>	<div></div>




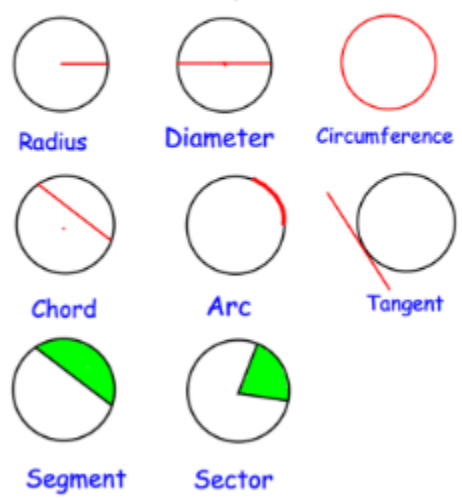
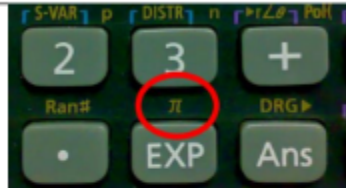
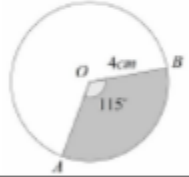
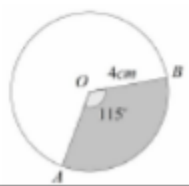
# Mathematics – Higher only

Topic/Skill	Definition/Tips	Example
1. Direct Proportion	<p>If two quantities are in direct proportion, <b>as one increases, the other increases</b> by the <b>same percentage</b>.</p> <p>If <math>y</math> is directly proportional to <math>x</math>, this can be written as <math>y \propto x</math></p> <p>An equation of the form <math>y = kx</math> represents direct proportion, where <math>k</math> is the <b>constant of proportionality</b>.</p>	
2. Inverse Proportion	<p>If two quantities are inversely proportional, <b>as one increases, the other decreases</b> by the <b>same percentage</b>.</p> <p>If <math>y</math> is inversely proportional to <math>x</math>, this can be written as <math>y \propto \frac{1}{x}</math></p> <p>An equation of the form <math>y = \frac{k}{x}</math> represents inverse proportion.</p>	
3. Using proportionality formulae	<p><b>Direct:</b> <math>y = kx</math> or <math>y \propto x</math></p> <p><b>Inverse:</b> <math>y = \frac{k}{x}</math> or <math>y \propto \frac{1}{x}</math></p> <ol style="list-style-type: none"> <li><b>Solve to find <math>k</math></b> using the pair of values in the question.</li> <li><b>Rewrite the equation</b> using the <math>k</math> you have just found.</li> <li><b>Substitute the other given value</b> from the question in to the equation to <b>find the missing value</b>.</li> </ol>	<p><math>p</math> is directly proportional to <math>q</math>. When <math>p = 12</math>, <math>q = 4</math>. Find <math>p</math> when <math>q = 20</math>.</p> <ol style="list-style-type: none"> <li><math>p = kq</math> <math>12 = k \times 4</math> so <math>k = 3</math></li> <li><math>p = 3q</math></li> <li><math>p = 3 \times 20 = 60</math>, so <math>p = 60</math></li> </ol>
4. Direct Proportion with powers	<p>Graphs showing <b>direct proportion</b> can be written in the form <math>y = kx^n</math></p> <p>Direct proportion graphs will always start at the origin.</p>	<p>Direct Proportion Graphs</p> 
5. Inverse Proportion with powers	<p>Graphs showing <b>inverse proportion</b> can be written in the form <math>y = \frac{k}{x^n}</math></p> <p>Inverse proportion graphs will never start at the origin.</p>	<p>Inverse Proportion Graphs</p> 

# Mathematics – Higher only


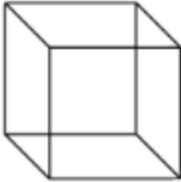
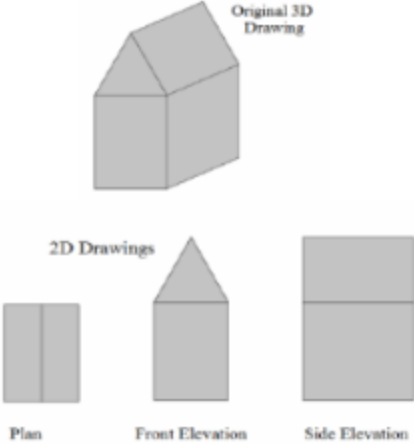
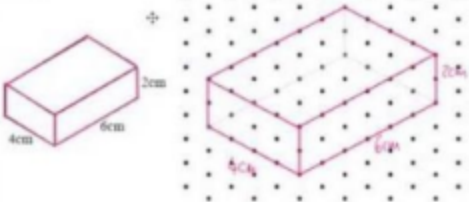
Topic/Skill	Definition/Tips	Example
1. Area Under a Curve	To find the area under a curve, <b>split it up into simpler shapes</b> – such as rectangles, triangles and trapeziums – that approximate the area.	
2. Tangent to a Curve	A straight <b>line</b> that <b>touches</b> a curve at <b>exactly one point</b> .	
3. Gradient of a Curve	<p>The <b>gradient of a curve</b> at a point is the same as the <b>gradient of the tangent</b> at that point.</p> <ol style="list-style-type: none"> <li>1. Draw a tangent carefully at the point.</li> <li>2. Make a right-angled triangle.</li> <li>3. Use the measurements on the axes to calculate the rise and run (change in y and change in x)</li> <li>4. Calculate the gradient.</li> </ol>	 $\text{Gradient} = \frac{\text{Change in } y}{\text{Change in } x}$ $= \frac{16}{2} = 8$

# Mathematics

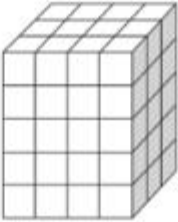
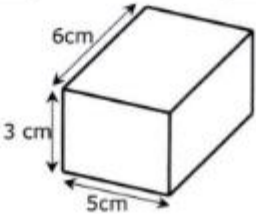
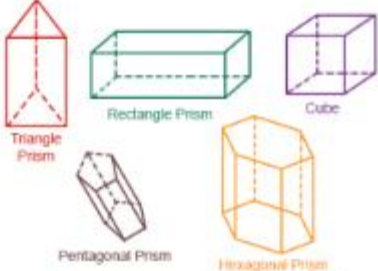
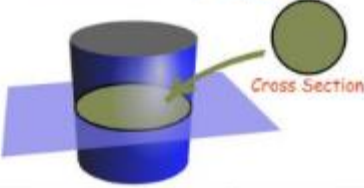
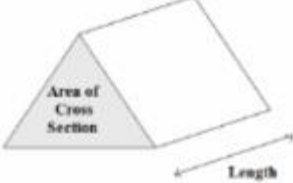
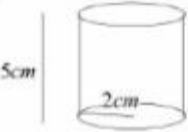

Topic/Skill	Definition/Tips	Example
1. Circle	A circle is the locus of all points equidistant from a central point.	
2. Parts of a Circle	<p><b>Radius</b> – the <b>distance</b> from the <b>centre</b> of a circle to the <b>edge</b></p> <p><b>Diameter</b> – the total <b>distance</b> across the <b>width</b> of a circle <b>through the centre</b>.</p> <p><b>Circumference</b> – the <b>total distance</b> around the <b>outside</b> of a circle</p> <p><b>Chord</b> – a <b>straight line</b> whose <b>end points lie on a circle</b></p> <p><b>Tangent</b> – a <b>straight line</b> which <b>touches</b> a circle at exactly <b>one point</b></p> <p><b>Arc</b> – a <b>part of the circumference</b> of a circle</p> <p><b>Sector</b> – the <b>region</b> of a circle enclosed by <b>two radii</b> and their intercepted <b>arc</b></p> <p><b>Segment</b> – the <b>region</b> bounded by a <b>chord</b> and the <b>arc</b> created by the chord</p>	<p>Parts of a Circle</p> 
3. Area of a Circle	$A = \pi r^2$ which means 'pi x radius squared'.	If the radius was 5cm, then: $A = \pi \times 5^2 = 78.5\text{cm}^2$
4. Circumference of a Circle	$C = \pi d$ which means 'pi x diameter'	If the radius was 5cm, then: $C = \pi \times 10 = 31.4\text{cm}$
5. $\pi$ ('pi')	Pi is the circumference of a circle divided by the diameter.  $\pi \approx 3.14$	
6. Arc Length of a Sector	The arc length is part of the circumference.  Take the <b>angle</b> given as a <b>fraction over 360°</b> and <b>multiply</b> by the <b>circumference</b> .	<p>Arc Length = <math>\frac{115}{360} \times \pi \times 8 = 8.03\text{cm}</math></p> 
7. Area of a Sector	The area of a sector is part of the total area.  Take the <b>angle</b> given as a <b>fraction over 360°</b> and <b>multiply</b> by the <b>area</b> .	<p>Area = <math>\frac{115}{360} \times \pi \times 4^2 = 16.1\text{cm}^2</math></p> 



# Mathematics

Topic/Skill	Definition/Tips	Example
1. Net	A pattern that you can <b>cut and fold</b> to make a <b>model</b> of a <b>3D shape</b> .	
2. Properties of Solids	<b>Faces</b> = flat surfaces <b>Edges</b> = sides/lengths <b>Vertices</b> = corners	A cube has 6 faces, 12 edges and 8 vertices. 
3. Plans and Elevations	This takes 3D drawings and produces 2D drawings.  <b>Plan View:</b> from <b>above</b> <b>Side Elevation:</b> from the <b>side</b> <b>Front Elevation:</b> from the <b>front</b>	
4. Isometric Drawing	A method for visually <b>representing 3D objects in 2D</b> .	

# Mathematics

Topic/Skill	Definition/Tips	Example
1. Volume	<p>Volume is a measure of the amount of space inside a solid shape.</p> <p>Units: <math>mm^3</math>, <math>cm^3</math>, <math>m^3</math> etc.</p>	
2. Volume of a Cube/Cuboid	<p><b><math>V = Length \times Width \times Height</math></b>  <b><math>V = L \times W \times H</math></b></p> <p>You can also use the Volume of a Prism formula for a cube/cuboid.</p>	 <p>volume = <math>6 \times 5 \times 3</math>  <math>= 90 \text{ cm}^3</math></p>
3. Prism	A prism is a 3D shape whose <b>cross section is the same</b> throughout.	
4. Cross Section	The <b>cross section</b> is the <b>shape that continues</b> all the way <b>through the prism</b> .	
5. Volume of a Prism	<p><b><math>V = Area \text{ of Cross Section} \times Length</math></b>  <b><math>V = A \times L</math></b></p>	
6. Volume of a Cylinder	<b><math>V = \pi r^2 h</math></b>	 <p><math>V = \pi(4)(5)</math>  <math>= 62.8 \text{ cm}^3</math></p>
7. Volume of a Cone	<b><math>V = \frac{1}{3} \pi r^2 h</math></b>	 <p><math>V = \frac{1}{3} \pi(4)(5)</math>  <math>= 20.9 \text{ cm}^3</math></p>

# Mathematics

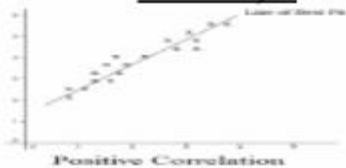
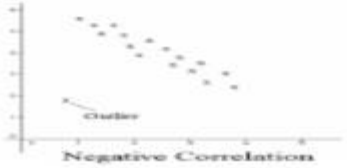
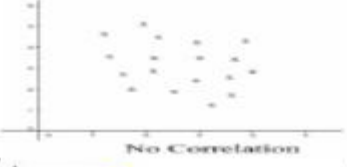
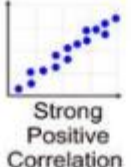
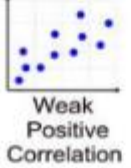
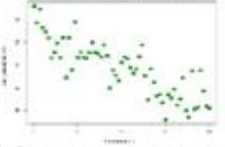

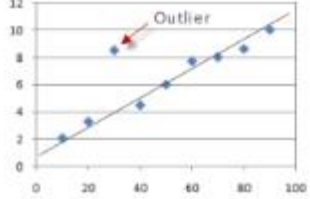
Topic/Skill	Definition/Tips	Example																				
1. Types of Data	<b>Qualitative Data</b> – <b>non-numerical</b> data <b>Quantitative Data</b> – <b>numerical</b> data  <b>Continuous Data</b> – data that can take <b>any numerical value</b> within a given range. <b>Discrete Data</b> – data that can take <b>only specific values</b> within a given range.	Qualitative Data – eye colour, gender etc.  Continuous Data – weight, voltage etc.  Discrete Data – number of children, shoe size etc.																				
2. Grouped Data	Data that has been <b>bundled in to categories</b> .  Seen in grouped frequency tables, histograms, cumulative frequency etc.	<table><tr><th>Foot length, <math>l</math>, (cm)</th><th>Number of children</th></tr><tr><td><math>10 \leq l &lt; 12</math></td><td>5</td></tr><tr><td><math>12 \leq l &lt; 17</math></td><td>53</td></tr></table>	Foot length, $l$ , (cm)	Number of children	$10 \leq l < 12$	5	$12 \leq l < 17$	53														
Foot length, $l$ , (cm)	Number of children																					
$10 \leq l < 12$	5																					
$12 \leq l < 17$	53																					
3. Primary /Secondary Data	<b>Primary Data</b> – <b>collected yourself</b> for a specific purpose.  <b>Secondary Data</b> – <b>collected by someone else</b> for another purpose.	Primary Data – data collected by a student for their own research project.  Secondary Data – Census data used to analyse link between education and earnings.																				
4. Mean	<b>Add</b> up the values and <b>divide</b> by how many values there are.	The mean of 3, 4, 7, 6, 0, 4, 6 is $\frac{3 + 4 + 7 + 6 + 0 + 4 + 6}{7} = 5$																				
5. Mean from a Table	1. Find the midpoints (if necessary) 2. Multiply Frequency by values or midpoints 3. Add up these values 4. Divide this total by the Total Frequency  If <b>grouped</b> data is used, the answer will be an <b>estimate</b> .	<table><tr><th>Height in cm</th><th>Frequency</th><th>Midpoint</th><th>F × M</th></tr><tr><td><math>0 &lt; h \leq 10</math></td><td>8</td><td>5</td><td><math>8 \times 5 = 40</math></td></tr><tr><td><math>10 &lt; h \leq 30</math></td><td>10</td><td>20</td><td><math>10 \times 20 = 200</math></td></tr><tr><td><math>30 &lt; h \leq 40</math></td><td>6</td><td>35</td><td><math>6 \times 35 = 210</math></td></tr><tr><td>Total</td><td>24</td><td>Ignore!</td><td>450</td></tr></table> <b>Estimated Mean</b> height: $450 \div 24 = 18.75\text{cm}$	Height in cm	Frequency	Midpoint	F × M	$0 < h \leq 10$	8	5	$8 \times 5 = 40$	$10 < h \leq 30$	10	20	$10 \times 20 = 200$	$30 < h \leq 40$	6	35	$6 \times 35 = 210$	Total	24	Ignore!	450
Height in cm	Frequency	Midpoint	F × M																			
$0 < h \leq 10$	8	5	$8 \times 5 = 40$																			
$10 < h \leq 30$	10	20	$10 \times 20 = 200$																			
$30 < h \leq 40$	6	35	$6 \times 35 = 210$																			
Total	24	Ignore!	450																			
6. Median Value	The <b>middle</b> value.  Put the data in order and find the middle one. If there are <b>two middle values</b> , find the number half way between them by <b>adding them together and dividing by 2</b> .	Find the median of: 4, 5, 2, 3, 6, 7, 6  Ordered: 2, 3, 4, <b>5</b> , 6, 6, 7  Median = 5																				
7. Median from a Table	Use the formula $\frac{(n+1)}{2}$ to find the position of the median.  $n$ is the total frequency.	If the total frequency is 15, the median will be the $\left(\frac{15+1}{2}\right) = 8\text{th}$ position																				
8. Mode /Modal Value	<b>Most</b> frequent/common.  Can have more than one mode (called bi-modal or multi-modal) or no mode (if all values appear once)	Find the mode: 4, 5, 2, 3, 6, 4, 7, 8, 4  Mode = 4																				
9. Range	<b>Highest value subtract the Smallest value</b>	Find the range: 3, 31, 26, 102, 37, 97.  Range = $102 - 3 = 99$																				



# Mathematics – Higher only













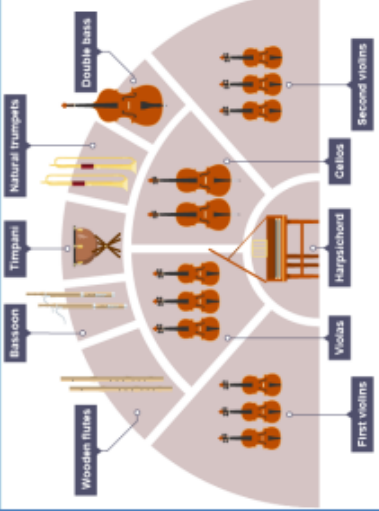
Topic/Skill	Definition/Tips	Example															
1. Histograms	<p>A visual way to display frequency data using bars.</p> <p>Bars can be <b>unequal in width</b>.</p> <p>Histograms show <b>frequency density</b> on the <b>y-axis</b>, not frequency.</p> <p><b>Frequency Density</b> = <math>\frac{\text{Frequency}}{\text{Class Width}}</math></p> <table><thead><tr><th>Height(cm)</th><th>Frequency</th></tr></thead><tbody><tr><td><math>0 &lt; h \leq 10</math></td><td>8</td></tr><tr><td><math>10 &lt; h \leq 30</math></td><td>6</td></tr><tr><td><math>30 &lt; h \leq 45</math></td><td>15</td></tr><tr><td><math>45 &lt; h \leq 70</math></td><td>5</td></tr></tbody></table>	Height(cm)	Frequency	$0 < h \leq 10$	8	$10 < h \leq 30$	6	$30 < h \leq 45$	15	$45 < h \leq 70$	5	<table><thead><tr><th>Frequency Density (FD)</th></tr></thead><tbody><tr><td><math>8 \div 5 = 1.6</math></td></tr><tr><td><math>6 \div 20 = 0.3</math></td></tr><tr><td><math>15 \div 15 = 1</math></td></tr><tr><td><math>5 \div 25 = 0.2</math></td></tr></tbody></table>	Frequency Density (FD)	$8 \div 5 = 1.6$	$6 \div 20 = 0.3$	$15 \div 15 = 1$	$5 \div 25 = 0.2$
Height(cm)	Frequency																
$0 < h \leq 10$	8																
$10 < h \leq 30$	6																
$30 < h \leq 45$	15																
$45 < h \leq 70$	5																
Frequency Density (FD)																	
$8 \div 5 = 1.6$																	
$6 \div 20 = 0.3$																	
$15 \div 15 = 1$																	
$5 \div 25 = 0.2$																	
2. Interpreting Histograms	<p>The <b>area</b> of the bar is proportional to the <b>frequency</b> of that class interval.</p> <p><b>Frequency</b> = <b>Freq Density</b> <math>\times</math> <b>Class Width</b></p>	<p>A histogram shows information about the heights of a number of plants. 4 plants were less than 5cm tall. Find the number of plants more than 5cm tall.</p> <p>Above 5cm: <math>1.2 \times 10 + 2.4 \times 15 = 12 + 36 = 48</math></p>															
3. Cumulative Frequency	<p>Cumulative Frequency is a <b>running total</b>.</p> <table><thead><tr><th>Age</th><th>Frequency</th></tr></thead><tbody><tr><td><math>0 &lt; a \leq 10</math></td><td>15</td></tr><tr><td><math>10 &lt; a \leq 40</math></td><td>35</td></tr><tr><td><math>40 &lt; a \leq 50</math></td><td>10</td></tr></tbody></table>	Age	Frequency	$0 < a \leq 10$	15	$10 < a \leq 40$	35	$40 < a \leq 50$	10	<table><thead><tr><th>Cumulative Frequency</th></tr></thead><tbody><tr><td>15</td></tr><tr><td><math>15 + 35 = 50</math></td></tr><tr><td><math>50 + 10 = 60</math></td></tr></tbody></table>	Cumulative Frequency	15	$15 + 35 = 50$	$50 + 10 = 60$			
Age	Frequency																
$0 < a \leq 10$	15																
$10 < a \leq 40$	35																
$40 < a \leq 50$	10																
Cumulative Frequency																	
15																	
$15 + 35 = 50$																	
$50 + 10 = 60$																	
4. Cumulative Frequency Diagram	<p>A cumulative frequency diagram is a <b>curve that goes up</b>. It looks a little like a stretched-out <b>S shape</b>.</p> <p>Plot the cumulative frequencies at the <b>end-point</b> of each interval.</p>																
5. Quartiles from Cumulative Frequency Diagram	<p><b>Lower Quartile (Q1):</b> 25% of the data is less than the lower quartile.</p> <p><b>Median (Q2):</b> 50% of the data is less than the median.</p> <p><b>Upper Quartile (Q3):</b> 75% of the data is less than the upper quartile.</p> <p><b>Interquartile Range (IQR):</b> represents the <b>middle 50%</b> of the data.</p>	<p><math>IQR = 37 - 18 = 19</math></p>															

# Mathematics

Topic/Skill	Definition/Tips	Example
1. Correlation	Correlation between two sets of data means they are <b>connected</b> in some way.	There is correlation between temperature and the number of ice creams sold.
2. Causality	When one variable <b>influences</b> another variable.	The more hours you work at a particular job (paid hourly), the higher your income <u>from that job</u> will be.
3. Positive Correlation	As one value <b>increases</b> the other value <b>increases</b> .	 <p>Positive Correlation</p>
4. Negative Correlation	As one value <b>increases</b> the other value <b>decreases</b> .	 <p>Negative Correlation</p>
5. No Correlation	There is <b>no linear relationship</b> between the two.	 <p>No Correlation</p>
6. Strong Correlation	When two sets of data are <b>closely linked</b> .	 <p>Strong Positive Correlation</p>
7. Weak Correlation	When two sets of data have correlation, but are <b>not closely linked</b> .	 <p>Weak Positive Correlation</p>
8. Scatter Graph	A graph in which values of <b>two variables</b> are plotted along two axes to <b>compare</b> them and see if there is any <b>connection</b> between them.	
9. Line of Best Fit	A <b>straight line</b> that <b>best represents the data</b> on a scatter graph.	
10. Outlier	A value that 'lies outside' most of the other values in a set of data. An outlier is <b>much smaller or much larger</b> than the other values in a set of data.	



# Music

Baroque Concerto Grosso		1600-1750	
<p>A BAROQUE CONCERTO GROSSO is an instrumental form involving two groups of performers: the <b>CONCERTINO</b> (or Concertante) featuring a small group of soloists accompanied by an orchestral accompaniment called the <b>RIPIENO</b>.</p>		<p><b>Form &amp; Structure</b></p>	
<p><b>Harmony &amp; Tonality</b></p> <p>All Baroque Concerto Grossos have a <b>CONTINUO</b> part – an accompaniment which “fills in the harmonies and texture” played by the <b>HARPSICHORD</b> (or Organ) (playing <b>CHORDAL HARMONY</b> from <b>FIGURED BASS NOTATION</b>) with the <b>CELLO</b> or <b>BASSOON</b> doubling the Bass Line. <b>MODULATIONS</b> (changes of key) tended to go to the Dominant key or to the Relative minor of the original key. Tonality was mainly <b>DIATONIC</b> and in either clear <b>MAJOR</b> or <b>MINOR</b> tonalities.</p>		<p><b>THREE MOVEMENTS</b> – contrasted by <b>TEMPO</b> and a single mood or style within each movement. Movements in <b>RITORNELLO FORM</b> began with a <b>TUTTI</b> section which featured a <b>THEME</b>. Between appearances of this Ritornello Theme came <b>EPISODES</b> (contrasting sections).</p>	
<p><b>Rhythm, Tempo &amp; Metre</b></p> <p>The three movements of a Baroque Concerto Grosso were contrasted in <b>TEMPO</b> – Fast-Slow-Fast – with a consistent tempo within each movement. Dotted Rhythms were often a feature of the slower/second movements.</p>	<p><b>Texture</b></p> <p>Mainly <b>POLYPHONIC</b> or <b>CONTRAPUNTAL</b> textures – complex and interweaving of parts, though some <b>HOMOPHONIC</b> <b>MELODY &amp; ACCOMPANIMENT</b> sections for musical contrast.</p>	<p><b>Dynamics</b></p> <p><b>TERRACED DYNAMICS</b> – clear dynamic contrasts achieved by the whole orchestra changing the volume suddenly (rather than Crescendos or Diminuendos). No building up or fading down of volume in Baroque Concerto Grossos.</p>	<p><b>Melody</b></p> <p>Melodies are decorated and embellished with <b>ORNAMENTS</b> (often by performers) e.g. <i>trills, turns, mordents and grace notes such as acciaccaturas</i>, which make melodies sound “busy”. Melodies often long and flowing and use <b>SEQUENCES</b> (a musical phrase that is repeated at a different pitch either going up or down) and <b>IMITATION</b> (where one instrumental part is copied (imitated) by other instruments).</p>
<p><b>Soloists</b></p> <p>The Baroque Concerto Grosso is a work for two or more soloists. The soloists (<b>CONCERTINO</b> –meaning “little ensemble”) were the “stars of the show” and performed demanding and technically difficult parts.</p>		<p><b>Venue</b></p> <p>Baroque Concerto Grossos were performed either in churches, opera houses or small salons (rooms) or courts of wealthy individuals.</p>	<p><b>Baroque Concerto Grosso Composers</b></p> <div></div> <p>J. S. Bach    Handel    Vivaldi    Corelli</p>
<p><b>Instrumentation – Typical Instruments, Timbres and Sonorities</b></p> <p>The orchestra used for a Baroque Concerto Grosso was split into two sections: the <b>RIPIENO</b> (the main orchestra who provided the accompaniment and less technically-demanding parts) and the <b>CONCERTINO</b> (or Concertante) who were the Soloists/Solo Section. The instruments used within the <b>CONCERTINO</b> of a Baroque Concerto Grosso can include: Violin, Cello, Recorder, Flute, Oboe, Bassoon, Trumpet and Lute.</p> <div></div> <p>The <b>BAROQUE ORCHESTRA</b> typically numbered between 10-30 players. The main and largest section was the <b>STRINGS</b> (<i>1<sup>st</sup> and 2<sup>nd</sup> Violins, Violas, Cellos and Double Basses</i>) who played most of the ‘main melody’. A small <b>WOODWIND</b> section could consist of 2 Wooden Flutes, 2 Oboes and 2 Bassoons. The <b>BRASS</b> section may feature 2 “Natural” Trumpets and the <b>PERCUSSION</b> SECTION featured only <b>TIMPANI</b> which were used only for dramatic effects. The <b>CONTINUO</b> player led and directed the Baroque Orchestra from the Harpsichord (no conductor).</p> <div></div>			



# Baroque Solo Concerto

The **BAROQUE SOLO CONCERTO** grew out of the **BAROQUE CONCERTO GROSSO** in which a single solo instrument is accompanied by an orchestra.

1600-1750

## Harmony & Tonality

All Baroque Solo Concertos have a **CONTINUO** part – an accompaniment which “fills in the harmonies and texture” played by the **HARPSICHORD** (or Organ) (playing **CHORDAL HARMONY** from **FIGURED BASS NOTATION**) with the **CELLO** or **BASSOON** doubling the Bass Line. **MODULATIONS** (changes of key) tended to go to the Dominant key or to the Relative minor of the original key. Tonality was mainly **DIATONIC** and in either clear **MAJOR** or **MINOR** tonalities.

## Rhythm, Tempo & Metre

The three movements of a Baroque Solo Concerto were contrasted in **TEMPO** – Fast-Slow-Fast – with a consistent tempo within each movement. Dotted Rhythms were often a feature of the slower/second movements.

## Texture

Mainly **POLYPHONIC** or **CONTRAPUNTAL** textures – complex and interweaving of parts, though some **HOMOPHONIC** **MELODY & ACCOMPANIMENT** sections for musical contrast.

## Soloists

The Baroque Solo Concerto is a work for a single solo instrument. The soloist's parts were often very technically difficult with a chance for the solo performer to “show off” their technical ability and skill.

## Soloist vs. Orchestral Accompaniment

The soloist was always “in the spotlight” but sometimes performed with the accompanying orchestra in **TUTTI** sections. Musical contrast between sections became more important than in Concerto Grossos.

## Venue

Baroque Solo Concertos were performed either in churches, opera houses or small salons (rooms) or courts of wealthy individuals.

## Baroque Solo Concerto Composers



J. S. Bach



Handel



Vivaldi

## Form & Structure

**THREE MOVEMENTS** – contrasted by **TEMPO** and a single mood or style within each movement. Movements in **RITORNELLO FORM** began with a **TUTTI** section which featured a **THEME**. Between appearances of this Ritornello Theme came **EPISODES** (contrasting sections). Sometimes feature a short **CADENZA** section towards the end of the first movement (unaccompanied).

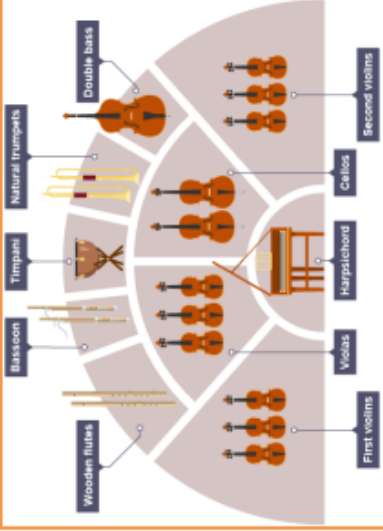
1 <sup>st</sup> Movement	Ritornello or a Fugue	Brisk and purposeful
2 <sup>nd</sup> Movement	Da Capo Aria or Ternary Form	Slow and song-like often dotted rhythms
3 <sup>rd</sup> Movement	Ritornello or a Fugue	Fast and Cheerful

## Dynamics

**TERRACED DYNAMICS** – clear dynamic contrasts achieved by the whole orchestra changing the volume suddenly (rather than Crescendos or Diminuendos). No building up or fading down of volume in Baroque Solo Concertos.

## Melody

Melodies are decorated and embellished with **ORNAMENTS** (often by the soloist) e.g. *trills, turns, mordents and grace notes* such as *acciaccaturas*, which make melodies sound “busy”. Melodies often long and flowing and use **SEQUENCES** (a musical phrase that is repeated at a different pitch either going up or down) and **IMITATION** (where one instrumental part is copied (imitated) by other instruments).



## Instrumentation – Typical Instruments, Timbres and Sonorities

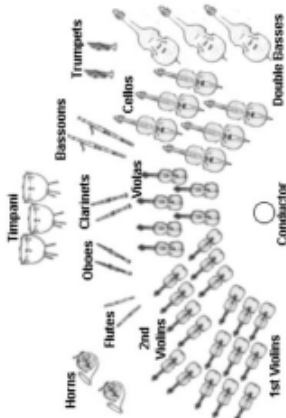



The orchestra used to accompany Baroque Solo Concertos was slightly larger than the Baroque Concerto Grosso but typically numbered between 10-30 players. The main and largest section was the **STRINGS** (1<sup>st</sup> and 2<sup>nd</sup> Violins, Violas, Cellos and Double Basses) who played most of the ‘main melody’. A small **WOODWIND** section could consist of 2 Wooden Flutes, 2 Oboes and 2 Bassoons. The **BRASS** section may feature 2 “Natural” Trumpets and 2 Horns and the **PERCUSSION SECTION** featured only **TIMPANI** which were used only for dramatic effects. The **CONTINUO** player led and directed the Baroque Orchestra from the Harpsichord (no conductor). The instruments used as soloists within Baroque Solo Concertos included the Violin, Cello, Recorder, Flute, Oboe, Bassoon, Trumpet and Lute.



Classical Solo Concerto

During the **CLASSICAL PERIOD**, the Baroque Concerto Grosso went “out of fashion” and Classical composers continued to write **SOLO CONCERTOS** for a single solo instrument with more difficult and technically demanding solo parts (**VIRTUOSIC**), accompanied by a now, much larger and more developed, orchestra.

1750-1820

Harmony & Tonality	Venue	Form & Structure		
<b>SIMPLE HARMONY</b> making use of mainly <b>PRIMARY CHORDS</b> – I, IV and V. <b>DIATONIC</b> harmony in either clear <b>MAJOR</b> or <b>MINOR</b> tonalities. <b>MODULATIONS</b> to <b>RELATED KEYS</b> (relative major/minor, subdominant major and minor and dominant major/minor).	Performance spaces were becoming larger than in the Baroque period due to size of orchestras. Recital and Concert Halls and Opera Houses were popular venues for performing Concertos.	<b>THREE MOVEMENTS</b> – contrasted by <b>TEMPO</b> and style/mood. <b>RONDO</b> form now popular (ABACADA...) where A is the recurring <b>THEME</b> between contrasting <b>EPISODES</b> (B, C, D...) and <b>SONATA FORM</b> ( <b>EXPOSITION</b> , <b>DEVELOPMENT</b> , <b>RECAPITULATION</b> , <b>CODA</b> ) now popular. Classical Solo Concertos often have long orchestral sections before the soloist enters – “delayed entry of the soloist”. Movements longer than Baroque.		
<b>Rhythm, Tempo &amp; Metre</b>	<b>Texture</b>	<b>Dynamics</b>	<b>Melody</b>	
The three movements of a Classical Solo Concerto were contrasted in <b>TEMPO</b> – Fast-Slow-Fast and style/mood. Some changes of <b>TEMPO</b> for effect/expression.	Busy Baroque Polyphonic Textures now replaced with clearer <b>HOMOPHONIC</b> ( <b>MELODY AND ACCOMPANIMENT</b> ) textures.	Wider range of Dynamics – <i>pp, ff, mp, mf</i> <b>CRESCENDOS</b> and <b>DECRESCENDOS</b> or <b>DIMINUENDOS</b> now used showing an increasing range of dynamics and more emphasis on expression in the music.	The melodies in Classical Solo Concertos were <b>LIGHT, SIMPLE</b> and <b>ELEGANT</b> and continue to use <b>SEQUENCES</b> and <b>ORNAMENTS</b> (although not as much as in the Baroque period). Musical phrases are <b>BALANCED</b> and <b>EVEN</b> (e.g. 4 or 8 bars) maybe with some <b>QUESTION AND ANSWER</b> phrases.	
<b>Soloist</b>		<b>Soloist vs. Orchestral Accompaniment</b>		
<b>CADENZA</b> – became integral to the end of the 1 <sup>st</sup> movement (and sometimes last movement) – very difficult and <b>VIRTUOSIC</b> unaccompanied sections allowing the soloist to show off their technical skill often containing lots of fast scale passages, broken chords and decorated and ornamented melodies. Often cadenza sections end with a long, held <b>TRILL</b> to signal to the orchestra to enter again for the final <b>CODA</b> section. Cadenzas were improvised by the soloists during performance, however, composers such as Beethoven wrote cadenzas out on the score. The soloist's part was more technically demanding and <b>VIRTUOSIC</b> than in Baroque Concertos.		Sometimes the soloist and orchestra perform sections in <b>DIALOGUE</b> with each other. <u>The conductor follows the soloist and the orchestra follow the conductor</u> depending on the soloist's <b>INTERPRETATION</b> of the piece (which requires rehearsal).		
		<b>Instrumentation – Typical Instruments, Timbres and Sonorities</b>		
As the Harpsichord declined in popularity, Classical composers no longer added <b>CONTINUO</b> parts to the orchestral accompaniment and a <b>CONDUCTOR</b> was now established to lead the orchestra. The <b>CLASSICAL ORCHESTRA</b> grew in size and new instruments such as the Clarinet were added. The <b>CLASSICAL ORCHESTRA</b> typically numbered between 30-60 players. The <b>STRINGS</b> (1 <sup>st</sup> and 2 <sup>nd</sup> Violins, Violas, Cellos and Double Basses) continued to be the ‘main section’ playing most of the ‘main melody’ and contained more players than in Baroque orchestras. The <b>WOODWIND</b> now typically featured 2 x METAL Flutes, 2 x Oboes, 2 x Bassoons, and 2 x (newly invented) Clarinets. <b>BRASS</b> continued to consist of 2 x Horns and 2 (now valved) Trumpets and the <b>PERCUSSION</b> continued to feature only the <b>TIMPANI</b> . Classical composers wrote Solo Concertos for instruments including the <b>PIANO</b> (newly invented and replacing the Baroque Harpsichord), <b>VIOLIN</b> , <b>CELLO</b> , <b>FLUTE</b> , <b>OBOE</b> , <b>CLARINET</b> (also newly invented), <b>BASSOON</b> and <b>FRENCH HORN</b> .		<b>Classical Solo Concerto Composers</b>		
		 <b>Haydn</b> Solo Trumpet, Flute, Oboe, Bassoon, Violin, Cello and Piano Concertos	 <b>Mozart</b> 27 Solo Piano Concertos, Solo Concertos for Violin, Clarinet, Horn and Flute.	 <b>Beethoven</b> Solo Concertos for Piano and Violin. Early style was “Classical”.







# Music

# Romantic Solo Concerto

**ROMANTIC SOLO CONCERTOS** continued to be instrumental works for a single solo instrument with orchestral accompaniment but became much more **DRAMATIC** sounding and emotive. Sometimes **DOUBLE CONCERTOS** were written for 2 solo instruments.

1820-1900

Form & Structure	
<p><b>Harmony &amp; Tonality</b></p> <p>Harmony continued to be mainly <b>DIATONIC</b> but much more use of <b>CHROMATIC HARMONY</b>, <b>DISSONANCE</b> (<i>clashing notes and chords</i>) and <b>ADDED NOTE CHORDS</b> (<i>e.g. 9ths to create dramatic effects</i>).</p>	<p><b>1<sup>st</sup> Movement</b>      Sonata Form</p> <p><b>2<sup>nd</sup> Movement</b>      Ternary or Variation Form</p> <p><b>3<sup>rd</sup> Movement</b>      Rondo, Variation or Sonata Form</p>
<p><b>Rhythm, Tempo &amp; Metre</b></p> <p>Frequent changes of time signature and tempo.</p>	<p><b>Texture</b></p> <p><b>HOMOPHONIC (MELODY AND ACCOMPANIMENT)</b> but more complex than in Classical Concertos.</p>
<p><b>Soloists (and Articulation)</b></p> <p>The soloist's part became even more difficult, <b>VIRTUOSIC</b> and technically difficult to play. <b>CADENZA</b> sections continued to allow the soloist to "show off" becoming more complex and difficult with lots of <b>MELODIC DECORATION, ORNAMENTATION</b> and <b>FAST SCALE PASSAGE</b> and demanding playing techniques particular to the solo instrument <i>e.g. glissandi on the piano, double stopping and harmonics on the violin</i>. Cadenzas were now written out and not improvised by the performer. Soloist often enters immediately (<b>NO ORCHESTRAL INTRODUCTIONS</b>) at the start of the 1<sup>st</sup> movement sharing themes with the orchestra.</p>	<p><b>Soloists vs. Orchestral Accompaniment</b></p> <p>In the Romantic period, the soloist stepped forward as a "heroic figure" with the orchestra slipping back into a more "subordinate" role, but these changing roles also added to excitement and drama and more "competition" between soloist and orchestra. The conductor continues to follow the soloist and the orchestra follows the conductor. The soloist's interpretation of the music is now more important due to the music being more dramatic and powerful.</p>
<p><b>Dynamics</b></p> <p>Extremes of dynamics common (<i>ppp, fff</i>) and specific <b>EXPRESSION MARKINGS</b> <i>e.g. espressivo, dolce, appassionato</i></p>	<p><b>Venue</b></p> <p>Many Romantic Solo Concerto composers were also <b>VIRTUOSO PERFORMERS</b> <i>e.g. Franz Liszt, Chopin, Clara Schumann</i> and <i>Niccolò Paganini (Violin Virtuoso)</i> who wrote and performed in large-scale public concerts, subscription concerts and festivals. Larger concert halls had to be built due to the rise of the "middle class" concert goer.</p>
<p><b>Melody</b></p> <p>The regular and balanced phrases of the Classical Concerto were less important with composers giving more freedom to expression within their melodies which were now often long and dramatic, loud and powerful or warm and emotional.</p>	<p><b>Romantic Solo Concerto Composers</b></p> <div>  <p><b>Beethoven</b> Late Concertos</p> </div> <div>  <p><b>Liszt</b> Piano Concertos</p> </div> <div>  <p><b>Brahms</b> Violin and Piano Concertos</p> </div> <div>  <p><b>Mendelssohn</b> Solo Violin Concerto</p> </div>
<p><b>THREE MOVEMENTS – (sometimes "linked" (Mendelssohn) or even in just one movement (Liszt))</b></p>	

**Instrumentation – Typical Instruments, Timbres and Sonorities**

The Romantic orchestra was large and often contrasted dramatically with the soloist. With the growth of the Romantic orchestra, new **TIMBRES** and **SONORITIES** became available to composers who explored rich and colourful orchestration. The **STRINGS** section was enlarged again, often with the addition of Harps. New instruments were added to the **WOODWIND** section such as the Double Bassoon, Cor Anglais, Bass Clarinet and Piccolo. The **BRASS** section saw Trombones and a Tuba added along with an extra Trumpet and two further French Horns and the **PERCUSSION** section now featured a vast array of Drums, Cymbals, Pitched Percussion and other instruments which could be hit, struck, banged or plucked! There could be between 90-100 players in a Romantic orchestra. Romantic composers wrote Solo Concertos for almost any orchestral instrument, but the **PIANO** and **VIOLIN** continued to be popular choices as solo instruments.



# Personal Development

What does the Law say?		
Act	Definition	Consequence
Rape	A rape is when a person uses their penis without consent to penetrate the vagina, mouth, or anus of another person.	Rape is punished by a maximum of fifteen years' in prison. Aggravated Rape is punished by a maximum of twenty years' in prison Both offences would result in placement on the sex offenders register.
Sexual Assault	Sexual assault is when a person is coerced or physically forced to engage against their will, or when a person, touches another person sexually without their consent. Touching can be done with any part of the body or with an object.	Up to 10 years in prison and placement on the sex offenders register
Sex Between Minors	When both parties involved the sexual activity are under 16 but have consented to the activity.	Technically the law is that if two 13 – 15 year olds engage in consensual sexual activity and each knows that the other is under 16, they will both be guilty of an offence carrying a maximum penalty of five years' imprisonment, however it is unlikely the CPS will prosecute. If one party is under 13 and the other under 18, it is statutory Rape which is punishable by life imprisonment, but the average is 6-7 years when prosecuted.
Who Can you turn to for help and Support		
Parents or trusted family members	The Police / Community support officers	
School Safe Guarding Team or any member of staff.		
NSPCC	Helpline: 0800 800 5000 (24 hours, every day) nspcc.org.uk	
Childline	Helpline: 0800 1111 (24 hours, every day) https://www.childline.org.uk	
Rape Crisis	Helpline: 0800 802 9999 (12-2:30 and 7-9:30) rapecrisis.org.uk	
Survivors UK – Male Rape and Sexual Abuse Support	survivorsuk.org	
RASAC (Rape and Sexual Abuse Support Centre)	National Helpline: 0800 802 9999 (12-2:30 & 7-9:30) rasac.org.uk	

Define: Sexual Consent	Consent is:
The giving of permission by a person to engage in any form of sexual activity including penetrative and oral sex.	1 Freely given. It's not okay to pressure, trick, or threaten someone into saying yes.
	2 Reversible. It's okay to say yes and then change your mind — at any time!
	3 Informed. You can only consent to something if you have all the facts.
	4 Enthusiastic. You should do stuff you WANT to do, not things people expect you to do. If someone doesn't seem enthusiastic stop and check in.
	5 Specific. Saying yes to one thing (like going to the bedroom to make out) doesn't mean you're saying yes to other things (like having sex).
Define: Affirmative Consent	When can consent not be given?
Consent is only given when a person agrees verbally to engage in sexual activities including penetrative and oral sex.	1 When a person is drunk or high, to the point that they are unable to speak or look after themselves.
	2 Asleep or Passed Out – if they are not conscious they are unable to agree to any sexual activity. If someone passes out whilst engaging in sexual activity – STOP!
	3 They are Underage – Legally a person under the age of 16 cannot give consent to any sexual activity.
	4 Mental disability or learning difficulties which mean they are unable to fully understand what they are consenting to.
Define: Coercion	
The action or practice of persuading someone to do something they wouldn't normally do or something they don't want to do by using force or threats.	
Define: A person who is a minor	
A person who is under the age of 18 and legally considered a child.	

# Personal Development

<b>Define: Domestic Abuse</b> Domestic abuse is violence or other abuse by one person against another in a domestic setting, such as in marriage or cohabitation or between siblings...	<b>The Statistics</b> 16 to 19-year olds had experienced domestic abuse in the past year (2015) <div><div>6.6%</div><div>12.9%</div></div> 13 to 17-year olds who had experienced physical abuse from an intimate partner <div><div>18%</div><div>25%</div></div> 13 to 17-year olds reported some form of sexual abuse within their relationships. <div><div>16%</div><div>31%</div></div>	<b>Types of Abuse</b> <b>Physical Abuse:</b> Hitting, slapping, shoving, grabbing, pinching, biting, hair pulling, etc. are types of physical abuse. This type of abuse also includes denying a partner medical care or forcing alcohol and/or drug use upon him or her. <b>Sexual Abuse:</b> Coercing or attempting to coerce any sexual contact or behavior without consent. Sexual abuse includes, but is certainly not limited to, marital rape, attacks on sexual parts of the body, forcing sex after physical violence has occurred, or treating one in a sexually demeaning manner. <b>Emotional Abuse:</b> Undermining an individual's sense of self-worth and/or self-esteem is abusive. This may include, but is not limited to constant criticism, diminishing one's abilities, name-calling, or damaging one's relationship with his or her children. <b>Economic Abuse:</b> Is defined as making or attempting to make an individual financially dependent by maintaining total control over financial resources, withholding one's access to money, or forbidding one's attendance at school or employment. <b>Psychological Abuse:</b> Elements of psychological abuse include - but are not limited to - causing fear by intimidation; threatening physical harm to self, partner, children, or partner's family or friends; destruction of pets and property; and forcing isolation from family, friends, or school and/or work.
<b>Signs of Abuse</b>		
<b>Physical</b> Unexplained and an increase in injuries such as: <ul style="list-style-type: none"><li>• Black eyes</li><li>• Busted lips</li><li>• Red or purple marks on the neck</li><li>• Sprained wrists</li><li>• Bruises on the arms</li></ul> It's also common for someone to try to cover up the physical signs with clothing. For example: <ul style="list-style-type: none"><li>• Wearing long sleeves or scarves in the hot summer.</li><li>• Wearing heavier than normal makeup</li><li>• Wearing sunglasses inside</li></ul>	<b>Emotional</b> Domestic abuse, of course, can take a serious emotional toll, creating a sense of helplessness, hopelessness, or despair. Other emotional signs of abuse include: <ul style="list-style-type: none"><li>• Low self-esteem</li><li>• Extremely apologetic or meek</li><li>• Seeming fearful</li><li>• Changes in sleep habits</li><li>• Agitation, anxiety, or constant apprehension</li><li>• Developing a drug or alcohol problem</li><li>• Symptoms of depression</li><li>• Loss of interest in daily activities</li><li>• Talking about or attempting suicide</li></ul>	<b>Social</b> If you notice that someone who was once outgoing and cheerful has gradually become quiet and withdrawn, it could be a sign of domestic abuse. You may notice that the person: <ul style="list-style-type: none"><li>• Is reserved and distant</li><li>• Drops out of activities they would usually enjoy.</li><li>• Cancels appointments or meetings with you at the last minute.</li><li>• Is often late to work or other appointments.</li><li>• Exhibits excessive privacy concerning their personal life or the person with whom they're in a relationship.</li><li>• Begins isolating themselves by cutting off contacts with friends and family members</li></ul>
<b>Who Can you turn to for help and Support</b>		
Parents or trusted family members and Friends		The Police / Community support officers
School Safe Guarding Team or any member of staff.		
NSPCC	Helpline: 0800 800 5000 (24 hours, every day) <a href="https://www.nspcc.org.uk">nspcc.org.uk</a>	
Childline	Helpline: 0800 1111 (24 hours, every day) <a href="https://www.childline.org.uk">https://www.childline.org.uk</a>	
Women's Aid	Helpline: 0800 2000 247 <b>24hr</b> <a href="https://www.womensaid.org.uk">https://www.womensaid.org.uk</a>	
Men's Advice Line	Helpline: 0800 801 0327 Monday-Friday 9am-5pm <a href="http://www.mensadvice.org.uk/">http://www.mensadvice.org.uk/</a>	



# Photography



## Analysis of Photographs (Challenge: Grade 5-1)

Photography literally means “to write or draw with light,” so we can “read” photographs just like we read any other text.

Visual literacy refers to the ability to “read” an image.

Visual rhetoric includes specific concepts of design or aesthetic theory and also describes how images reflect, communicate, and even shape cultural meaning.

### Content

- ⇒ I can see ... in the photograph (e.g. people, places, objects etc.)
- ⇒ The place the photograph has been taken is...
- ⇒ From looking at the picture, I think the photographer was trying to tell a story about...
- ⇒ The picture was taken because...

### Frame/Cropping

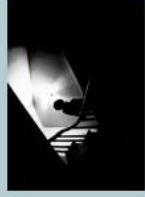
- ⇒ The photograph has been cropped close to the main shape as there is not much space in the background. This works well because...
- ⇒ The photograph has lots of background space (negative space). This is/is not effective because...
- ⇒ The picture is... (e.g. crowded, spacious, busy, empty etc.)

### Direction of Reading

- ⇒ When I first look at the photograph I notice... This is because...
- ⇒ Then, my eye is drawn to... because...
- ⇒ Colours do/do not lead my eye around the image because...
- ⇒ Contrasts do/do not lead my eye around the image because...
- ⇒ Shapes do/do not lead my eye around the image because...
- ⇒ The photograph is divided into ... lines or bands (e.g. horizontal, vertical, diagonal)

### Light

- ⇒ The light in the photograph is coming from the... (back, front, sides etc.)
- ⇒ The light source is...
- ⇒ I think the photograph was taken at ... time of day because...
- ⇒ The areas that are light are important because ... The areas that are dark are important because ...
- ⇒ There are harsh shadows/soft light/soft shadows/strong highlights/evenly diffused light.
- ⇒ There is high/medium/low tonal contrast. This is important because...



### Composition (Shapes and Space)

- ⇒ In the front of the photograph, there is...
- ⇒ In the middle of the photograph, I can see...
- ⇒ There is/are ... at the back, (background) of the photograph.
- ⇒ The ... is in focus (e.g. foreground, middle ground, background).
- ⇒ The most important shape in the photograph is...
- ⇒ The photographer has used the following rules: Rule of Thirds/Golden Ratio etc. to take the picture.
- ⇒ The angle the photographer used is interesting because...

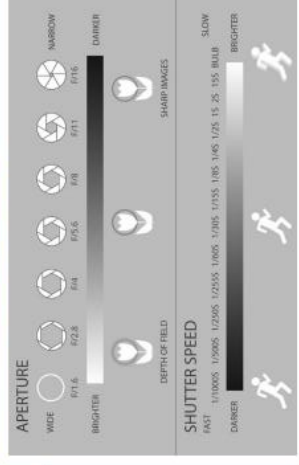


### Technical Camera Settings

- ⇒ The photographer has used a quick shutter speed/long exposure because ...
- ⇒ The aperture is wide/shallow because...
- ⇒ I think the photographer would/would not have used a tripod because...

### Post-production/Editing

- ⇒ This is a digital/analogue photograph...
- ⇒ I know this because...
- ⇒ The editing is/is not effective because...





# Analysis of Photographs (High Challenge: Grade 6-9)

Photography literally means “to write or draw with light,” so we can “read” photographs just like we read any other text.

Visual literacy refers to the ability to “read” an image.

Visual rhetoric includes specific concepts of design or aesthetic theory and also describes how images reflect, communicate, and even shape cultural meaning.



## Content

- ⇒ I can see ... in the photograph (e.g. people, places, objects etc.)
- ⇒ The people in the photograph are ... (e.g. male, female, workers, upper class people, teenagers, children etc.)
- ⇒ The people are... (e.g. walking, working, relaxing, posing, running etc.)
- ⇒ The place the photograph has been taken is...
- ⇒ In the photograph there are also...

## Audience/Context

- ⇒ The picture was taken because... (e.g. why was the picture taken?)
- ⇒ The picture was taken at... time. This is important because... (e.g. When was the picture taken?)
- ⇒ The photograph intended for... (e.g. Fine Art, Historic, Journalism, Commercial?)
- ⇒ The photograph/photographer is trying to show...

## Frame/Cropping

- ⇒ The photograph has been cropped close to the subject as there is not much space in the background. This is/is not effective because...
- ⇒ The photograph has lots of background space (negative space). This is/is not effective because...
- ⇒ The main shape in the photograph is... It fills ... % of the frame.
- ⇒ The composition feels... (e.g. crowded, spacious, busy, empty etc.)
- ⇒ I think there is ... just outside the frame of the photograph.
- ⇒ What is not shown in the photograph is... This is important because...

## Direction of Reading

- ⇒ When I look at the photograph my eye is first drawn to ..., this is because...
- ⇒ Then, my eye is drawn to... because...
- ⇒ My eye moves across the image from... (e.g. left to right, right to left, top to bottom, bottom to top, in a circular motion etc.). This is because...
- ⇒ The photograph is divided into ... lines or bands (e.g. horizontal, vertical, diagonal)

**NOTE:** If the eyes read from left-right or top-bottom you can say that the image follows a **Western Direction of Reading**.

**TIP:** It can be really useful to include a **diagram** which illustrates the Direction of Reading.

## Post-production/Editing

- ⇒ This is a digital/analogue photograph... I know this because...
- ⇒ From looking at the photograph, I think the photographer edited it by... The editing is/is not effective because...
- ⇒ This photograph was printed in a dark room so the photographer might have.... I think the dark room editing is/is not effective because...
- ⇒ The photographer has used manual editing techniques like collage/textiles etc. This is effective because...
- ⇒ I could create similar effects with my own photographs by...

## Composition (Shapes and Space)

- ⇒ In the front of the photograph, (foreground) there is... In the middle of the photograph, I can see... There is/are ... at the back, (background) of the photograph.
- ⇒ The ... is in focus (e.g. foreground, middle ground, background).
- ⇒ The ... are blurry and out of focus (specify areas/shapes).
- ⇒ Because the ... is blurry, I can see the ... clearly. This means a shallow/deep depth of field has been used.
- ⇒ Because the ... is blurry, the ... are hidden.
- ⇒ Because all of the shapes are in focus, the image appears to be...
- ⇒ The photographer has used the following rules: Rule of Thirds/Golden Rule etc.
- ⇒ The angle the photographer used is interesting because...

## Technical Camera Settings

- ⇒ The photographer has used a quick shutter speed/long exposure because ...
- ⇒ I estimate the ISO setting is... because...
- ⇒ The aperture is wide/shallow because...
- ⇒ I think the photographer would/would not have used a tripod because...

## Light

- ⇒ The light in the photograph is coming from the... (back, front, sides etc.)
- ⇒ I think the main light source is ... because...
- ⇒ I think the photograph was taken at ... time of day because...
- ⇒ The photograph has light/dark areas in ...
- ⇒ The photograph is under/over exposed. I know this because...
- ⇒ The areas that are light are important because ...
- ⇒ The areas that are dark are important because ...
- ⇒ There are harsh shadows/soft light/soft shadows/strong highlights/evenly diffused light
- ⇒ The light/dark areas draw my attention because ...
- ⇒ The light/dark areas hide ... this is important because ...
- ⇒ There is high/medium/low tonal contrast. This is important because...
- ⇒ The light influences the mood/atmosphere because...

# GCSE PE

## 1.2.b Applying the Principles of Training Key Terms

**Circuit Training** a series of stations of different exercises that focus on different muscle groups

**Continuous training** Training that involves activity without rest intervals

**Fartlek training** A type of training which varies in intensity and duration and consists of bursts of intense effort, alternating with less strenuous activity

**FITT** Outlines the key components of a fitness program Frequency (how often) Intensity (how hard) Time (how long) and Type (the kind of exercise you do)

**HIIT** Exercise which alternates between high intensity and periods of recovery to improve cardiovascular endurance

**Interval training** A type of training which included periods of exercise and rest

**Overload** A principle of training where you work your body harder than it normally would, so training adaptations take place and fitness level increases

**Principles of training** The 4 principles to follow to maximise the impact of your training -Specificity, Progression, Overload, Reversibility

**Progression** A principle of training where you gradually increase the level of training so the body adapts

**Reversibility** A principle of training where any improvement in fitness due to training will gradually be lost if training stops

**SMART Goals** To ensure a goal is effective, the SMART principle should be used (**S**pecific, **M**easurable, **A**chievable, **R**ecorded & **T**imed)

**Specificity** A principle of training where training must match the needs of a sporting activity and individual to ensure it is effective and worthwhile

**Weight training** A method of training which uses free weights or resistance machines to improve strength and muscular endurance

# GCSE PE

## 2.2 Sports Psychology Key Terms

**Closed skill** A skill which is always performed in a predictable, constant environment.

**Complex skill** A skill performed in a changing environment so it needs adapting every time it is performed

**Confidence** The degree to which a performer believes they have the ability to perform and complete tasks with success

**Difficulty continuum** classifying skills as either simple (low concentration required) or complex (high concentration required)

**Environment continuum** classifying skills as more 'open' or 'closed'. Closed skills are performed in the same predictable environment. Open skills have to be adapted as the environment changes.

**Feedback** Information which is given to a performer either during or after their performance to help them improve. There are 6 types

**Guidance** Information and help given to aid learning of a skill. It can be visual (demonstrations), verbal (explain) mechanical (the use of equipment to assist the performer) or manual (coach physically manipulates the athlete through the skill)

**Mental preparation.** Preparing for a physical performance using mental techniques including imagery, selective attention, positive thinking and mental rehearsal.

**Motor Skill** A learned ability to use movement to bring about the result you want

**Open Skill** A skill performed in a changing environment, the performer must adapt the skill due to these external factors

**Self-esteem** How much you appreciate and believe in yourself

**Simple skill** Consists of basic movement actions that are not difficult to perform, with few decisions to make

**Skill Continuum** Categorising skills along a continuum according to their difficulty, from 'easy' at one end to 'complex' at the other

**Skilful Movement** A pre-determined, fluent and coordinated movement which is efficient and aesthetically pleasing



# Science - Combined

## Magnets

Magnets have a north (N) and a south (S) pole.

When two magnets are brought close together, they exert a non-contact force on each other.

**Repulsion** – If the poles are the same (N and N or S and S), they will repel each other.

**Attraction** – If the poles are different (N and S or S and N), they will attract each other.

The force between a magnet and a magnetic material (iron, steel, cobalt, or nickel) is always attractive.

## Magnetic fields

A **magnetic field** is the region around a magnet where another magnet or magnetic material will experience a force due to the magnet.

A magnetic field can be represented by magnetic field lines.

Field lines show the direction of the force that would act on a north pole at that point.

Field lines always point from the north pole of a magnet to its south pole.

A magnetic field's strength is greatest at the poles and decreases as distance from the magnet increases.

The closer together the field lines are, the stronger the field.

## Induced and permanent magnets

A **permanent** magnet produces its own magnetic field which is always there.

An **induced** magnet is an object that becomes magnetic when it is placed in a magnetic field.

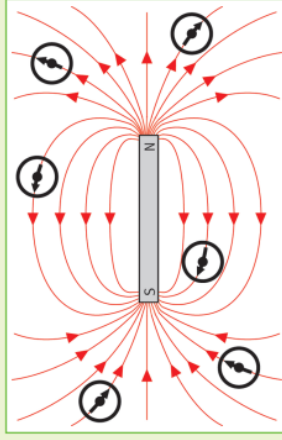
The force between an induced magnet and a permanent magnet is *always attractive* (it doesn't matter which pole of the permanent magnet the induced magnet is near).

If the induced magnet is removed from the magnetic field it will quickly lose most or all of its magnetism.

## Plotting magnetic fields

A magnetic compass contains a small bar magnet that will line up with magnetic field lines pointing from north to south.

A compass can be used to plot the magnetic field around a magnet or an **electromagnet**:



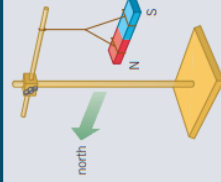
If it is not near a magnet, a compass will line up with the Earth's magnetic field, providing evidence that the Earth's core is magnetic.

As a compass points towards a south pole, the magnetic pole near the Earth's geographic North Pole is actually a south pole.

## Magnetic materials

Iron or steel objects, and some nickel and cobalt materials can be magnetised or demagnetised. Magnets made of steel tend to be more permanent as it does not lose its magnetism easily.

N-pole and S-pole can be identified by suspending a bar magnet, and using a second magnet to identify each pole.



## Electromagnetism

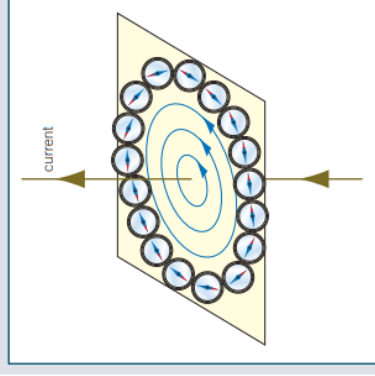
If an electric current flows through a wire (or other conductor), it will produce a magnetic field around the wire.

The field strength increases:

- with greater current
- closer to the wire.

Reversing the direction of the current reverses the direction of the field.

The field around a straight wire takes the shape of concentric circles at right angles to the wire:



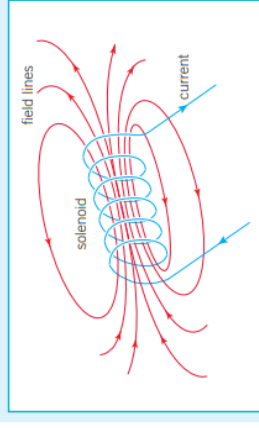
If the wire was gripped by someone's right hand so that the thumb pointed in the direction of the current, the fingers would curl in the direction of the magnetic field.

## Solenoids

A **solenoid** is a cylindrical coil of wire.

Bending a current-carrying wire into a solenoid increases the strength of the magnetic field produced.

The shape of the magnetic field around a solenoid is similar to a magnetic field around a bar magnet.



Inside a solenoid the magnetic field is *strong and uniform*, which means it has the same strength and direction at all points.

The strength of the magnetic field around a solenoid can be increased by putting an iron core inside it.

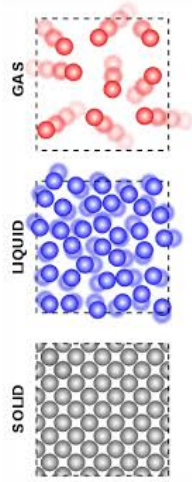
If the wire was gripped by someone's right hand so that the fingers curl in the direction of the current in the coil, the thumb will point towards the north pole of the field. Electromagnets are often solenoids with an iron core.

## Advantages of electromagnets

- An electromagnet can be turned on and off.
- The strength of an electromagnet can be increased or decreased by adjusting the current.

# Science - Combined

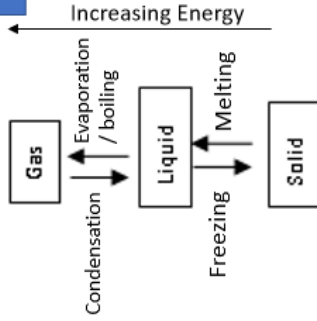
## Lesson 1 States of matter



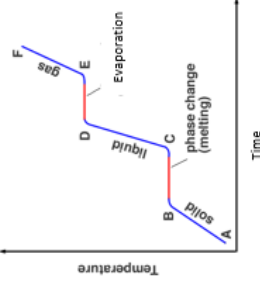
### Arrangement of particles

Ordered	Random	Random
Neat rows	Some touch	Apart

## State Changes



## Lesson 2 Heating / Cooling curves



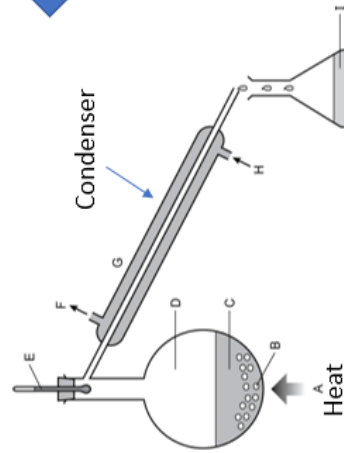
A heating or cooling curve looks like this

## Lesson 3 Mixtures

- Mixtures contain substances which are not chemically combined and they can be separated
- Mixtures melt over a range of temperatures

## Lesson 6 Distillation

Distillation is used to separate a solvent from a solution



State changes involved in distillation - boiling/evaporation and condensation

### Risk Assessment

**Hazard** – what is dangerous e.g. Bunsen

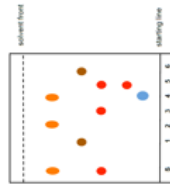
**Burner**

**Risk** – the harm it could do e.g. Hair could catch fire

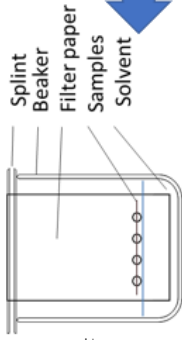
**Control measure** – How you make it safe e.g. tie your hair back

## Lesson 5 Chromatography

Chromatography is used to separate a mixture of substances. E.g. a mixture of different dyes in an ink.

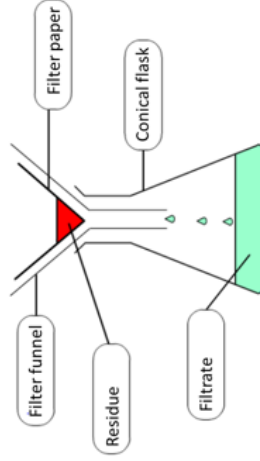


Each dot represents a dye  
The same dye will travel the same distance up the paper

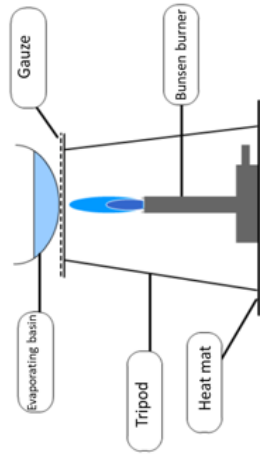


## Lesson 4 Filtration and crystallisation

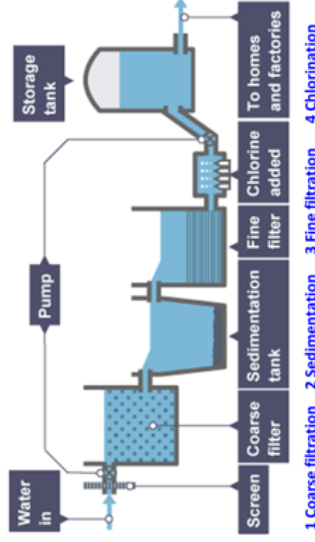
Filtration can be used to separate solid from a liquid



In crystallisation the solvent is evaporated off



## Lesson 7 Purifying water



**filtration** – filtered to remove solid  
**Sedimentation** – solid sinks to bottom  
**Chlorination** – to kill bacteria

# Science - Combined

## Keywords

**allele** – An alternative form of a gene.

**asexual reproduction** – The production of offspring from a single parent by mitosis. The offspring are clones of the parent.

**chromosome** – Structures that contain the DNA of an organism and are found in the nucleus.

**cystic fibrosis** – A disorder of cell membranes caused by a recessive allele.

**DNA** – A polymer that is made up of two strands that form a double helix.

**dominant** – An allele that is always expressed, even if only one copy is present.

**fertilisation** – The fusion of male and female gametes.

**gamete** – Sperm cell and egg cell in animals; pollen and egg cell in plants.

**gene** – A small section of DNA that codes for a specific protein.

**genome** – The entire genetic material of an organism.

**genotype** – The combination of alleles.

**heterozygous** – A genotype that has two different alleles – one dominant and one recessive.

**homozygous** – A genotype that has two of the same alleles. Either two dominant alleles or two recessive alleles.

**meiosis** – The two-stage process of cell division that reduces the chromosome number of the daughter cells. It makes gametes for sexual reproduction.

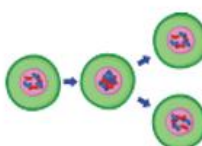
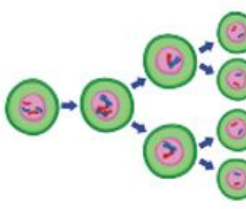
**mutation** – A change in DNA.

**phenotype** – The characteristic expressed because of the combination of alleles.

**polydactyly** – Having extra fingers or toes. Is caused by a dominant allele.

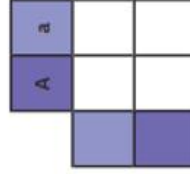
**recessive** – An allele that is only expressed if two copies of it are present.

**sexual reproduction** – The production of offspring by combining genetic information from the gametes of two parents. Leads to variation in the offspring.

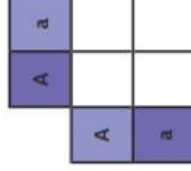
Mitosis	Meiosis
Produces two daughter cells.	Produces four daughter cells.
Daughter cells are genetically identical.	Daughter cells are not genetically identical.
The cell divides once.	The cell divides twice.
The chromosome number of the daughter cells is the same as the parent cells. In humans, this is 46 chromosomes.	The chromosome number is reduced by half. In humans, this is 23 chromosomes.
Used for growth and repair, and asexual reproduction.	Produces gametes for sexual reproduction.
	

## How to Complete a Punnet Square

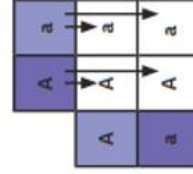
**Step 1:** Put the two alleles from one parent into the boxes at the top. This parent is a heterozygote. This means they have one dominant and one recessive allele.



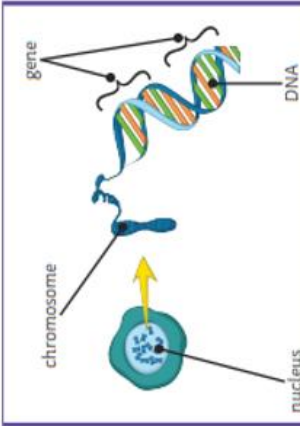
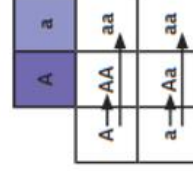
**Step 2:** Put the two alleles from the second parent into the boxes on the left. This parent is also a heterozygote.



**Step 3:** Put the alleles from the first parent into the two boxes beneath them.



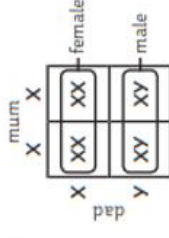
**Step 4:** Put the alleles from the second parent into the two boxes to the right of them.



## Sex Determination

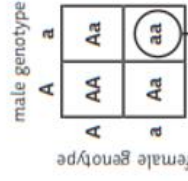
Females carry two X chromosomes.

Males carry one X and one Y chromosome.



## Probability

There are four possible combinations of gametes that offspring can inherit.



One of these four has the genotype aa, that's  $\frac{1}{4}$ , 25% or 0.25.

The recessive phenotype has a ratio of 1:3 because only one combination will show the phenotype, while the other three will not.



# Science - Triple

## p8-9: Energy and forces and their effects

- Lesson sequence
- 1. Work and power
- 2. Objects affecting each other
- 3. Vector diagrams
- 4. Rotational forces

1. Work and power	
Energy	The capacity to do work.
Joules	The units of energy, symbol = J.
Kilojoules	1000 J, symbol = kJ.
Work done	The energy transferred by a force.
Calculating work done	Work done = force x distance $E = F \times d$
	Work done = joules Force = newtons Distance = metres
Power	The rate of energy transfer.
Watts, W	The unit of power: 1 W = 1 joule per second $P = E / t$
Calculating power	Power = work done / time $P = E / t$ Power = watts Work done = joules Time = seconds

### Worked example

Danny is moving a box weighing 300 N. He pulls it 3 m along a sloping ramp using a force of 200 N. Calculate the work Danny does.

$$E = F \times d$$
$$= 200 \text{ N} \times 3 \text{ m}$$
$$= 600 \text{ J}$$

The force must be in the direction of the movement.

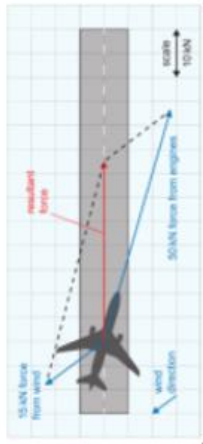
2. Objects affecting each other	
Contact force	A force that acts when two objects touch.

Contact force examples	Normal force, normal reaction force, friction, upthrust, air resistance.
Non-contact force	A force that acts at a distance.
Non-contact force examples	Gravity, magnetism, electrostatic force.
Action-reaction forces	If, A applies an action force to B, B applies a reaction force of same size and opposite direction to A.
Force field	The area around an object where its force can affect other objects.
Magnetic field	The area of magnetic force around a magnet.
Electric field	The area of electrostatic force around an object charged with static electricity.
Vectors	Arrows that show size and direction.

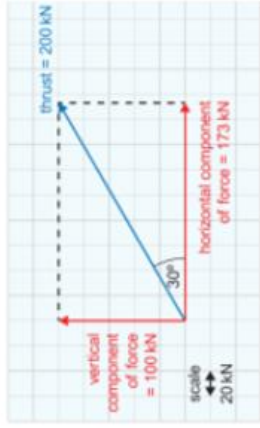


3. Vector diagrams	
Free body diagram	A diagram showing all the forces on an object.
Vector diagram	Arrows showing the size and direction of a force – must be drawn to scale.
Scale diagram	Diagram drawn on graph paper to find the size of forces.
Resultant force	The force left over when forces acting in opposite directions are cancelled out.

Resultant force diagram	Draw correct arrows for two forces, add lines to make a parallelogram. Resultant force = the diagonal of the parallelogram.
Resolving forces	Breaking a force up into its horizontal and vertical components.
Component forces	The vertical and horizontal forces that a diagonal force is made from.
Resolving forces diagram	Draw a correct force arrow, add arrows for vertical and horizontal component forces.



4. Rotational forces	
Moment	The turning effect of a force $\text{Moment} = \text{Force} \times \text{Perpendicular distance from pivot}$ $\text{Moment} = \text{Nm}$ $\text{Force} = \text{N}$ $\text{Distance} = \text{m}$ the central point, pin, or shaft on which a mechanism turns or oscillates. a line at right angles to a given line or surface.
Pivot	
Normal	
Equilibrium	a state in which opposing forces or influences are balanced.
Lever	a rigid bar resting on a pivot, used to move a heavy or firmly fixed load with one end when pressure is applied to the other.
Gears	An alternative method for transmitting the rotational effect of a force.

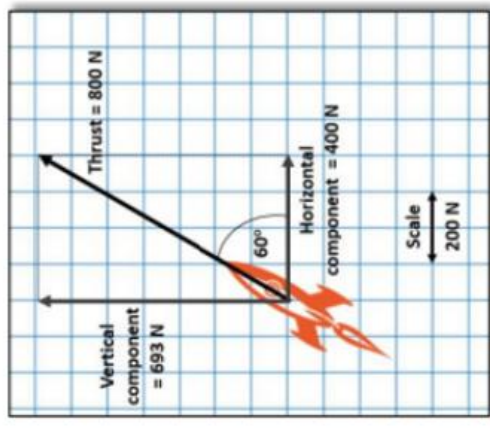


**Worked example**

In diagram B the sacks are hanging from a point 0.1 m from the pivot. They are balanced by a weight of 300 N hanging 1 metre from the pivot and a weight of 20 N hanging 1.2 m from the pivot. Calculate the weight of the sacks.

sum of clockwise moments =  $300 \text{ N} \times 1 \text{ m} + 20 \text{ N} \times 1.2 \text{ m}$   
 $= 300 \text{ Nm} + 24 \text{ Nm} = 324 \text{ Nm}$

sum of clockwise moments = sum of anti-clockwise moments  
 $324 \text{ Nm} = \text{weight} \times 0.1 \text{ m}$   
 $\text{weight} = 3240 \text{ N}$



# Science - Triple

### Crude oil

Crude oil is incredibly important to our society and economy. It is formed from the remains of ancient biomass – living organisms (mostly plankton) that died many millions of years ago.

Raw crude oil is a thick black liquid made of a large number of different compounds mixed together. Most of the compounds are **hydrocarbons** of various sizes. Hydrocarbons are molecules made of carbon and hydrogen only.

### Combustion

Hydrocarbons are used as **fuels**. This is because when they react with oxygen they release a lot of energy. This reaction is called **combustion**. Complete combustion is a type of combustion where the only products are carbon dioxide and water.

### Properties

Whether or not a particular hydrocarbon is useful as a fuel depends on its properties:

- **flammability** – how easily it burns
- **boiling point** – the temperature at which it boils
- **viscosity** – how thick it is

Its properties in turn depend on the length of the molecule.

Chain length	Flammability	Boiling point	Viscosity
long chain	low	high	high (very thick)
short chain	high	low	low (very runny)

### Alkanes

One family of hydrocarbon molecules are called **alkanes**. Alkane molecules only have single bonds in them. The first four alkanes are:

$\begin{array}{c} \text{H} \\ | \\ \text{H}-\text{C}-\text{H} \\ | \\ \text{H} \end{array}$ 

methane

$\begin{array}{c} \text{H} & \text{H} \\ | & | \\ \text{H}-\text{C}-\text{C}-\text{H} \\ | & | \\ \text{H} & \text{H} \end{array}$ 

ethane

$\begin{array}{c} \text{H} & \text{H} & \text{H} \\ | & | & | \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{H} \\ | & | & | \\ \text{H} & \text{H} & \text{H} \end{array}$ 

propane

$\begin{array}{c} \text{H} & \text{H} & \text{H} & \text{H} \\ | & | & | & | \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{C}-\text{H} \\ | & | & | & | \\ \text{H} & \text{H} & \text{H} & \text{H} \end{array}$ 

butane

The different alkanes have different numbers of carbon atoms and hydrogen atoms. You can always work the molecular formula of an alkane by using  $\text{C}_n\text{H}_{2n+2}$ .

**Key terms**

Make sure you can write a definition for these key terms.

alkanes  
flammability

alkenes  
boiling point  
fractional distillation

alkynes  
combustion  
fuel

alkenes  
cracking  
hydrocarbon

alkenes  
feedstock  
viscosity

### Fractional distillation

The different hydrocarbons in crude oil are separated into fractions based on their boiling points in a process called **fractional distillation**. All the molecules in a fraction have a similar number of carbon atoms, and so a similar boiling point.

The process takes place in a fractionating column, which is hot at the bottom and cooler at the top.

The process works like this:

- 1 crude oil is vapourised (turned into a gas by heating)
- 2 the hydrocarbon gases enter the column
- 3 the hydrocarbon gases rise up the column
- 4 as hydrocarbon gases rise up the column they cool down
- 5 when the different hydrocarbons reach their boiling point in the column they condense
- 6 the hydrocarbon fraction is collected.

### Products from fractional distillation

Many useful products come from the separation of crude oil by fractional distillation.

Fuels	Feedstock	Useful materials produced
petrol, diesel oil, kerosene, heavy fuel oil, and liquefied petroleum gases	fractions form the raw material for other processes and the production of other substances	solvents, lubricants, polymers, and detergents

### Cracking

Not all hydrocarbons are as useful as each other. Longer molecules tend to be less useful than shorter ones. As such, there is a higher demand for shorter-chain hydrocarbons than longer-chain hydrocarbons.

A process called **cracking** is used to break up longer hydrocarbons and turn them into shorter ones.

Cracking produces shorter alkanes and **alkenes**.

Two methods of cracking are:

- catalytic cracking – vaporise the hydrocarbons, then pass them over a hot catalyst
- steam cracking – mix the hydrocarbons with steam at a very high temperature

### Alkenes

Alkenes are a family of hydrocarbons that contain double bonds between carbon atoms.

Alkenes are also used as fuels, and to produce polymers and many other materials.

They are much more reactive than alkanes. When mixed with bromine water, the bromine water turns from orange to colourless. This can be used to tell the difference between alkanes and alkenes.