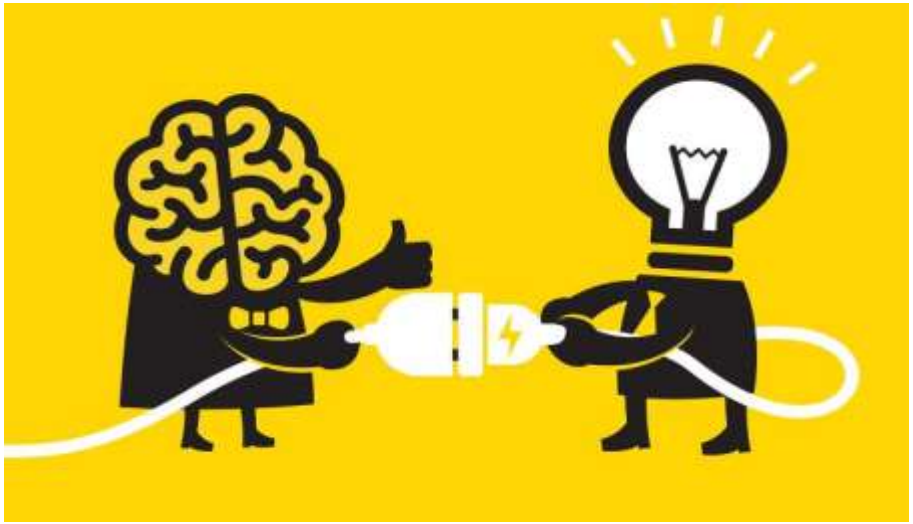
DELTA Academies Trust

... Changing lives

Name:



'Curiosity is the wick in the candle of learning.'
William Arthur Ward

Year 10

Knowledge Organiser

Spring Term 2

Instructions for Using your Knowledge Organiser

Every school day you should be studying 2 sections of your Knowledge Organiser (KO) for homework.

You are to use your exercise book to show the work you have done. Each evening you should start a new page and put the date clearly at the top. You need to bring your KO and exercise book with you EVERY DAY to the academy.

You can use your KOs and book in a number of different ways but you should not just copy from the Knowledge Organiser into your book. Use the **'How to self-test with the Knowledge Organiser'** booklet available on the school website which you can access using the QR code to the right. An instructional video on how to use your Knowledge Organiser is also available on the school website.

There are some more ideas and strategies listed below:

- Ask someone to write questions for you
- Write your own challenging questions and then leave it overnight to answer them the next day
- Create mind maps
- Create flashcards
- Put the key words into new sentences
- Look, cover, write and check
- Mnemonics
- Draw a comic strip of a timeline
- Use the 'clock' template to divide the information into smaller sections. Then test yourself on different sections
- Give yourself spelling tests
- Definition tests
- Draw diagrams of processes
- Draw images and annotate/label them with extra information
- Do further research on the topic
- Create fact files
- Create flowcharts

Presentation

You should take pride in how you present your work, each page should be clearly dated at the top left hand side with Subject 1 written in the middle. Half way down the page a line should divide it in two with Subject 2 written above the dividing line. Each half of the page should be neatly filled with evidence of self-testing. There should be an appropriate amount of work. Remember the **PROUD** system should still be followed in your exercise book.

DELTA Academies Trust

Year 10 iMedia Knowledge Organiser

DELTA Ash Hill

GCSE Creative iMedia Literacy Mat

Exam R081

Learning Objective Terminology

Purpose – The reason for which something is produced or created, or for which something exists

Content – The information that is directed towards an end-user or audience

Use – The action of using something for a purpose

Plan – A detailed proposal or outline for doing or achieving something

Produce – To make something using creative skills

Review – A formal assessment of something with intention of making changes if needed.

Exam Command Works

Identify	Pick out what you regard as the key features of something, perhaps making clear the criteria you use in doing do.
State	Present the main points clearly and briefly.
Explain	Tell how things work or how they came to be the way they are.
Describe	Give a detailed account, talk about the item.
Choose	Pick out something as being the best or most appropriate of two or more alternatives
Create	Invent a new product or idea
Justify	Give valid reasons to support a claim or conclusion
Indicate	Point out, identify or show

Long Answer 8 or 12 Mark Question Starters

A mind map is created to...
Mood boards are produced with the purpose of...
A script is a pre-production document that...
A positive feature of a script is...
Another strength of this storyboard is...
A clear weakness of the visualisation diagram is...
Another fault that I have identified with this document is...
A suitable improvement that I would make is...

Grade Boundaries

Marks needed out of 60

P - 36
M - 42
D - 48
D* - 54

iMedia Vocabulary

LO1
Theme
Genre
Target Audience
Visualisation
Concept
Layout
Design
Script
Storyboard

LO2
Demographics
Marketing
Advertising
Survey
Questionnaire
Resources
Work Plan
Schedule
Software
Application
Hardware
File Format
Documentation
Risk Assessment
Recce
Legislation
Copyright
Trademark
Intellectual Property

LO3
Collate
Analysis
Image Editing
Content
Structure
Illustration
Properties
Limitations
Convention
Version Control

LO4
Review
Positives
Strengths
Negatives
Weaknesses
Process
Critical
Evaluation
Summary

GENERAL
Requirements
Client
Deadline
Preparation
Speciation
Accessibility

DELTA Academies Trust

DELTA Ash Hill

Romeo and Juliet is a tragedy written by William Shakespeare early in his career about two young Italian star-crossed lovers whose deaths ultimately reconcile their feuding families. It was among Shakespeare's most popular plays during his lifetime and, along with *Hamlet*, is one of his most frequently performed plays. Today, the title characters are regarded as archetypal young lovers.

Describe the characters in one sentence	
Romeo	
Juliet	
Mercutio	
Benvolio	
Tybalt	
Nurse	
Lord Capulet	
Lady Capulet	

- Recap and revise the PLOT of Romeo and Juliet (you will be quizzed on this – you need to 'wow' us).
- This will be tested!
- If in doubt – Pod it!
- Watch the plot overview.

Key quotation	Word to remember
"a pair of star-crossed lovers take their life"	Star-crossed
"I have a soul of lead"	Lead
"forswear it sight, for I never saw a true beauty 'til this night"	True beauty
"by the stock and honour of my kin, to strike him dead I hold it not a sin"	Sin
"O Romeo, Romeo! wherefore art thou Romeo?"	Wherefore
"It is the east, and Juliet is the sun!"	East
"'tis thy name that is my enemy"	Name
"a rose by another name would smell as sweet"	Rose
"a plague on both your houses"	Plague
"O! I am Fortune's fool!"	Fool
"does she not give us thanks? is she not proud?"	Proud
"Thus with a kiss I die."	Kiss
"for never was a story of more woe, than this of Juliet and her Romeo."	Woe

Pod it! Use GCSE Pod to:

1. Watch the scene summary pods
2. Know the themes of the play

Year 10 English Poetry Anthology- how many do you know?
Knowledge Organiser

Anthology Poem	Key quotes & Trigger Words	Covered?
Hawk Roosting *The Hawk which behaves like an arrogant God and rules the forest*	"in sleep **rehearse** perfect kills and eat" "now I hold **Creation** in my foot" "I am going to **keep** things like this"	
Ozymandias *The pharaoh Rameses II thought his creations would last forever, but they crumble*	"I met a **traveller** from an antique land" "look on my works, ye **mighty** and despair" "nothing beside **remains**"	
Living Space *The poor in India who have poor quality houses and need to believe in God to make it from day to day.*	"nothing is **flat** or parallel" "**eggs** in a wire basket" "hung out of the dark edge of a **slanted** universe"	
London *The poor in London who suffer because the church refuses to help them escape poverty.*	"**marks** of weakness, marks of woe" "mind-forged **manacles**" "every black'ning **church** appals"	
Death of a Naturalist *The narrator wanted to become a naturalist, but lost his childish innocence as he grew up.*	"warm thick **slobber** of frogspawn" "the **daddy** frog was called a bullfrog" "the great slime kings were gathered there for **vengeance**"	
Afternoons *The narrator doesn't believe in traditional families and think people sacrifice too much of their own happiness for their children*	"Summer is **fading** the leaves fall in ones and twos" "An estateful of **washing**" "Something is pushing them to the **side** of their own lives"	
The Soldier *The patriotic soldier who thinks dying for his country is noble and that he is blessed for being English*	"some corner of a foreign **field** that is for ever England" "a **dust** whom England bore, shaped, made aware" "a pulse in the **eternal** mind"	
The Manhunt *The soldier's wife tries to help him cope with PTSD after he returns home from war.*	"only then would he let me trace the **frozen** river which ran through his face" "sweating, unexploded **mine** buried deep in his mind" "then and only then did I come **close**"	
Dulce et Decorum Est *The poet's experience in war taught him that it was not sweet and right to die for your country*	"bent double, like old **beggars** under sacks" "He plunges at me, guttering**, choking**, drowning" "The old **Lie**: Dulce et Decorum est pro patria mori"	

Year 10 English Poetry Anthology- how many do you know?
Knowledge Organiser

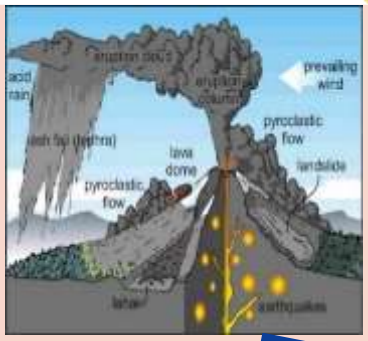
Anthology Poem	Key quotes & Trigger Words	Covered?
Mametz Wood *The poet's journey to the battlefields makes him think about how past sacrifices can resurface.*	"the **wasted** young, turning up under their plough blades" "like a wound working a foreign body to the **surface** of the skin" "a broken **mosaic** of bone linked arm in arm"	
A Wife in London *The wife receives a telegram of her husband's death, followed shortly after by a letter he wrote which was about him looking forward to coming home.*	"She sits in the tawny **vapour**" "He – has **fallen** – in the far South Land" "His hand, whom the **worm** now knows"	
Cozy Apologia *A woman who realises that true love doesn't have to be a fairy-tale and that commitment and contentment is the most important thing.*	"Chain mail **glinting**, to set me free" "**Teenage** crushes on worthless boys whose only talent was to kiss you senseless" "We're **content**, but fall short of the Divine"	
As Imperceptibly as Grief *The poet's slide into depression as mirrored by the changing of the seasons and the disappearing of light*	"The **Summer** lapsed away" "As **twilight** long begun" "Our summer made her light **escape** into the beautiful"	
Excerpt from The Prelude *The poet marvels at the beauty of nature, the excitement it brings and how he fits into the wider world.*	"It was a time of **rapture**: clear and loud" "The **Pack** loud bellowing, and the hunted hare" "The **orange** sky of evening died away."	
Valentine *The poet explores the bitterness and rejection of a love which ends badly.*	"it will blind you with **tears**" "Its fierce **kiss** will stay on your lips, possessive and faithful" "**platinum** loops shrink to a wedding-ring, if you like"	
She Walks in Beauty *The poet admires the grace and poise of a woman whose dark-haired appearance was distinctive and unusual*	"of **cloudless** climes and starry skies" "one **shade** the more, one ray the less" "A heart whose love is **innocent**!"	
To Autumn *The writer explores how he admires autumn for providing growth, giving us a harvest and being perfectly in harmony like music.*	"Fill all fruit with **ripeness** to the core" "on a half-reap'd **furrow** sound asleep" "Where are the **songs** of Spring?"	
Sonnet 43 *The poet explores the reasons for loving her partner (after falling out with her parents) and how it will only become stronger and stronger, even after death*	"I love thee to the **depth** and breadth and height my soul can reach" "I love thee with the passion put to use in my old **griefs**" "if God choose, I shall but love thee **better** after death"	

The structure of the Earth

The Crust	Varies in thickness (5-10km) beneath the ocean. Made up of several large plates.
The Mantle	Widest layer (2900km thick). The heat and pressure means the rock is in a liquid state that is in a state of convection.
The Inner and outer Core	Hottest section (5000 degrees). Mostly made of iron and nickel and is 4x denser than the crust. Inner section is solid whereas outer layer is liquid.

Volcanic Hazards

Ash cloud	Small pieces of pulverised rock and glass which are thrown into the atmosphere.
Gas	Sulphur dioxide, water vapour and carbon dioxide come out of the volcano.
Lahar	A volcanic mudflow which usually runs down a valley side on the volcano.
Pyroclastic flow	A fast moving current of super-heated gas and ash (1000°C). They travel at 450mph.
Volcanic bomb	A thick (viscous) lava fragment that is ejected from the volcano.



Managing Volcanic Eruptions

Warning signs	Monitoring techniques
Small earthquakes are caused as magma rises up.	Seismometers are used to detect earthquakes.
Temperatures around the volcano rise as activity increases.	Thermal imaging and satellite cameras can be used to detect heat around a volcano.
When a volcano is close to erupting it starts to release gases.	Gas samples may be taken and chemical sensors used to measure sulphur levels.

Planning & Preparation	
Creating an exclusion zone around the volcano.	Being ready and able to evacuate residents.
Having an emergency supply of basic provisions, such as food	Trained emergency services and a good communication system.

Convection Currents

The crust is divided into tectonic plates which are moving due to convection currents in the mantle.

1. Radioactive decay of some of the elements in the core and mantle generate a lot of heat.
2. When lower parts of the mantle molten rock (Magma) heat up they become **less dense** and **slowly rise**.
3. As they move towards the top they cool down, become **more dense** and **slowly sink**.
4. These **circular movements** of semi-molten rock are **convection currents**
5. Convection currents create **drag** on the base of the tectonic plates and this causes them to move.

LIC -CS: Haiti Earthquake 2010

Causes
On a conservative plate margin, involving the Caribbean & North American plates. The magnitude 7.0 earthquake was only 15 miles from the capital Port au Prince. With a very shallow focus of 13km deep.

Effects
230,000 people died and 3 million affected. Many **emotionally affected**. **250,000 homes** collapsed or were damaged. **Millions homeless**. Rubble blocked roads and shut down ports.

Management
Individuals tried to recover people. Many countries **responded with appeals** or **rescue teams**. Heavily relied on **international aid**, e.g. **$330 million** from the EU. **98% of rubble** remained after **6 months**.

Earthquake Management

PREDICTING

Methods include:
- Satellite surveying (tracks changes in the earth's surface)
- Laser reflector (surveys movement across fault lines)
- Radon gas sensor (radon gas is released when plates move so this finds that)
- Seismometer
- Water table level (water levels fluctuate before an earthquake).
- Scientists also use seismic records to predict when the next event will occur.

PROTECTION

You can't stop earthquakes, so earthquake-prone regions follow these three methods to reduce potential damage:
- Building earthquake-resistant buildings
- Raising public awareness
- Improving earthquake prediction

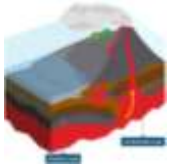
Unit 1a

The Challenges of Natural Hazards

Types of Plate Margins

Destructive Plate Margin

When the denser plate subducts beneath the other, friction causes it to **melt and become molten magma**. The magma forces its ways up to the surface to form a volcano. This margin is also responsible for **devastating earthquakes**.



Constructive Plate Margin

Here two plates are **moving apart** causing new magma to reach the surface through the gap. Volcanoes formed along this crack cause a submarine mountain range such as those in the **Mid Atlantic Ridge**.

Conservative Plate Margin

A conservative plate boundary occurs where plates **slide past each other** in opposite directions, or in the same direction but at different speeds. This is responsible for earthquakes such as the ones happening along the San Andreas Fault, USA.

What is a Natural Hazard

A natural hazard is a natural process which could cause death, injury or disruption to humans, property and possessions.

Geological Hazard	Meteorological Hazard
These are hazards caused by land and tectonic processes.	**These are hazards caused by weather and climate.**

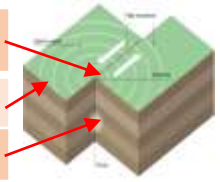
Causes of Earthquakes

Earthquakes are caused when two plates become **locked** causing **friction** to build up. From this **stress**, the **pressure** will eventually be released, triggering the plates to move into a new position. This movement causes energy in the form of **seismic waves**, to travel from the **focus** towards the **epicentre**. As a result, the crust vibrates triggering an earthquake.

The point directly above the focus, where the seismic waves reach first, is called the **EPICENTRE**.

SEISMIC WAVES (energy waves) travel out from the focus.

The point at which pressure is released is called the **FOCUS**.



HIC - CS: Eyjafjallajokull (E15) Eruption, Iceland 2010

Causes
The North-American and Eurasian plates move apart on a constructive plates.
The disruption caused by Eyjafjallajökull was the result of a series of small volcanic eruptions from March to October.

Effects
The **thick ice cap m**elted which caused major flooding.
No reported deaths.
Airspace closed across Europe, with at least **17,000** flights cancelled
Costed insurers **£65m** to cancelled flights.

Management
Iceland had a good warning system with **texts being sent** to residents within **30 minutes**.
Large sections of **European airspace were closed** down due ash spread over the continent.
Airlines developed **ash monitoring equipment**.

Global pattern of air circulation

Atmospheric circulation is the large-scale movement of air by which heat is distributed on the surface of the Earth.

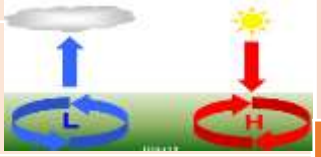
Hadley cell	Largest cell which extends from the **Equator** to between **30° to 40° north & south**.
Ferrel cell	Middle cell where air flows **poleward** between **60° & 70°** latitude.
Polar cell	**Smallest & weakness** cell that occurs from the poles to the Ferrel cell.

Distribution of Tropical Storms.

They are known by many names, including hurricanes (North America), cyclones (India) and typhoons (Japan and East Asia). They all occur in a band that lies roughly 5-15° either side of the Equator.

High and Low Pressure

Low Pressure	High Pressure
Caused by hot air rising. Causes stormy, cloudy weather.	**Caused by cold air sinking. Causes clear and calm weather.**



Formation of Tropical Storms

1	The sun's rays heats large areas of ocean in the summer and autumn. This causes **warm, moist air** to rise over the particular spots
2	Once the **temperature is 27°**, the rising warm moist air leads to a **low pressure**. This eventually turns into a thunderstorm. This causes air to be sucked in from the **trade winds**.
3	With trade winds blowing in the opposite direction and the rotation of earth involved (Coriolis effect), the thunderstorm will eventually start to **spin**.
4	When the storm begins to **spin faster than 74mph**, a tropical storm (such as a hurricane) is officially born.
5	With the tropical storm growing in power, **more cool air sinks** in the centre of the storm, creating calm, clear condition called the **eye of the storm**.
6	When the tropical storm hits land, it **loses its energy source** (the warm ocean) and it begins to lose strength. Eventually it will 'blow itself out'.

Changing pattern of Tropical Storms

Scientist believe that global warming is having an impact on the frequency and strength of tropical storms. This may be due to an increase in ocean temperatures.

Management of Tropical Storms

Protection
Preparing for a tropical storm may involve construction projects that will improve protection.

Aid
Aid involves assisting after the storm, commonly in LIDs.

Development
The scale of the impacts depends on the whether the country has the resources cope with the storm.

Planning
Involves getting people and the emergency services ready to deal with the impacts.

Prediction
Constant monitoring can help to give advanced warning of a tropical storm

Education
Teaching people about what to do in a tropical storm.

Primary Effects of Tropical Storms

- The intense winds of tropical storms can destroy whole **communities, buildings** and **communication networks**.
- As well as their own destructive energy, the winds can generate abnormally high waves called **storm surges**.
- Sometimes the most destructive elements of a storm are these subsequent **high seas and flooding** they cause to coastal areas.

Secondary Effects of Tropical Storms

- People are **left homeless**, which can cause distress, poverty and ill health due to lack of shelter.
- **Shortage of clean water** and **lack of proper sanitation** makes it easier for diseases to spread.
- **Businesses are damaged** or destroyed causing employment.
- Shortage of food as **crops are damaged**.

Case Study: Typhoon Haiyan 2013

Causes
Started as a tropical depression on **2rd November 2013** and gained strength. Became a Category 5 **"super typhoon"** and made landfall on the Pacific islands of the Philippines.

Effects
- Almost **6,500 deaths**.
- **130,000 homes destroyed.**
- Water and sewage systems destroyed had caused **diseases**.
- **Emotional grief** for dead.

Management
- The UN raised **£190m in aid**.
- USA & UK **sent helicopter carrier ships** deliver aid remote areas.
- **Education** on typhoon preparedness.

Case Study: UK Heat Wave 2003

Causes
The heat wave was caused by an anticyclone (areas of high pressure) that stayed in the area for most of August. This blocked any low pressure systems that normally brings cooler and rainier conditions.

Effect
- People suffered from heat strokes and dehydration.
- 2000 people died from causes linked to heatwave.
- Rail network disrupted and crop yields were low.

Management
- The NHS and media gave guidance to the public.
- Limitations placed on water use (hose pipe ban).
- Speed limits imposed on trains and government created 'heatwave plan'.

What is Climate Change?

Climate change is a large-scale, long-term shift in the planet's weather patterns or average temperatures. Earth has had tropical climates and ice ages many times in its 4.5 billion years.

Recent Evidence for climate change.

Global temperature	Average global temperatures have increased by more than **0.6°C since 1950**.
Ice sheets & glaciers	Many of the world's glaciers and ice sheets are melting. E.g. the Arctic sea ice has declined by **10% in 30 years**.
Sea Level Change	Average global **sea level has risen by 10-20cms** in the past 100 years. This is due to the additional water from ice and thermal expansion.

Enhanced Greenhouse Effect

Recently there has been an increase in **humans burning fossil fuels** for energy. These fuels (gas, coal and oil) emit **greenhouse gases**. This is making the Earth's atmosphere thicker, therefore trapping more solar radiation and causing **less to be reflected**. As a result, the Earth is becoming warmer.

Evidence of natural change

Orbital Changes	Some argue that climate change is linked to how the Earth orbits the Sun, and the way it wobbles and tilts as it does it.
Sun Spots	Dark spots on the Sun are called Sun spots. They increase the **amount of energy Earth receives** from the Sun.
Volcanic Eruptions	Volcanoes release large amounts of **dust containing gases**. These can **block sunlight** and results in cooler temperatures.

Managing Climate Change

Carbon Capture
This involves new technology designed to reduce climate change.

Planting Trees
Planting trees increase the amount of carbon is absorbed from atmosphere.

International Agreements
Countries aim to cut emissions by signing international deals and by setting targets.

Renewable Energy
Replacing fossil fuels based energy with clean/natural sources of energy.

Geography Mnemonic

Rates of deforestation. 1970s-present x3 UKs. 100 years:50% lost. Brazil reducing rates.

Animal and plant adaptations; Emergent(60-70m) / Canopy / Understory / Forest Floor / Buttress roots / drip tips / epiphytes / smooth bark / Toucans / Bats / Glasswing butterfly / Poison dart frogs.

Interdependence

Nutrient cycle; Biomass – litter (humus) – (decomposers) soil (infertile). (No seasons- rapid cycle)

Fact file: 9 countries in South America, Oldest biomes, 40,000 plants.

Over population – is that the biggest cause of deforestation?

Rainfall 2000-3000mm / 25-30oC / Low pressure

Economic and environmental impacts. ($6.9 million trade, mining, soya, jobs, PME, loss for rubber tappers). (Soil erosion, 55 million tonnes, Climate change 20% CO_2 in biomass, Loss of biodiversity)

Services and goods. (Resources: food, water, medicine) (Climate, water, flooding regulator, habitat shelter)

Timber – Logging

Selective logging – management. (debt reduction, education, afforestation, ecotourism, international agreements (ITS, 2006,70)

When using this remember to add the facts- not just the first word!

Paper 2: Section A: American West, c.1835-c.1890: Conflict and Conquest, 1876-95 Core Knowledge 1/3

Plains Indians – Ways of life

- **Women:** responsible for the tipi, clothing, water and children.
- **Men:** responsible for hunting, horses and protection.
- **Older people:** advised younger leaders; told stories of their histories.
- **Chiefs:** e.g. Red Cloud and Sitting Bull; they were chosen for spiritual powers and wisdom; negotiated with the US government and led tribes into war e.g. Red Cloud's War (1866-68).
- **Nations:** e.g. Sioux Nation was a large group/collection of tribes.
- **Tribes:** e.g. Crow, Cheyenne, these were groups of bands/families who shared the same practices/beliefs.
- **Bands:** a group of a few families from a tribe who lived and moved together.
- **The horse:** used for hunting, transportation and war. They were a symbol of wealth and would be stolen between tribes.
- **The tipi:** a mobile shelter made from Buffalo skins; decorated to show victories in war/successes in hunting; scalps placed at the top as trophies.
- **Buffalo:** used for food e.g. tongue and muscle; fat for cooking; dung for fuel; hide (skin) for tipis; horns for cutlery and headdresses.

Plains Indians – Beliefs

- **The spirit world:** Wakan Tanka (the Great Spirit) created all life and all living things had a spirit including rocks, trees and streams. The spirit world could be contacted through dances and visions.
- **Land:** all life came from the land and would be returned to it; land could not be owned; the Black Hills were sacred.
- **War:** Raiding parties may attack/steal from other tribes 3-4 times a year; battles took place to control access to hunting; the Sioux and Cheyenne were rivals with the Crow and Pawnee tribes. Warriors proved their bravery by getting close to an enemy and touching them with a coup stick. Feathers were used to record success in battle.

Why did settlers migrate into the West?

- **Manifest destiny:** the belief that it was God's will for Christian Americans to occupy all of the land in America from coast to coast.
- **Oregon Trail:** Use by wagon trails from 1843, 3200km long and protected by the Fort Laramie Treaty after 1851.
- **Economy:** Fur trappers told stories about the lush grasslands of the West which attracted investment. A banking crisis in 1837 led to high unemployment, especially amongst Mississippi farmers and meant people had less reason to stay in the East as there was less wealth.
- **Government encouragement:** 1842 – Pre-Emption Act encouraged settlement as people could claim 160 acres of land and buy it for $1.25 after living there for 14 months.
- **Gold Rush (1848-9):** People moved from Europe, Asia and East America to California where the population increased from 15,000 to 250,000 by 1852.

Government policy towards the Natives

- **1830: Indian Removal Act:** 46,000 Indians moved to the west of the Mississippi = Trail of Tears due to deaths as they moved.
- **1834: Permanent Indian Frontier:** created a border to stop whites moving onto Indian land. Whites banned from selling alcohol/guns to Indians.
- **1842: Pre-emption Act** allowed settlers to claim 160 acres of land and buy it after living there for 14 months for $1.25 per acre.
- **1851:** (First) **Indian Appropriations Act:** Indians began to be placed on reservations.
- **1851: Fort Laramie Treaty:** Indians allowed settlers safe passage along the trails and were paid $50,000 a year; they were fined if settlers were attacked; Indians had territory protected from settlers. The government enforced fines on Indians but did not stop people using Indian land for travel. The document was not fully understood and not all tribes agreed e.g. Crow.
- **1862: Homestead Act** divided land into smaller areas for families to buy. $10 registration fee then $30 to buy it after 5 years. Anyone aged 21+ could claim land, even ex-slaves did. 6 million acres of land was sold. Only 16% of the land available was bought by 1884; wealthy people bought the land cheap to sell it for a profit.
- **1862: Pacific Railroad Act:** government paid $16,000 for every mile of track built; 45 million acres of land taken from Plains Indians to build the railroad; it led to increased migration from Europe e.g. Germany; it became much quicker to travel West, businesses e.g. in Texas could use it to trade quickly/easily; growth of cow towns e.g. Abilene to transport cattle to the north/east where the cattle were sold for higher value.
- **1868: President Grant's Peace Policy:** All Natives had to move onto reservations or they would be treated as hostile; Ely Parker was put in charge of the Bureau of Indian Affairs – taught children Western customs.
- **1871: Second Indian Appropriations Act:** Declared all previous deals between government and Natives were invalid, promised to protect existing Indian land and provide money/food to those on reservations; PIs given poor land that was difficult to farm.
- **1873: Timber Culture Act:** Homesteaders would be given an additional 160 acres for planting 40 acres of trees.
- **1887: Dawes General Allotment Act:** Native families could claim 160 acres of reservation land; only half did meaning the rest of the land was sold to settlers.

Who migrated West?

- **Donner Party:** Began on the Oregon Trail, reached Little Sandy River by June 1846. Used Hastings Cutoff to shorten the journey but lost 4 wagons, oxen and cattle. Trapped by snow in mountains for 4 months; only 46/87 survived.
- **Mormons:** They left Ohio after their bank collapsed in 1837; moved to Missouri but suffered persecution as they sympathised with Natives and were anti-slavery, they were attacked and forced to leave; went to Illinois where the population increased to 35,000, Joseph Smith announced polygamy and he would run for President which led to him being imprisoned then murdered by a gang. Brigham Young led them to the Great Salt Lake (outside the USA) were they settled. They setup the Perpetual Emigration Fund to pay for more Mormon converts to come to Utah. Utah was established as a state of the USA.
- **Gold miners:** Early miners used simple tools e.g. hammers and picks; mining companies paid for workers to travel from China; others came from other parts of America, Australia and Europe – mostly single men. Increase in saloons e.g. 500 in San Francisco by 1853.
- **Farmers:** Mostly white settlers from the east. The early settlers occupied land immediately to the West of the Appalachian Mountains where the fertile prairie lands were. They faced issues – limited water supply; claim-jumping; extreme weather e.g. no rain in Kansas from Jan.1859-Nov. 1860; limited wood for fuel/building; ploughing the land was difficult due to long roots of prairie grass; very hot summers led to wildfires destroying crops.

Paper 2: Section A: American West, c.1835-c.1890: The Development of the Plains, 1862-90 Core Knowledge 2/3

Settlement Farming (Homesteads)

Problems:

- Water was in short supply meaning crops could fail e.g. Jan.1859-Nov. 1860 there was no rain fall in Kansas.
- There was little wood in some areas for fuel, housebuilding or fencing meaning it was difficult to enclose farmland to keep it safe from trampling.
- Sod houses were built as temporary homes. They had earth floors and were easily infiltrated by snakes, mice and rats.
- Ploughing was difficult as the prairie grass had very long roots and hadn't been ploughed before.
- European style crops (corn and wheat) were not well suited to the environment.

Solutions:

- 1837 – John Deere's sod-buster was strong enough to break up the ground.
- 1874 - Daniel Halladay's self-governing windmill was metal bladed and could pump water from 30m below ground level.
- 1874 – barbed wire was being used to fence off crops.
- 1875 – the Sulky Plough could break up tough weeds, sold 50,000 in 6 years.
- Turkey Red Wheat brought by Russians – it was hardier than other forms of wheat and could grow well on the Plains.
- Dry farming – a special method of preparing the soil to grow crops with minimal water.

Tension between homesteaders and ranchers

General issues

- Access to water – homesteaders would try to cut off access with fencing.
- Ranchers were often richer and could take homesteaders to court using expensive lawyers.
- More sheep on the land from the 1880s (5 million sheep in New Mexico) – cattle ranchers claimed the sheep spread disease and ate all the grass.

Examples

- 1870s, in Custer County the Olive family (ranchers) had their water source cut off by Homesteaders who fenced off access to the water.
- 1877-79: ranchers attempted to drive homesteaders off their land = 2 homesteaders murdered.
- 1865-1900: corporations bought up land to create huge open ranges and attempted to drive homesteaders off their land e.g. Lincoln County War and Mussel Slough County (4 millionaire owners of the Southern Pacific Railroad Company took out a legal case against homesteaders and won. But fighting broke out and 2 gunfighters working for the millionaires were killed as well as 5 homesteaders).
- Fence cutting wars e.g. 1883 following a drought, ranchers cut the barbed wire fences where homesteaders had cut off access to water leading to ranchers cutting fences down at night.

Consequences of the Californian Gold Rush (1848+)

- Population of California increased from 15,000 to 250,000 with prospectors e.g. Californian Indians, ex-convicts from Australia, Europeans, Americans from the East.
- Mining companies moved in with more sophisticated equipment and paid for Chinese labourers to come to USA.
- Mining towns provided shelter, supplies, alcohol and brothels for miners e.g. 500 saloons in San Francisco by 1853.
- Violence and law codes developed as miners decided on punishments for crimes e.g. claim jumping.

Cattle Industry

- **Before 1865** (Civil War) – Texas had become the main state for cattle due to the success of the hardy breed of Texas Longhorn cattle there. Cowboys took cattle on long cattle drives to move/sell the cattle. This caused problems in 1855 as Missouri farmers formed a vigilante group to stop Texan cattle coming through as it carried a disease from ticks.
- **After 1865 –** increased number of cattle but the price dropped significantly in the south ($5 in the south but $40 in the north) e.g. Charles Goodnight's herd increased from 180 to 5000 due to poor management.
- **Goodnight-Loving trail** was used to take cattle north (avoiding Kansas as they introduced Quarantine Laws to block the Texas Longhorn) in 1866. They sold their cattle in the north for a higher price to supply 2000 Navajo Indians and the US army = Goodnight became rich and grew his ranch to 1 million acres. By 1870, the government was buying 50-60,000 cattle per year to supply Plains Indians on reservations.
- **Cow Towns –** Joseph McCoy established Abilene next to the railroad so that cattlemen could sell their cattle to the east by loading them onto cattle wagons on the new railroad. He bought 100 railway cars and 3 million cattle went through Abilene between 1867 and 1872.
- **John Iliff –** bought land using the Homestead Act for 26,000 cattle in Colorado close to newly discovered gold – this allowed him to directly supply miners rather than driving cattle long distances = large-scale open ranges on the Plains rather than just raising cattle in Texas. He became Denver's first millionaire and others were encouraged to farm cattle on huge open ranges on the Plains.
- **Cattle barons –** overstocked their ranches leading to soil erosion and the price of meat fell.
- **Winter of 1886-7 –** temperatures dropped to -55F meaning cattle could not move through the snow/ice and thousands died. Some cattlemen went bankrupt as prices had previously fallen. The surviving cattle were severely weakened.
- **End of the open range/small ranches –** the bad winter showed that cattle needed to be more carefully managed = homesteaders took up cattle farming as the cattle were safer and stocks/breeding could be controlled. Cowboys' roles were to patrol the fence line (more boring than cattle driving).

Exoduster Movement and Oklahoma Land Rush

Exoduster movement

- After slavery was ended (1865) black people continued to suffer discrimination in the south so moved West to start a new life. e.g. Benjamin Singleton claimed homestead land in Kansas in 1873. By 1879, 40,000 set off for Kansas after a false rumour that land was being given to ex-slaves for free.
- Blacks were generally given the worst land as whites had already taken the best land.
- Yellow fever in the Plains made many black Americans ill.

Oklahoma Land Rush

- The Dawes General Allotment Act forced Plains Indians to sign up for plots of land on the reservations but only half of the land was taken up meaning the rest was sold off. When the land was released for sale, there was a rush of people trying to buy it. There were 7 land rushes from 1889-93, the biggest saw 8 million acres of land opened up to settlers in 1893.

Paper 2: Section A: American West, c.1835-c.1890: Conflict and Conquest, 1862-95 Core Knowledge 3/3

Civil War – consequences

- South lost – poverty in the south and slavery was ended.
- Over 200,000 men had died + 400,000 wounded.
- Migration west slowed during the war.
- Increase in cattle numbers in Texas.
- Increase in crime/issues of lawlessness especially in the south.

Lawlessness

Problems with lawlessness:

- Gambling, drinking and prostitution was common especially in mining towns.
- Claim jumping was common.
- 1858 – Wells Fargo established the first transcontinental coach service to transport money/gold/silver but they were easy targets in the open Plains.
- August 1860, silver was discovered in Aurora = conflict between Plains Indians and prospectors leading to 200 Indian and 30 American deaths (1862-4).
- 1863-4, stagecoaches were held up 7 times coming out of Aurora.
- Gangs were hired to defend mining claims e.g. Daly gang hired by Pond Mining Company.
- Vigilantism – Citizens' Safety Committee organised to defend against the Daly gang, they hanged 4 of them in 1864 following a murder.
- Reno brothers were Civil War deserters who carried out train robberies – stole $13,000 in their first train robbery. They were eventually captured and lynched by a vigilante group.
- James-Younger gang (ex-soldiers) carried out bank and stagecoach robberies between 1866 and 1876.

Responses:

- US Marshals were appointed by the President (later, the Department of Justice) They could appoint deputies.
- 3 federal judges were appointed in each territory/state to ride a circuit around the area and listen to cases.
- Vigilantes e.g. Citizens' Safety Committee.
- County Sheriff was an elected official responsible for law enforcement and tax collection. Some were corrupt e.g. Henry Plummer.
- Militia e.g. the Esmerelda Rangers and the Hooker Light Infantry used to protect from attacks by Indians.

Case Studies on the back of this sheet!

Conflict (= are consequences)

Little Crow's War (1862) – Dakota Sioux in Minnesota

- The Dakota Sioux had agreed to move onto a reservation in 1851 in exchange for $1.4 million plus $80,000 per year in cash and resources. But in 1862, the government payment was late, the Sioux were starving and resorted to eating grass. They had no money to buy food.
- Warrior brotherhoods raided local Indian Agency supply warehouses then burnt them down. They also attacked and killed 600 settlers and US soldiers.

= 400 Sioux were arrested and sentenced to death.
= The tribe was moved to a worse reservation with poorer land called the Cow Creek Reservation. Little Crow was scalped and beheaded by a hunter.

Sand Creek Massacre (1864) – Cheyenne and Arapaho in Colorado

- In 1861, Black Kettle had agreed (Treaty of Fort Wise) to take his tribe onto a reservation but after seeing what happened to Little Crow, they did not trust the US government.
- Young warriors (dog soldiers) refused to move and attacked the prospectors who were crossing their land. The US government tried to reach a new agreement.
- Black Kettle setup a camp at Sand Creek (believing he was protected) but governor John Evans set out to kill them there = Colonel Chivington took 700 cavalrymen to attack Black Kettle's camp at Sand Creek.

= 130 Natives were slaughtered despite surrendering.
= The government moved the tribes onto a reservation ½ the size of that previously promised with no compensation.

Red Cloud's War – Lakokta Sioux, Minnesota (1866-68)

- Sioux were angry due to gold prospectors using the Bozeman trail from 1862-5. A deal was due to be signed to allow the prospectors safe passage but Red Cloud was angered as construction started before the deal was done.
- The government wanted the tribe to move onto reservations but Red Cloud decided to fight. They attacked workers building the army forts along the trail.
- Red Cloud's forces were joined by Sitting Bull and Crazy Horse who assembled 3000 Plains Indians fighting 700 US army soldiers.80 soldiers led by Captain Fetterman were led into an ambush by Plains Indians.
- Red Cloud's warriors also stopped settlers using the Bozeman Trail

= Bozeman Trail was closed and Red Cloud agreed to take his tribe onto a reservation which was promised to Sioux tribes only.
= Sitting Bull and Crazy Horse refused to sign the treaty.

Battle of Little Big Horn (Custer's Last Stand)-Sioux-Crazy Horse and Sitting Bull (1874)

- The Northern Pacific Railroad was coming towards Sioux land so General Custer's men were placed to protect the workers but also looked for gold in the Black Hills.
- The government offered to buy the Black Hills for $6million but the Sioux refused.
- Thousands of Sioux and Cheyenne warriors left reservations to defend the Black Hills

= Grant's Peace Policy ordered them to return to their reservation within 60 days but deep snow trapped the Sioux so they setup camps which the government interpreted as a hostile act.

- Custer led 200 men into Little Big Horn valley where all of his 200 men were slaughtered by the Sioux. = Public opinion changed, PIs were seen as a real threat meaning the government were pressured to deal with them more harshly.

= Sioux placed under military rule and had their weapons confiscated, US army built more forts and Sioux moved away from the Black Hills.

Wounded Knee Massacre (1890) – Sioux – Sitting Bull

- Drought in the summer of 1890 and government cutting food rations led to Indians believing they needed to reject white ways of life and perform a sacred dance to bring all dead Indians back to life and bring about a great flood.
- The army was ordered into reservations to take control – Sitting Bull was killed whilst resisting arrest. His followers met at Wounded Knee Creek and some began the Ghost Dance. The Army became concerned and began arresting people. A soldier began shooting and others joined in = 250 Natives killed in 10 mins. = ended the Ghost Dance movement and no further conflict between Natives and US.

Lawlessness Case Studies

1. Billy the Kid (1859-81) and Lincoln County War (1878)

- Billy the Kid came from a poor background. Participated in the Lincoln County War where individual ranchers fought with a rich land baron (John Chisholm).
- Billy threatened to kill everyone who had been involved in the death of his friend in the LCW.
- Pat Garrett was asked to deal with this – he captured Billy but he escaped. Garrett later found and shot him.

Importance

= Revealed the weakness of the systems of law and order.
= Revealed the influence of rich and powerful over law in the West.
= Billy became a symbol to minority groups who liked the way he stood up to powerful businessmen.

2. Wyatt Earp (1848-1929) and OK Corral (1881)

- Became a Deputy Marshall in 1874 after helping to break up a cowboy fight then a Marshall in Dodge City in 1879.
- 1880 Earp was hired by rich ranching families to bring law and order to the town.
- 1881 he had become lawless – stealing horses and robbing stagecoaches, he and his brothers killed members of the rich family he had previously worked for at the OK Corral.
- 1882 – he shot dead 2 people who he thought had killed his brother but people turned against him and he fled Tombstone.

3. Johnson County War (1892)

- Rich cattle barons fought with homesteaders and independent ranchers over land.
- Smaller ranchers felt hard done to by the cattle barons and began stealing their cattle in revenge. Barons took the law into their own hands.

e.g.

- Albert Bothwell tried to get Jim Averill and Ella Watson off his land. Averill wrote a letter to a newspaper called Bothwell a rich land grabber.
- Watson was accused of stealing cattle.
- Bothwell had Averill and Watson hanged.
- Barons raised money to pay for 22 Texan gunmen to kill cattle rustlers. They were paid $50 for each rustler killed.

But, attitudes turned against the Cattle Barons as people believed they had gone too far.

Lawlessness Case Studies

1. Billy the Kid (1859-81) and Lincoln County War (1878)

- Billy the Kid came from a poor background. Participated in the Lincoln County War where individual ranchers fought with a rich land baron (John Chisholm).
- Billy threatened to kill everyone who had been involved in the death of his friend in the LCW.
- Pat Garrett was asked to deal with this – he captured Billy but he escaped. Garrett later found and shot him.

Importance

= Revealed the weakness of the systems of law and order.
= Revealed the influence of rich and powerful over law in the West.
= Billy became a symbol to minority groups who liked the way he stood up to powerful businessmen.

2. Wyatt Earp (1848-1929) and OK Corral (1881)

- Became a Deputy Marshall in 1874 after helping to break up a cowboy fight then a Marshall in Dodge City in 1879.
- 1880 Earp was hired by rich ranching families to bring law and order to the town.
- 1881 he had become lawless – stealing horses and robbing stagecoaches, he and his brothers killed members of the rich family he had previously worked for at the OK Corral.
- 1882 – he shot dead 2 people who he thought had killed his brother but people turned against him and he fled Tombstone.

3. Johnson County War (1892)

- Rich cattle barons fought with homesteaders and independent ranchers over land.
- Smaller ranchers felt hard done to by the cattle barons and began stealing their cattle in revenge. Barons took the law into their own hands.

e.g.

- Albert Bothwell tried to get Jim Averill and Ella Watson off his land. Averill wrote a letter to a newspaper called Bothwell a rich land grabber.
- Watson was accused of stealing cattle.
- Bothwell had Averill and Watson hanged.
- Barons raised money to pay for 22 Texan gunmen to kill cattle rustlers. They were paid $50 for each rustler killed.

But, attitudes turned against the Cattle Barons as people believed they had gone too far.

Lawlessness Case Studies

1. Billy the Kid (1859-81) and Lincoln County War (1878)

- Billy the Kid came from a poor background. Participated in the Lincoln County War where individual ranchers fought with a rich land baron (John Chisholm).
- Billy threatened to kill everyone who had been involved in the death of his friend in the LCW.
- Pat Garrett was asked to deal with this – he captured Billy but he escaped. Garrett later found and shot him.

Importance

= Revealed the weakness of the systems of law and order.
= Revealed the influence of rich and powerful over law in the West.
= Billy became a symbol to minority groups who liked the way he stood up to powerful businessmen.

2. Wyatt Earp (1848-1929) and OK Corral (1881)

- Became a Deputy Marshall in 1874 after helping to break up a cowboy fight then a Marshall in Dodge City in 1879.
- 1880 Earp was hired by rich ranching families to bring law and order to the town.
- 1881 he had become lawless – stealing horses and robbing stagecoaches, he and his brothers killed members of the rich family he had previously worked for at the OK Corral.
- 1882 – he shot dead 2 people who he thought had killed his brother but people turned against him and he fled Tombstone.

3. Johnson County War (1892)

- Rich cattle barons fought with homesteaders and independent ranchers over land.
- Smaller ranchers felt hard done to by the cattle barons and began stealing their cattle in revenge. Barons took the law into their own hands.

e.g.

- Albert Bothwell tried to get Jim Averill and Ella Watson off his land. Averill wrote a letter to a newspaper called Bothwell a rich land grabber.
- Watson was accused of stealing cattle.
- Bothwell had Averill and Watson hanged.
- Barons raised money to pay for 22 Texan gunmen to kill cattle rustlers. They were paid $50 for each rustler killed.

But, attitudes turned against the Cattle Barons as people believed they had gone too far.

Lawlessness Case Studies

1. Billy the Kid (1859-81) and Lincoln County War (1878)

- Billy the Kid came from a poor background. Participated in the Lincoln County War where individual ranchers fought with a rich land baron (John Chisholm).
- Billy threatened to kill everyone who had been involved in the death of his friend in the LCW.
- Pat Garrett was asked to deal with this – he captured Billy but he escaped. Garrett later found and shot him.

Importance

= Revealed the weakness of the systems of law and order.
= Revealed the influence of rich and powerful over law in the West.
= Billy became a symbol to minority groups who liked the way he stood up to powerful businessmen.

2. Wyatt Earp (1848-1929) and OK Corral (1881)

- Became a Deputy Marshall in 1874 after helping to break up a cowboy fight then a Marshall in Dodge City in 1879.
- 1880 Earp was hired by rich ranching families to bring law and order to the town.
- 1881 he had become lawless – stealing horses and robbing stagecoaches, he and his brothers killed members of the rich family he had previously worked for at the OK Corral.
- 1882 – he shot dead 2 people who he thought had killed his brother but people turned against him and he fled Tombstone.

3. Johnson County War (1892)

- Rich cattle barons fought with homesteaders and independent ranchers over land.
- Smaller ranchers felt hard done to by the cattle barons and began stealing their cattle in revenge. Barons took the law into their own hands.

e.g.

- Albert Bothwell tried to get Jim Averill and Ella Watson off his land. Averill wrote a letter to a newspaper called Bothwell a rich land grabber.
- Watson was accused of stealing cattle.
- Bothwell had Averill and Watson hanged.
- Barons raised money to pay for 22 Texan gunmen to kill cattle rustlers. They were paid $50 for each rustler killed.

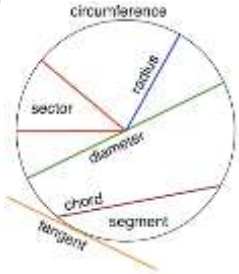
But, attitudes turned against the Cattle Barons as people believed they had gone too far.

Year 10 Term 2 Route 1 (Unit 1)
PERIMETER AND CIRCUMFERENCE

DELTA Ash Hill

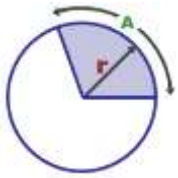
Key Concepts

Parts of a circle



Circumference of a circle is calculated by πd and is the distance around the circle.

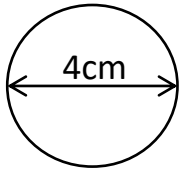
Arc length of a sector is calculated by $\frac{\theta}{360}\pi d$.



Examples

Calculate:

a) **Circumference**



$C = \pi \times 4$

$= 4\pi$

or $= 12.57cm$

b) **Diameter** when the circumference is 20cm

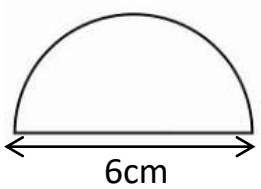
$C = \pi \times d$

$20 = \pi \times d$

$\frac{20}{\pi} = d$

Or $6.37cm$

c) **Perimeter**



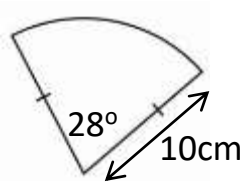
$P = \frac{\pi \times d}{2} + d$

$P = \frac{\pi \times 6}{2} + 6$

$P = 3\pi + 6$

Or = 15.42cm

d) **Arc length**



$\text{Arc} = \frac{\theta}{360} \times \pi \times d$

$\text{Arc} = \frac{28}{360} \times \pi \times 2 \times 10$

$\text{Arc} = \frac{28}{360} \times \pi \times 20$

$\text{Arc} = \frac{14}{9}\pi$

Or = 4.89cm

hegartymaths

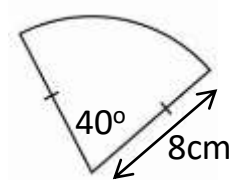
534, 535, 537, 538, 541, 544-545

Key Words

Circle
Perimeter
Circumference
Radius
Diameter
Pi
Arc

Calculate:

1) The circumference of a circle with a diameter of 12cm
2) The diameter of a circle with a circumference of 30cm
3) The perimeter of a semicircle with diameter 15cm
4) The arc length of the diagram



ANSWERS: 1) 12π or 37.7cm 2) $\frac{30}{\pi}$ or 9.54cm 3) 38.56cm 4) $\frac{16}{9}\pi$ or 5.59cm

DELTA Academies Trust

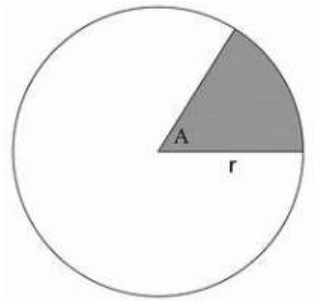
Year 10 Term 2 Route 1 (Unit 1)
AREA OF CIRCLES AND PART CIRCLES

DELTA Ash Hill

Key Concepts

The **area** of a circle is calculated by πr^2

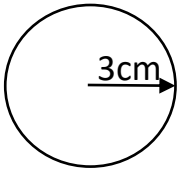
The **area of a sector** is calculated by $\frac{\theta}{360}\pi r^2$



Examples

Calculate:

a) **Area**



$A = \pi \times 3^2$

$= 9\pi$

or $= 28.3cm^2$

b) **Radius** when the area is $20cm^2$

$A = \pi \times r^2$

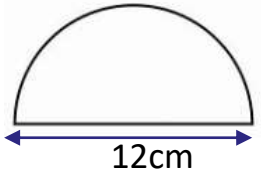
$20 = \pi \times r^2$

$\frac{20}{\pi} = r^2$

$\sqrt{\frac{20}{\pi}} = r$

Or $2.52cm$

c) **Area**



$P = \frac{\pi \times r^2}{2}$

$P = \frac{\pi \times 6^2}{2}$

$P = 18\pi$

Or $= 56.55cm^2$

d) **Area of a sector**

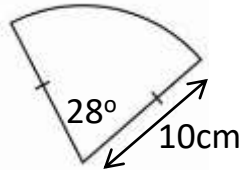
$\text{Arc} = \frac{\theta}{360} \times \pi \times r^2$

$\text{Arc} = \frac{28}{360} \times \pi \times 10^2$

$\text{Arc} = \frac{28}{360} \times \pi \times 100$

$\text{Arc} = \frac{70}{9}\pi$

Or $= 24.43cm$



hegartymaths

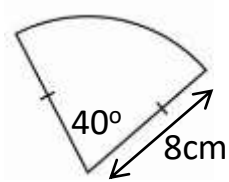
539, 540, 542-543, 546-547

Key Words

Circle
Area
Radius
Diameter
Pi
Sector

Calculate:

1) The area of a circle with a radius of 9cm
2) The radius of a circle with an area of $45cm^2$
3) The area of a semicircle with diameter of 16cm
4) The area of the sector in the diagram



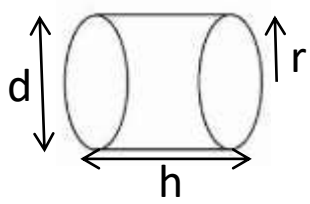
ANSWERS: 1) 81π or $254.47cm^2$ 2) $\sqrt{\frac{45}{\pi}}$ or $3.78cm^2$ 3) 32π or $100.53cm$ 4) $\frac{64}{9}\pi$ or $22.34cm$

DELTA Academies Trust

Year 10 Term 2 Route 1 (Unit 1)
VOLUME AND SURFACE AREAS OF CYLINDERS

Key Concepts

A **cylinder** is a **prism** with the cross section of a circle.

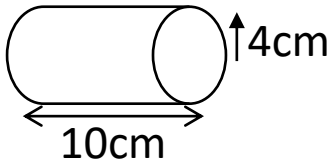


The **volume** of a cylinder is calculated by $\pi r^2 h$ and is the space inside the 3D shape

The **surface area** of a cylinder is calculated by $2\pi r^2 + \pi dh$ and is the total of the areas of all the faces on the shape.

Examples

From the diagram calculate:



a) **Volume**

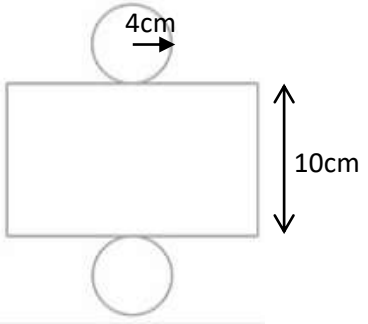
$V = \pi \times r^2 \times h$

$V = \pi \times 4^2 \times 10$

$V = 160\pi$

Or $= 502.65cm^3$

b) **Surface Area –** You can use the net of the shape to help you



$Area\ of\ two\ circles$

$= 2 \times \pi \times r^2$

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

$= 32\pi$

$Area\ of\ rectangle$

$= \pi \times d \times h$

$= \pi \times 8 \times 10$

$= 80\pi$

$Surface\ Area = 32\pi + 80\pi$

$= 112\pi$

or $= 351.86cm^3$

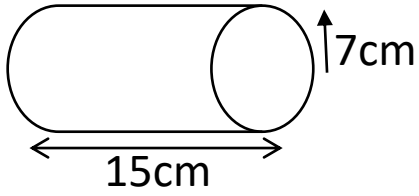
hegartymaths

572, 586

Key Words

Cylinder
Surface Area
Radius
Diameter
Pi
Volume
Prism

Calculate the volume and surface area of this cylinder



ANSWERS: Volume = 735π or $2309.07cm^3$ Surface area = 308π or $967.61cm^3$

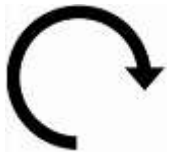
Year 10 Term 2 Route 1 (Unit 2)
REFLECTION AND ROTATION

DELTA Ash Hill

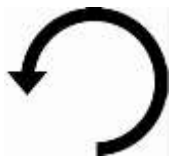
Key Concepts

A **reflection** creates a mirror image of a shape on a coordinate graph. The mirror line is given by an equation eg. $y = 2, x = 2, y = x$. The shape does not change in size.

A **rotation** turns a shape on a coordinate grid from a given point. The shape does not change size but does change orientation.



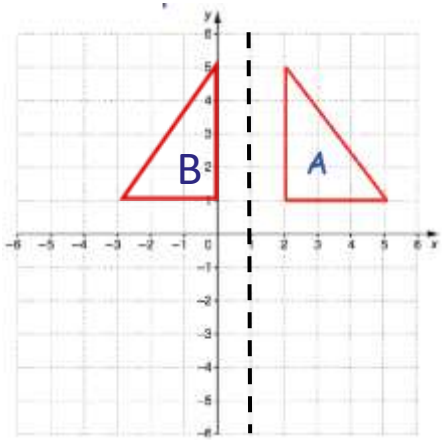
Clockwise



Anticlockwise

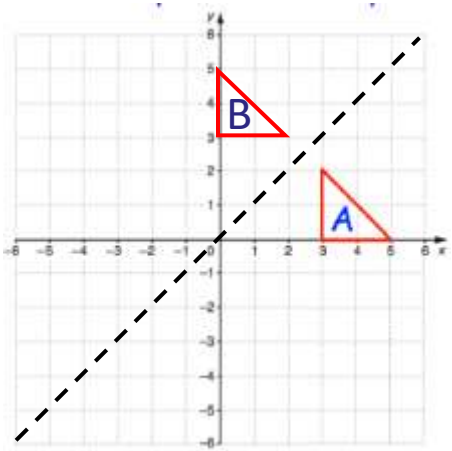
Examples

Reflect shape A in the line $x = 1$. Label it B.



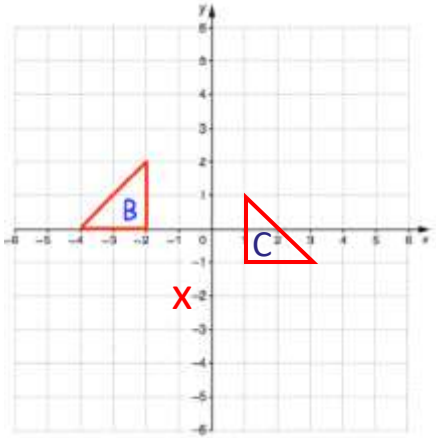
$x = 1$

Reflect shape A in the line $y = x$. Label it B.



$y = x$

Rotate shape B from the point (-1, -2)



hegartymaths

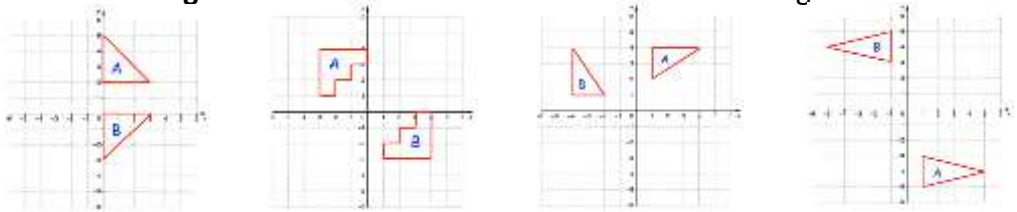
639-641, 652, 653,654,648,649

DELTA Academies Trust

Key Words

Rotate
Clockwise
Anticlockwise
Centre
Degrees
Reflect
Mirror image

Describe the **single** transformation you see on each coordinate grid from A to B:



ANSWERS: a) reflection, $y = 1$ b) reflection $y = x$ c) rotation, centre (0,0), 90° anticlockwise
d) rotation, centre (0,0), 180°

Year 10 Term 2 Route 1 (Unit 2)
TRANSLATION AND ENLARGEMENT

Key Concepts

A **translation** moves a shape on a coordinate grid. Vectors are used to instruct the movement:

$\begin{pmatrix} x \\ y \end{pmatrix}$

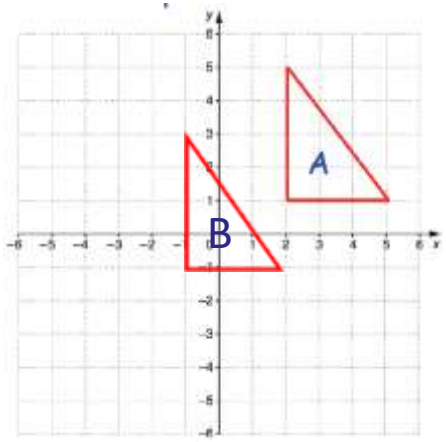
Positive-Right
Negative - Left

Positive-Up
Negative - Down

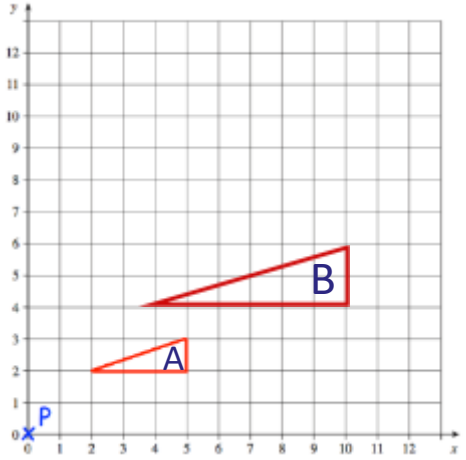
An **enlargement** changes the size of an image using a scale factor from a given point.

Examples

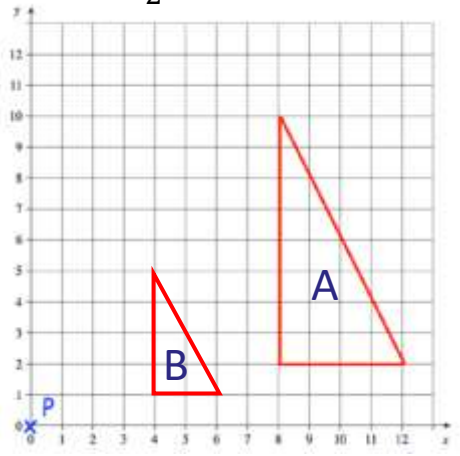
Translate shape A by $\begin{pmatrix} -3 \\ -2 \end{pmatrix}$. Label it B



Enlarge shape A by scale factor 2 from point P.



Enlarge shape A by scale factor $\frac{1}{2}$ from point P.

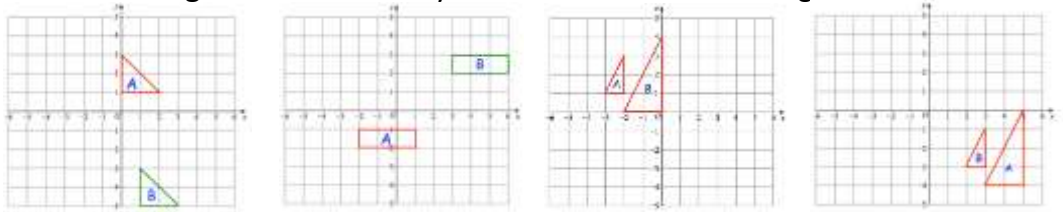


hegartymaths

637,638,650,
642-645, 651

Key Words
Translation
Enlargement
Scale factor
Centre
Positive
Negative

Describe the **single** transformation you see on each coordinate grid from A to B:



ANSWERS: a) translation $\begin{pmatrix} 1 \\ -6 \end{pmatrix}$ b) translation $\begin{pmatrix} 5 \\ 4 \end{pmatrix}$ c) enlarge, centre (-4,2) scale factor 2
d) enlarge, centre (1,-2) scale factor $\frac{1}{2}$

Year 10 Term 2 Route 1 (Unit 3)
DISTANCE-TIME GRAPHS

DELTA Ash Hill

Key Concepts

A **distance-time** graph plots time against the distance away from a starting point.

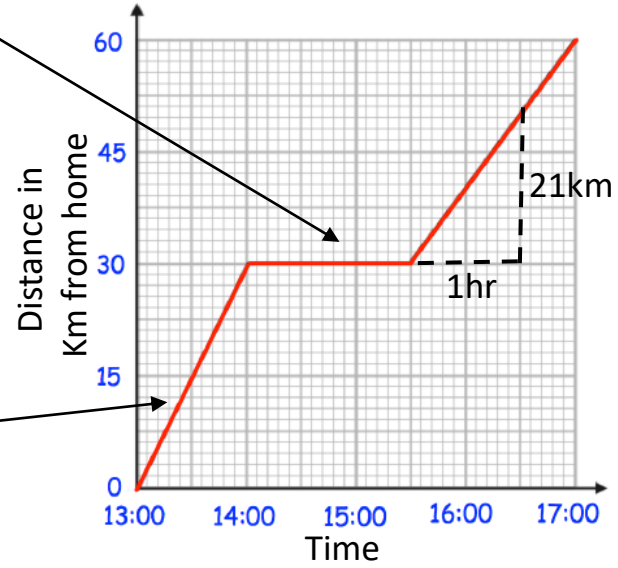
Speed can be calculated from these graphs by finding the gradient of the graph.

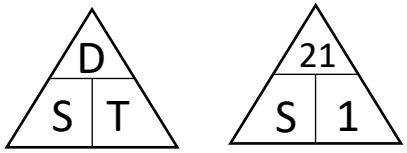
Horizontal lines are sections where the object is stationary.

Examples

Horizontal sections are where the object is stationary

Diagonal lines show the object moving away from home or moving closer to home





$$Speed = \frac{distance}{time}$$

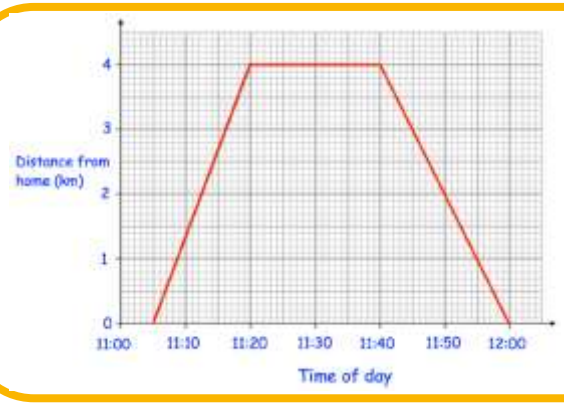
$$Speed = \frac{21}{1}$$

$$Speed = 21km/h$$

hegartymaths

Key Words

Distance
Time
Speed
Gradient
Stationary



A distance-time graph shows the journey of someone from home to the shop and back again.

1) How long were they at the shop for?
2) How far away from home is the shop?
3) How far did they travel in total?
4) What speed did they travel on the way to the shop in km/h?

ANSWERS: 1) 20 minutes 2) 4km 3) 8km 4) 16km/h

DELTA Academies Trust

Year 10 Term 2 Route 1 (Unit 3)

STRAIGHT LINE GRAPHS AND EQUATION OF A LINE

Key Concepts

Coordinates in 2D are written as follows:

x is the value that is to the left/right

(x, y)

y is the value that is to up/down

Straight line graphs always have the equation:

$$y = mx + c$$

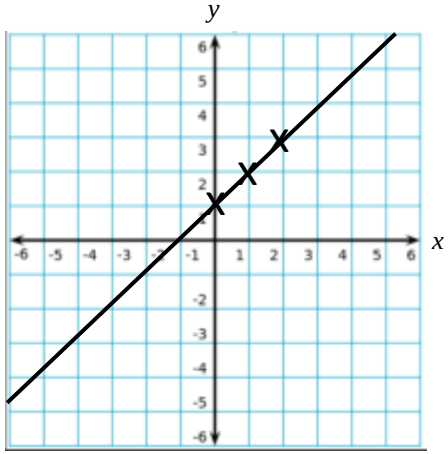
m is the **gradient** i.e. the steepness of the graph.

c is the **y intercept** i.e. where the graph cuts the y axis.

Parallel lines always have the same **gradient**.

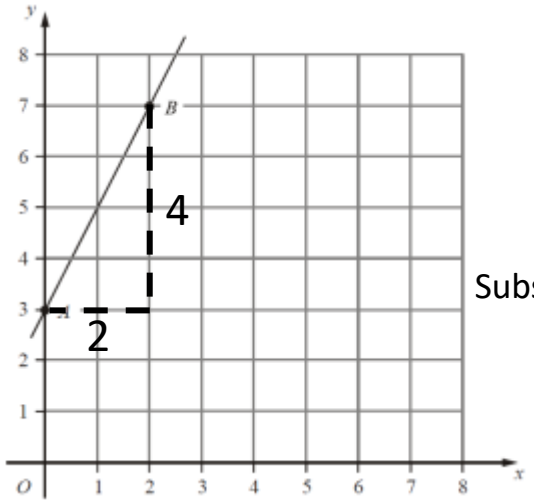
Plot the graph of $y = 2x + 1$

x	0	1	2
y	1	2	3



Examples of lines parallel to this graph are: $y = 2x - 3$ or $y = 2x + 7$

Examples



Calculate the equation of this line:

$$y = mx + c$$

$$m = \frac{4}{2}$$

$$= 2$$

$$y = 2x + c$$

Substitute in a coordinate: (2,7)

$$7 = (2 \times 2) + c$$

$$3 = c$$

$$y = 2x + 3$$

hegartymaths

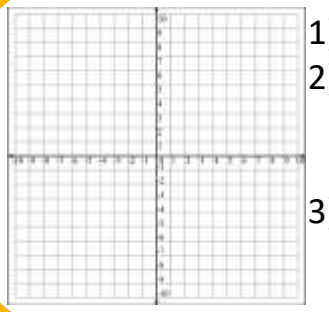
199,200,205,207-211,214

Key Words

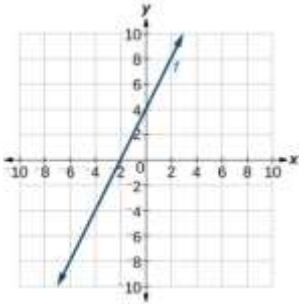
Coordinate

Gradient

Parallel



1) Plot the line $y = 3x - 2$
2) Find the equation of the line for the attached graph.
3) State the equation of a line that would be parallel to this line.



ANSWERS: 2) $y = 2x + 4$ 3) Any line that has a gradient of 2

DELTA Academies Trust

Year 10 Term 2 Route 2 (Unit 1)
REFLECTION, ROTATION AND TRANSLATION

Key Concepts

A **reflection** creates a mirror image of a shape on a coordinate graph. The mirror line is given by an equation eg. $y = 2, x = 2, y = x$. The shape does not change in size.

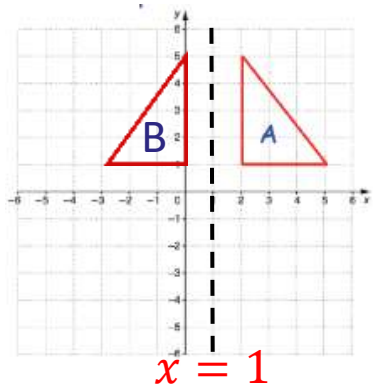
A **rotation** turns a shape on a coordinate grid from a given point. The shape does not change size but does change orientation.

A **translation** moves a shape on a coordinate grid. Vectors are used to instruct the movement:

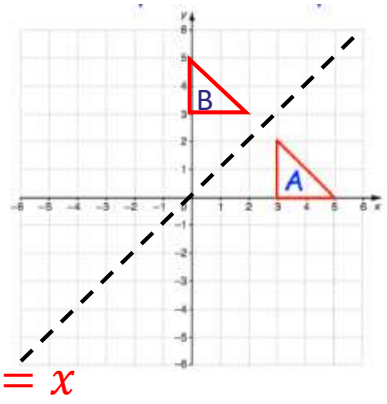
$\begin{pmatrix} x \\ y \end{pmatrix}$ → Positive-Right, Negative - Left; ↓ Positive-Up, Negative - Down

Examples

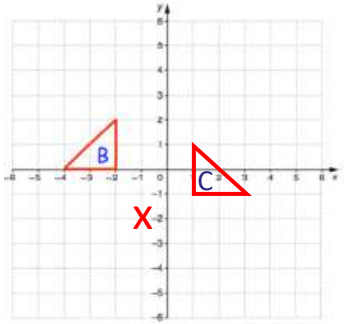
Reflect shape A in the line $x = 1$. Label it B.



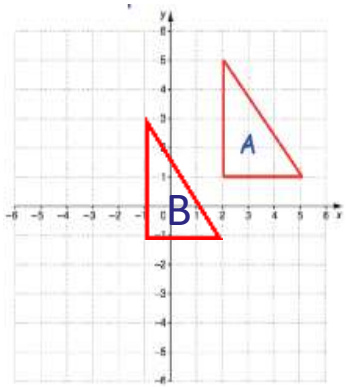
Reflect shape A in the line $y = x$. Label it B.



Rotate shape B from the point (-1, -2)



Translate shape A by $\begin{pmatrix} -3 \\ -2 \end{pmatrix}$. Label it B



hegartymaths

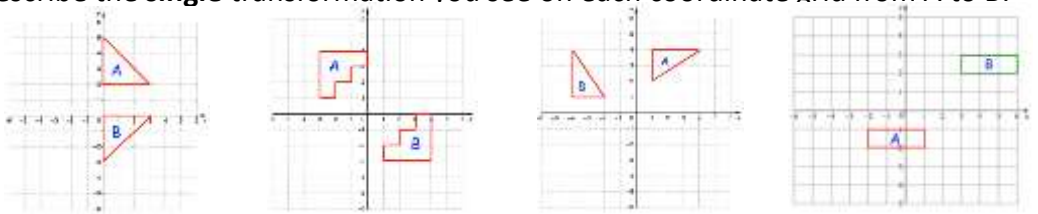
637-641, 652, 653,654,648-650

DELTA Academies Trust

Key Words

Rotate
Clockwise
Anticlockwise
Centre
Degrees
Reflect
Mirror image
Translate
Vector

Describe the **single** transformation you see on each coordinate grid from A to B:



ANSWERS: a) reflection, $y = 1$ b) reflection $y = x$ c) rotation, centre (0,0), 90° anticlockwise d) translation $\begin{pmatrix} 5 \\ 4 \end{pmatrix}$

Year 10 Term 2 Route 2 (Unit 1)
ENLARGEMENT

DELTA Ash Hill

Key Concepts

An **enlargement** changes the size of an image using a scale factor from a given point.

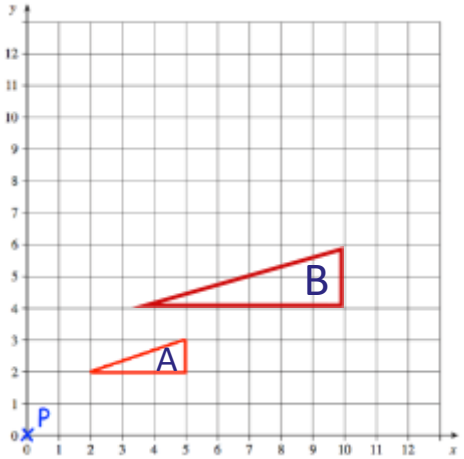
A **positive scale factor** will increase the size of an image.

A **fractional scale factor** will reduce the size of an image.

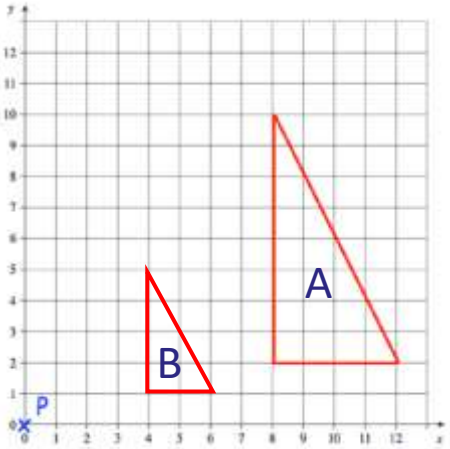
A **negative scale factor** will place the image on the opposite side of the centre of enlargement, with the image inverted.

Examples

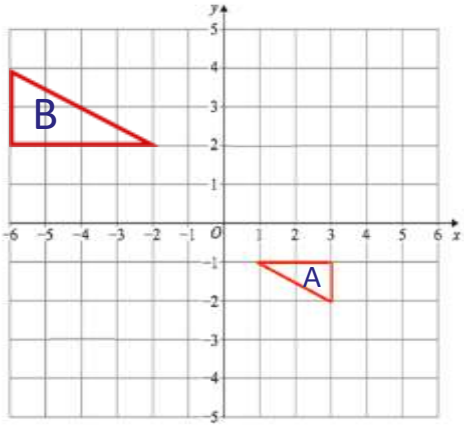
Enlarge shape A by scale factor 2 from point P.



Enlarge by scale factor $\frac{1}{2}$ from point P.



Enlarge by scale factor -2 from (0,0).



hegartymaths

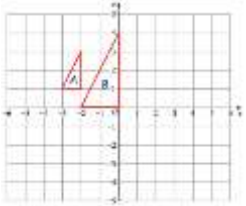
637,638,650, 642-645, 651

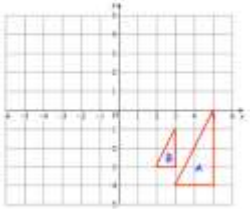
DELTA Academies Trust

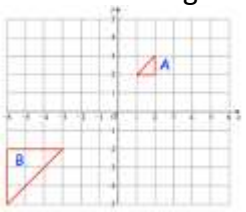
Key Words

Enlargement
Scale factor
Centre
Positive
Negative

Describe the **single** transformation you see on each coordinate grid from A to B:







ANSWERS: a) enlarge, centre (-4,2) scale factor 2 b) enlarge, centre (1,-2) scale factor $\frac{1}{2}$
c) enlarge, centre (0,1) scale factor -3

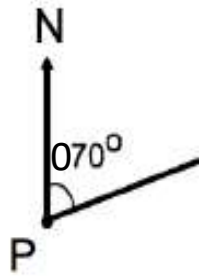
Year 10 Term 2 Route 2 (Unit 1)
SCALES AND BEARINGS

DELTA Ash Hill

Key Concepts

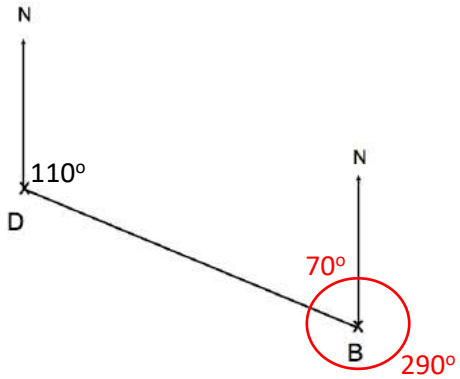
Scales are used to reduce real world dimensions to a useable size.

A **bearing** is an angle, measured **clockwise** from the **north** direction. It is given as a **3 digit** number.



Examples

The diagram shows the position of a boat B and dock D.



The scale of the diagram is 1cm to 5km.

a) Calculate the real distance between the boat and the dock.

$6cm = 6 \times 5$

$= 30km$

b) State the bearing of the boat from the dock.

110^o

c) Calculate the bearing of the dock from the dock.

$180^o - 110^o = 70^o$ because the angles are cointerior

$360^o - 70^o = 290^o$ because angles around a point equal 360°

hegartymaths

674-679,492-495

Key Words

Scale
Bearing
Clockwise
North

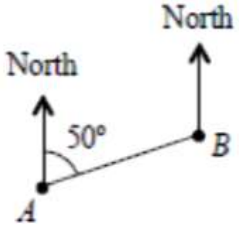
Links

Geography

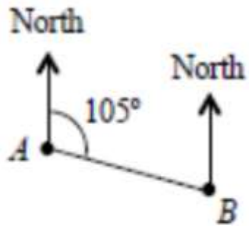
Find the bearing of A from B

(Diagrams not drawn to scale):

a)



b)



ANSWERS: (a) 230° (b) 285°

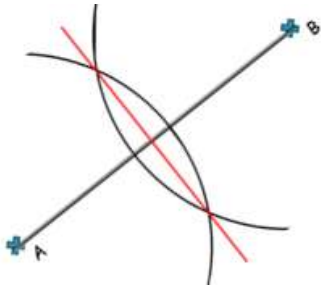
DELTA Academies Trust

Year 10 Term 2 Route 2 (Unit 1)
CONSTRUCTIONS AND LOCI

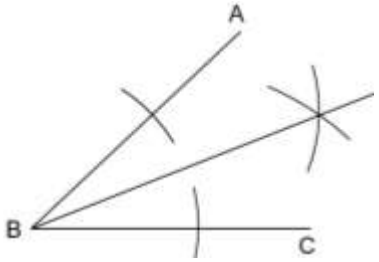
DELTA Ash Hill

Key Concepts

Line bisector



Angle bisector

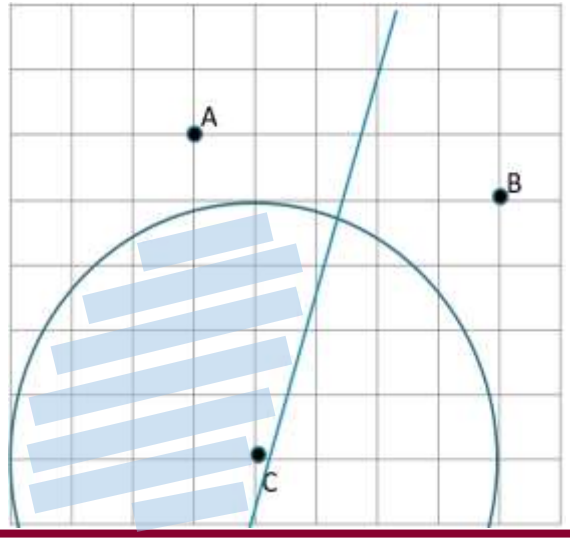


hegartymaths

683,660-665,
674-679

DELTA Academies Trust

Examples



Shade the region that is:

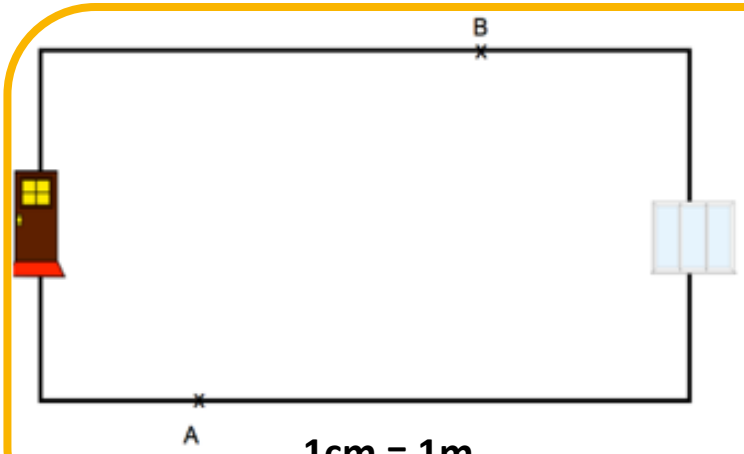
- closer to A than B
- less than 4 cm from C

Line bisector of A and B

Circle with radius 4cm

Key Words

Bisect
Radius
Region
Shade



1cm = 1m

There are two burglar alarm sensors, one at A and one at B.

The range of each sensor is 4m.

The alarm is switched on.

Is it possible to walk from the front door to the patio door without setting off the alarm?

Year 10 Term 2 Route 2 (Unit 2)
TWO WAY TABLES AND STEM AND LEAF

Key Concepts

A **two way table** is used to represent categorised data.

A **stem and leaf diagram** orders large data sets. It can be used to calculate the median.

stem	leaf
7	0
6	1 2 3 4 5 6 9
5	7 9

Median = 63.5

Examples

This **two way table** gives information on how 100 students travelled to school.

	Walk	Car	Other	Total
Boy	15	25	14	54
Girl	22	8	16	46
Total	37	33	30	100

Always double check that your rows and columns add up to the total value.

Stem and leaf diagrams

Phone Battery Comparison

"Brand A" "Brand B"

LEAF	STEM	LEAF
8 8 7 5	0	7
9 7 4 1 0	1	0 5 5 5 7 9
2 2 2 1	2	0 2 2 6 7
8 6 4 2 0	3	0 2 4 6 8
	4	
	5	6
1	6	
	7	5

Key : 6 | 1 = 61 hours

Must be ordered from smallest to largest

A key must be included

hegartymaths

422-424,430-433

Key Words

Two way table
Stem and Leaf
Median
Compare

Complete a two way table using this information:
Felicity asked 100 students how they came to school one day. Each student walked or came by bicycle or came by car.
49 of the 100 students are girls.
10 of the girls came by car.
16 boys walked.
21 of the 41 students who came by bicycle are boys.
Work out the total number of students who walked to school.

Year 10 Term 2 Route 2 (Unit 2)
AVERAGES FROM A TABLE

Key Concepts

Modal group (mode)
Group with the highest frequency

Median group
Find the cumulative frequency of the frequency. The median lies in the group which holds the $\frac{Total\ frequency+1}{2}$ number

Estimate the mean
From grouped data the mean can only be an estimate as we do not know where the data lies in each group.

$$\frac{Total\ fx}{Total\ f}$$

Examples

	Frequency (f)	Midpoint (x)	fx
$0 < x \leq 10$	10	5	50
$10 < x \leq 20$	15	15	225
$20 < x \leq 30$	23	25	575
$30 < x \leq 40$	7	35	245
Total	55		1095

a) Identify the modal group from this data set.

$20 < x \leq 30$

b) Identify the group in which the median would lie.

$$\frac{Total\ frequency + 1}{2} = \frac{56}{2} = 28th$$

Using the cumulative frequency of the groups the 28th lies in the groups $20 < x \leq 30$

c) Estimate the mean of this data:

$$\frac{Total\ fx}{Total\ f} = \frac{1095}{55} = 19.9$$

hegartymaths

414-418

Key Words
Midpoint
Mean
Median
Modal

Cost	Frequency	Midpoint	
$0 < c \leq 4$	2		
$4 < c \leq 8$	3		
$8 < c \leq 12$	5		
$12 < c \leq 16$	12		
$16 < c \leq 20$	3		

From the data:
a) Identify the modal group
b) Identify the group which holds the median
c) Estimate the mean

ANSWERS: a) $12 < c \leq 16$ b) 13th value is in the group $12 < c \leq 16$ c) $\frac{294}{25} = 11.76$

Year 10 Term 2 Route 2 (Unit 2)
STATISTICAL DIAGRAMS

DELTA Ash Hill

Key Concepts

A **frequency polygon** is a line graph which connects the midpoints of grouped data.

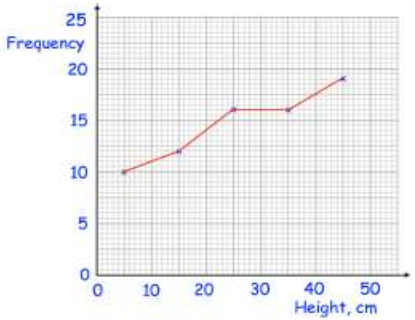
A **pie chart** represents data into proportional sections.

A **scatter-graph** shows the relationship between two variables. **Correlation** is used to describe the relationships.

Positive Correlation **Negative Correlation** **No Correlation**

Plot at the midpoint

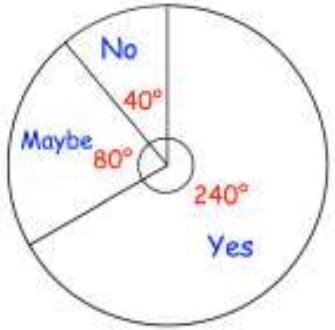
Length, cm	Frequency
$0 < x \leq 10$	10
$10 < x \leq 20$	12
$20 < x \leq 30$	16
$30 < x \leq 40$	16
$40 < x \leq 50$	19

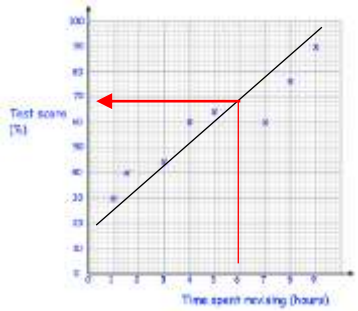


Examples

Answer	Frequency	Angle
Yes	60	240
No	10	40
Maybe	20	80
Total	90	360

× 4





a) What type of correlation is shown?
Positive correlation

b) Another student spent 6 hours revising for the test. Find an estimate of their test score.
Draw a line of best fit and read from it - 68%

c) Explain why it might not be sensible to use the scatter graph to estimate the score for a student that spent 15 hours revising.
It is out of the data range.

hegartymaths

441,427-429, 453-454

DELTA Academies Trust

Key Words

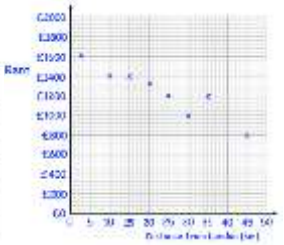
Midpoint
Frequency polygon
Pie chart
Degrees
Scatter graph
Correlation
Line of best fit

1) Draw a frequency polygon using this data.

Marks	Frequency
$0 < m \leq 10$	8
$10 < m \leq 20$	11
$20 < m \leq 30$	23
$30 < m \leq 40$	19
$40 < m \leq 50$	15

2) Draw a pie chart using this data.

Make	Frequency
Ford	8
Mazda	14
Volkswagen	21
Fiat	20
Honda	9



3a) What type of correlation is shown?

b) The distance from London of a house is 22km. What is an estimate of the rent it will cost?

ANSWERS: 2) Angles – 40, 70, 105, 100, 45 3a) Negative correlation b) Between £1200 and £1300

Year 10 Term 2 Route 2 (Unit 3)
CUMULATIVE FREQUENCY AND BOX PLOTS

DELTA Ash Hill

Key Concepts

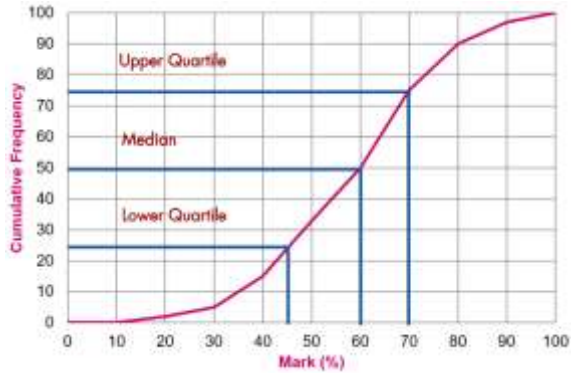
A **cumulative frequency** graph shows a running total of frequency.

We can read the **median** and the **interquartile range** from this graph.

A **box plot** shows the distribution of data using **minimum**, **maximum**, **median** and **quartiles**.

Mark	Freq	CF
$0 < x \leq 10$	0	0
$10 < x \leq 20$	4	4
$20 < x \leq 30$	1	5
$30 < x \leq 40$	10	15
$40 < x \leq 50$	17	32
$50 < x \leq 60$	18	50
$60 < x \leq 70$	24	74
$70 < x \leq 80$	16	90
$80 < x \leq 90$	6	96
$90 < x \leq 100$	4	100

Plot at the upper bound



Median and quartiles are found from the *y* axis:

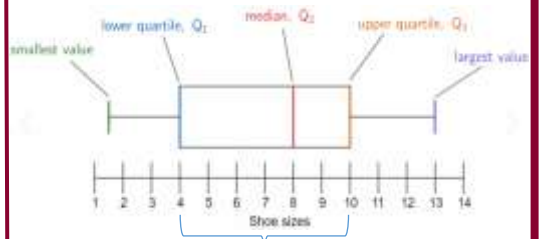
Lower quartile = 25% of the way through the data
= 45

Median = 50% of the way through the data
= 60

Upper quartile = 75% of the way through the data
= 70

Interquartile range = UQ – LQ
= 70 – 45
= 25

Examples

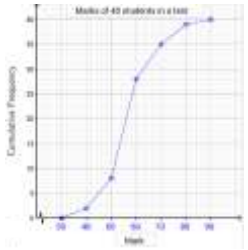


hegartymaths

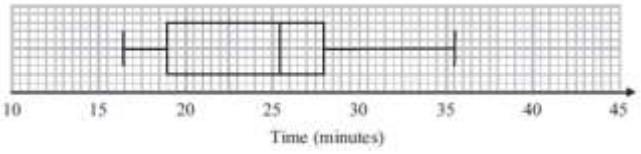
434-440

Key Words
Cumulative frequency
Box plot
Range
Interquartile range
Median
Quartiles
Minimum/maximum values

1) Read from the cumulative frequency graph to find the median and the interquartile range.



2) Read from the box plot the median, range and interquartile range.



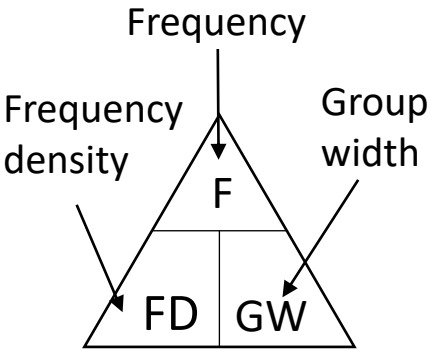
ANSWERS: 1) Median = 56, Interquartile range = 64 – 52 = 12 2) Median = 26, Range = 35.5 – 16.5 = 19, Interquartile range = 28 – 19 = 9

DELTA Academies Trust

Year 10 Term 2 Route 2 (Unit 3) HISTOGRAMS

Key Concepts

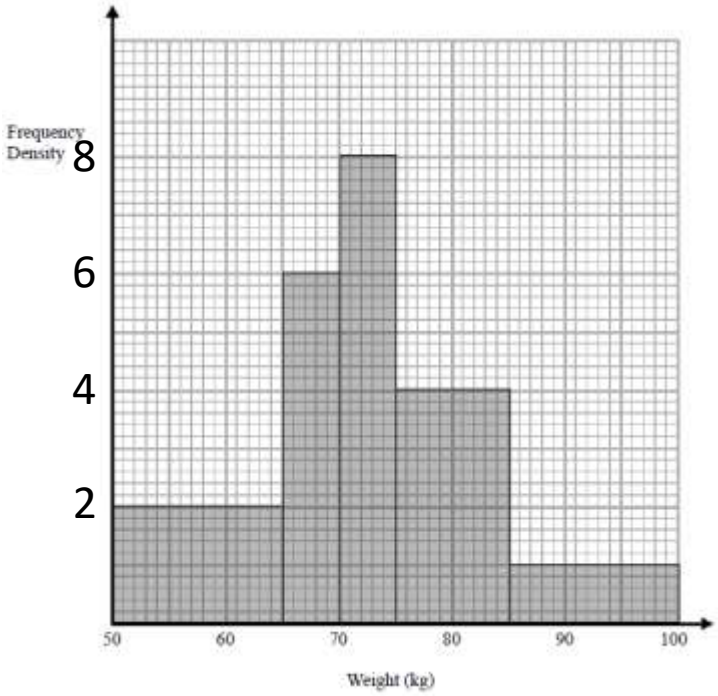
A **Histogram** is a graphical representation of data consisting of rectangles whose **area is proportional to the frequency** of a variable and whose **width is equal to the group width**.



A group of people are weighed and their results recorded. Below is their data. A histogram is used to represent this data.

Weight	Frequency	Frequency density
50 < w ≤ 65	30	30 ÷ 15 = 2
65 < w ≤ 70	30	30 ÷ 5 = 6
70 < w ≤ 75	40	40 ÷ 5 = 8
75 < w ≤ 85	40	40 ÷ 10 = 4
85 < w ≤ 100	15	15 ÷ 15 = 1

Example



hegartymaths

443-449

Key Words

Histogram
Frequency density
Group width
Median

Speed (mph)	Frequency
50 < s ≤ 55	6
55 < s ≤ 60	10
60 < s ≤ 65	46
65 < s ≤ 75	48
75 < s ≤ 90	6

Calculate the frequency density for this table of information.

On a separate set of axes, draw your histogram.

ANSWERS: Frequency densities = 0.4, 2, 9.2, 4.8, 0.4

Year 10 Term 2 Route 2 (Unit 4)
VENN DIAGRAMS

Key Concepts

Venn diagrams show all possible relationships between different sets of data.

Probabilities can be derived from Venn diagrams. Specific notation is used for this:

P(A ∩ B) = Probability of A **and** B

P(A ∪ B) = Probability of A **or** B

P(A') = Probability of **not** A

hegartymaths

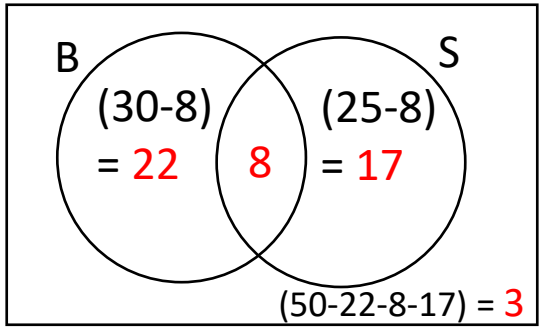
372-388, 391

Key Words
Venn diagram
Union
Intersection
Probability
Outcomes

Example

Out of 50 people surveyed:

30 have a brother
25 have a sister
8 have both a brother and sister



a) Complete the Venn diagram

b) Calculate:

i) P(A ∩ B) $= \frac{8}{50}$

ii) P(A ∪ B) $= \frac{47}{50}$

iii) P(B') $= \frac{20}{50}$

iv) The probability that a person with a sister, does not have a brother.

$= \frac{8}{25}$

40 students were surveyed:

20 have visited France
15 have visited Spain
10 have visited both France and Spain

a) Complete a Venn diagram to represent this information.

b) Calculate:

i) P(F ∩ S) ii) P(F ∪ S) iii) P(S')

iv) The probability someone who has visited France, has not gone to Spain.

ANSWERS: b) i) 10/40 ii) 25/40 iii) 25/40 iv) 20/40 = 1/2

Year 10 Term 2 Route 2 (Unit 4)

TWO WAY TABLES AND PROBABILITY TABLES

Key Concepts

Two way tables are used to tabulate a number of pieces of information.

Probabilities can be formulated easily from two way tables.

Probabilities can be written as a **fraction, decimal or a percentage** however we often work with fractions. You do not need to simplify your fractions in probabilities.

Estimating the number of times an event will occur

Probability × no. of trials

Examples

There are only red counters, blue counters, white counters and black counters in a bag.

Colour	Red	Blue	Black	White
No. of counters	9	$3x$	x-5	$2x$

A counter is chosen at random, the probability it is red is $\frac{9}{100}$. Work out the probability is black.

$$9 + 3x + x - 5 + 2x = 100$$
$$6x + 4 = 100$$
$$x = 16$$

Number of black counters = 16 – 5
= 11

Probability of choosing black = $\frac{11}{100}$

80 children went on a school trip. They went to London or to York.
23 boys and 19 girls went to London. 14 boys went to York.

	London	**York**	**Total**
Girls	19	**24**	**43**
Boys	23	14	**37**
Total	**42**	**38**	80

What is the probability that a person is chosen that went to London? $\frac{42}{80}$

If a girl is chosen, what is the probability that she went to York? $\frac{24}{38}$

hegartymaths

353, 422-424

Key Words

Two way table
Probability
Fraction
Outcomes
Frequency

	1	**2**	**3**
Prob	0.37	$2x$	x

1a) Calculate the probability of choosing a 2 or a 3.
b) Estimate the number of times a 2 will be chosen if the experiment is repeated 300 times.

2a) Complete the two way table:

	Year Group			Total
	9	10	11	
Boys			125	407
Girls		123		
Total	303	256		831

b) What is the probability that a Y10 is chosen, given that they are a girl .

ANSWERS: 1) a) P(2) = 0.42 P(3) = 0.21 b) 0.42×300=126 2b) 123/424

Year 10 Term 2 Route 2 (Unit 4)
PROBABILITY TREE DIAGRAMS

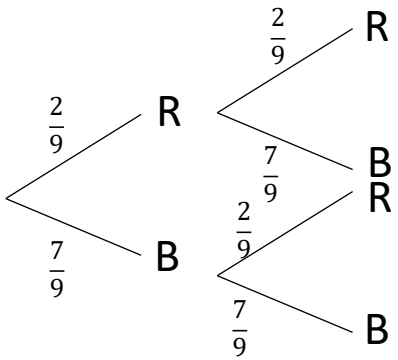
Key Concepts

Independent events are events which do not affect one another.

Dependent events affect one another's probabilities. This is also known as **conditional probability**.

Examples

There are red and blue counters in a bag.
The probability that a red counter is chosen is $\frac{2}{9}$.
A counter is chosen and **replaced**, then a second counter is chosen.
Draw a tree diagram and calculate the probability that two counters of the same colour are chosen.

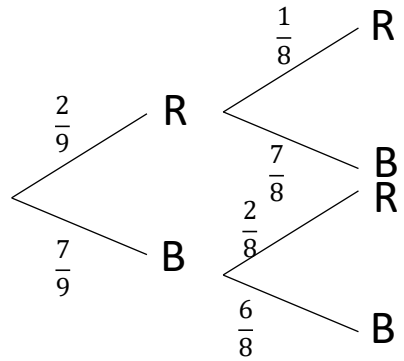


Prob of two reds:
$\frac{2}{9} \times \frac{2}{9} = \frac{4}{81}$

Prob of two blues :
$\frac{7}{9} \times \frac{7}{9} = \frac{49}{81}$

Prob of same colours:
$\frac{4}{81} + \frac{49}{81} = \frac{53}{81}$

There are red and blue counters in a bag.
The probability that a red counter is chosen is $\frac{2}{9}$.
A counter is chosen and **not replaced**, then a second counter is chosen.
Draw a tree diagram and calculate the probability that two counters of the same colour are chosen.



Prob of two reds:
$\frac{2}{9} \times \frac{1}{8} = \frac{2}{72}$

Prob of two blues :
$\frac{7}{9} \times \frac{6}{8} = \frac{42}{72}$

Prob of same colours:
$\frac{2}{72} + \frac{42}{72} = \frac{44}{72}$

hegartymaths

361-362, 364-367, 389-390

Key Words
Independent
Dependant
Conditional
Probability
Fraction

1) There are blue and green pens in a drawer.
There are 4 blues and 7 greens.
A pen is chosen and then **replaced**, then a second pen is chosen.
Draw a tree diagram to show this information and calculate the probability that pens of different colours are chosen.

2) There are blue and green pens in a drawer.
There are 4 blues and 7 greens.
A pen is chosen and **not replaced**, then a second pen is chosen.
Draw a tree diagram to show this information and calculate the probability that pens of different colours are chosen.

ANSWERS: 1) 56/121 2) 56/110

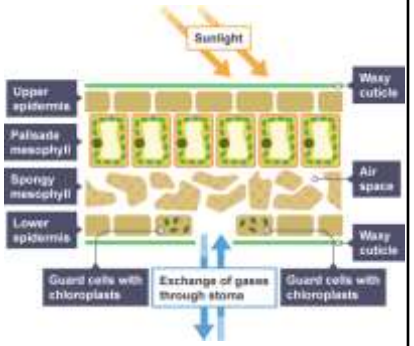
AQA BIOLOGY UNIT 4: BIOENERGETICS

Photosynthesis

Carbon Dioxide + Water → Glucose + Oxygen

$$6CO_2 + 6H_2O \rightarrow C_6H_{12}O_6 + 6O_2$$

- Gases diffuse through stomata
- Palisade cells have lots of chloroplasts
- Xylem brings water
- Spongy to allow gases to move through leaf.

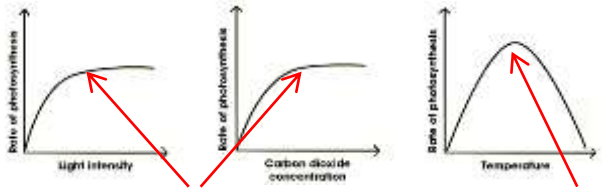


Uses of glucose:

- Respiration – energy – growth
- Starch – storage
- Protein – glucose + nutrients from the soil
- Fats – stored in seeds
- Cellulose – cell walls

Limiting factors

- Light
- Carbon dioxide concentration
- Temperature



Something else limits the rate (temperature, CO_2, amount of chlorophyll)

Controlled by **enzymes** that are too slow when cold and **denature** when too hot

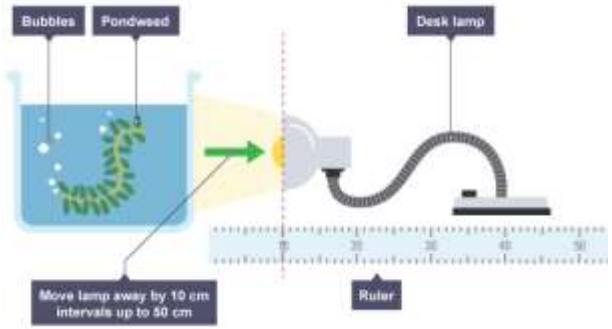
Greenhouses

\+ Control the conditions (heat, CO_2, water, light, pests, weeds)
\+ Grow plants all year round
\+ Grow plants not native to certain countries
\+ Increased crop yields

\- Costs to maintain conditions
\- Conditions need to be monitored

Hydroponics: Plants grown in mineral solution rather than water – control nutrients, no fungal infections from soil.

REQUIRED PRACTICAL: Photosynthesis



In the experiment above:

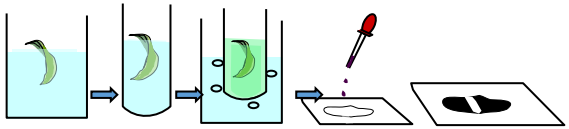
1. Pondweed is in water with sodium carbonate solution (to provide CO_2 for photosynthesis)
2. Move light bulb different distances and count the bubbles of oxygen that are produced per minute.

The closer the light, the more oxygen is made because the rate of photosynthesis increases.

Starch Testing a Variegated Leaf

We test for the presence of **starch** in leaves in order to determine that photosynthesis has occurred. Glucose is rapidly converted into starch for **storage** in the chloroplast and cytoplasm.

De-starching is the process by which the starch reserves in a plant are depleted by depriving the plant of either light or carbon dioxide. We need to **remove all traces of starch** in leaves so that we can provide evidence that photosynthesis takes place during the experiment.

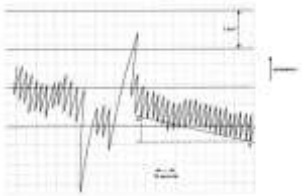


- Boiling ethanol breaks down cellulose and removes chlorophyll.
- Iodine solution turns blue/black where starch is present i.e. where photosynthesis has taken place.

Measuring HR and BR

HR – heart rate monitor
BR – spirometer

Tidal volume – normal volume breathed in and out.



Respiration – energy RELEASE not made (exothermic)

Aerobic: Glucose + Oxygen → Carbon Dioxide + Water

$$C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$$

- Occurs in mitochondria
- Needs oxygen
- Releases a lot of energy (ATP)

Anaerobic: Glucose → Lactic acid

$$C_6H_{12}O_6 \rightarrow 2C_3H_6O_3$$

- Occurs in mitochondria
- No oxygen
- Leads to **oxygen debt** (which is why you breathe heavily after sport to pay it back)
- Very little energy is released.

Some microorganisms (e.g. yeast) respire anaerobically producing ethanol and CO_2. This is called **fermentation** and is used to make bread and alcohol.

Exercise effect on HR and BR

Heart Rate increases – more oxygen to muscle
- more glucose to muscle
- more CO_2 and water to lungs

Breathing Rate increases – more oxygen into blood
- more CO_2 and water out of the blood

Stored glycogen in muscle turned into glucose.

Metabolic Rate: The speed of chemical reactions in the body.

- Older = slower
- Female = slower
- High fat to muscle ratio = slower
- Could be inherited

Metabolic reactions:

- Respiration – catabolic (big → smaller molecules)
- Photosynthesis – anabolic (small → bigger molecules)
- Break down of proteins to urea in **liver** – catabolic
- Enzymes breaking down food – catabolic
- Combining glucose with nitrate ions to form amino acids and then protein – anabolic

Anabolic reactions require **energy** from cellular respiration.

Carbohydrates	Energy
Protein	Cell repair, growth and replacement
Fat	Energy and insulation
Fibre	Digestion
Minerals	Calcium – Bones, Iron – Blood
Vitamins	Immune system

Year 10 SCIENCE Knowledge Organiser

DELTA Ash Hill

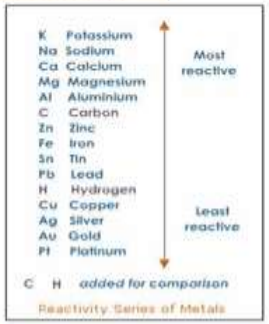
AQA Science: Chemical changes

Extraction of Metals + Metal Oxides

Metals react with oxygen to form metal oxides

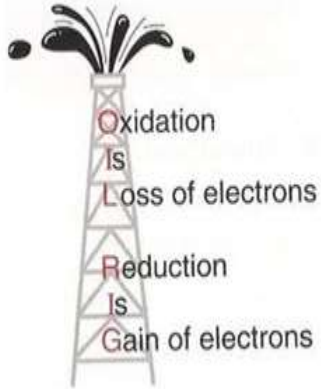
Chromium + Oxygen → Chromium oxide
Iron + Oxygen → Iron oxide
Copper + Oxygen → Copper oxide

Many metals are found in the ground as metal compounds. The metal needs to be extracted. For metals that are below carbon in the reactivity series this can be done by heating the metal compound with carbon The carbon removes the oxygen from the metal oxide.



1. Copper oxide + Carbon → Carbon dioxide + Copper
2. Lead oxide + Carbon → Carbon dioxide + Lead
3. Iron oxide + Carbon → Carbon dioxide + Iron

Oxidation and Reduction



Oxidation is the gain of oxygen and the loss of electrons, reduction is the loss of oxygen and gain of electrons.

A chemical reaction where both oxidation and reduction occur is called a redox reaction.

The equation below shows a word equation, a balanced symbol equation, ionic and half equations which show the movement of electrons.

Zinc + copper sulphate → zinc sulphate + copper
$Zn + CuSO_4 \rightarrow ZnSO_4 + Cu$
Zn - oxidised Cu^{2+} - reduced
$Zn + Cu^{2+} \rightarrow Zn^{2+} + Cu$
$Zn - 2e^- \rightarrow Zn^{2+}$ or $Zn \rightarrow Zn^{2+} + 2e^-$
$Cu^{2+} + 2e^- \rightarrow Cu$

Metals + Acids and Metal Carbonates + Acid

Metal + Acid → Metal salt + Hydrogen

Calcium + Hydrochloric acid → Calcium chloride + Hydrogen
$Ca + 2HCl \rightarrow CaCl_2 + H_2$

Zinc + Hydrochloric acid → Zinc chloride + Hydrogen
$Zn + 2HCl \rightarrow ZnCl_2 + H_2$

Metal Carbonate + Acid → Metal salt + Carbon Dioxide + Water

Calcium Carbonate + Hydrochloric acid → Calcium chloride + Carbon Dioxide + Water
$CaCO_3 + 2HCl \rightarrow CaCl_2 + CO_2 + H_2O$

Potassium Carbonate + Nitric acid → Potassium nitrate + Carbon Dioxide + Water
$K_2CO_3 + 2HNO_3 \rightarrow 2KNO_3 + CO_2 + H_2O$

Acid + Alkali → Metal salt + Water

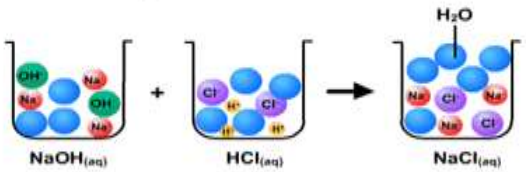
Hydrochloric acid + Sodium hydroxide → Sodium chloride + Water
$2HCl + NaOH \rightarrow NaCl_2 + H_2O$

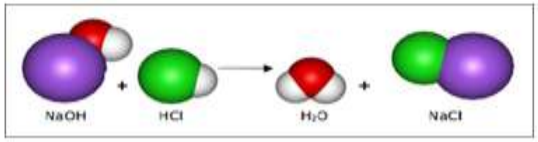
Sulphuric acid + Potassium hydroxide → Potassium Sulphate + Water
$H_2SO_4 + 2KOH \rightarrow K_2SO_4 + 2H_2O$

Neutralisation

The acid used will determine the salt produced in a neutralisation reaction:

- hydrochloric acid produces chlorides
- nitric acid produces nitrates
- sulfuric acid produces sulfates





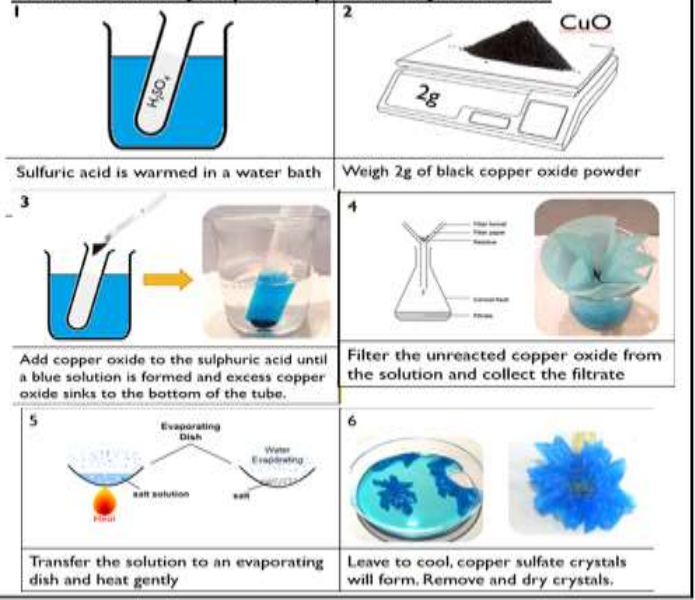
Soluble salts (Required practical)

Soluble salts can be made from acids by reacting them with solid insoluble substances, such as metals, metal oxides, hydroxides or carbonates.

The solid is added to the acid until no more reacts and the excess solid is filtered off to produce a solution of the salt.

Salt solutions can be crystallised to produce solid salts.

Soluble salts (Required practical): Method

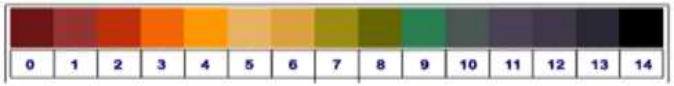


Year 10 SCIENCE Knowledge Organiser

DELTA Ash Hill

AQA Science: Chemical changes

pH and Acids + Alkalis



Acids produce H^+ (as H_3O^+) ions in water and they taste sour. They also corrode metals and have a pH of less than 7. They also turns blue litmus paper to red.

Alkalis produce OH^- ions in water and they taste bitter with a pH greater than 7. Alkalis turns red litmus paper to blue.

A solution is defined as an acid if the concentration of H^+ ions is greater than the concentration of OH^- ions. $[H^+] > [OH^-]$

A solution is defined as alkali/base if the concentration of hydrogen ions is less than the concentration of hydroxide ions. $[H^+] < [OH^-]$

Strong and weak acids

A strong acid is completely ionised in aqueous solution. $HCl + H_2O \longrightarrow H^+ + Cl^-$

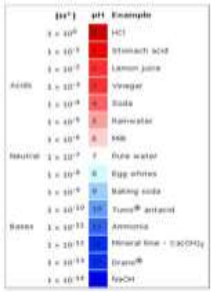
Examples of strong acids are hydrochloric, nitric and sulfuric acids.

A weak acid is only partially ionised in aqueous solution. $CH_3COOH + H_2O \rightleftharpoons CH_3COO^- + H^+$

Examples of weak acids are ethanoic, citric and carbonic acids.

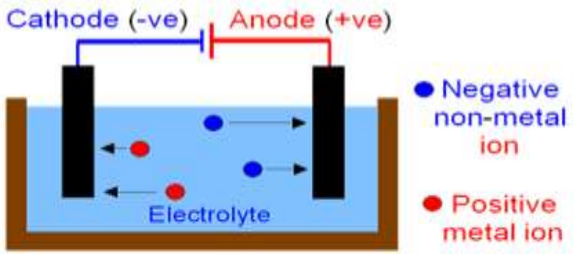
For a given concentration of aqueous solutions, the stronger an acid, the lower the pH.

As the pH decreases by one unit, the hydrogen ion concentration of the solution increases by a factor of 10.



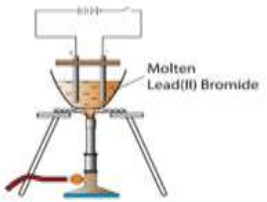
Electrolysis

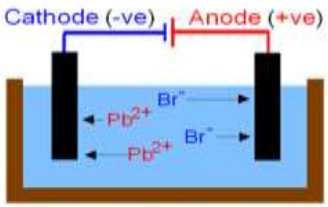
When an ionic compound is melted or dissolved in water, the **ions** are free to move about within the liquid or solution. These liquids and solutions are able to conduct electricity and are called electrolytes. Passing an electric current through electrolytes causes the ions to move to the electrodes. Positively charged ions move to the negative electrode (the cathode), and negatively charged ions move to the positive electrode (the anode).



Electrolysis of molten ionic compounds

When a simple ionic compound (eg lead bromide) is electrolysed in the molten state using inert electrodes, the metal (lead) is produced at the cathode and the non-metal (bromine) is produced at the anode.





Cathode (-ve electrode)

$Pb^{2+} + 2e^- \rightarrow Pb$

Anode (+ve electrode)

$2Br^- - 2e^- \rightarrow Br_2$

OR $2Br^- \rightarrow Br_2 + 2e^-$

Electrolysis Extended

At the negative electrode, hydrogen is produced if the metal is more reactive than hydrogen.
At the positive electrode oxygen is produced unless the solution contains halide ions when the halogen is produced.

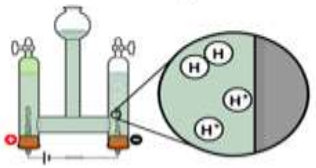
This is due to water molecules breaking down in aqueous solution to form hydrogen and hydroxide ions.

At the cathode positively charged ions gain electrons, whereas as the negatively charged ions lose electrons at the anode. These are both examples of oxidation and reduction. These can be represented as half equations.

$2H+ + 2e- \rightarrow H_2$

$4OH- \rightarrow O_2 + 2H_2O + 4e-$

$4OH- - 4e- \rightarrow O_2 + 2H_2O$



Rules for determining products

At the cathode

Whether hydrogen or a metal is produced at the cathode depends on the position of the metal in the metal **reactivity series**:

- the metal is produced at the cathode if it is less **reactive** than hydrogen
- hydrogen is produced at the cathode if the metal is more reactive than hydrogen

At the anode

Oxygen is produced (from hydroxide ions), unless **halide** ions (chloride, bromide or iodide ions) are present. In that case, the negatively charged halide ions lose electrons and form the corresponding **halogen** (chlorine, bromine or iodine).

The table summarises the product formed at the anode during the electrolysis of different **electrolytes** in solution.

Negative ion	Element given off at anode
Chloride, Cl^-	Chlorine, Cl_2
Bromide, Br^-	Bromine, Br_2
Iodide, I^-	Iodine, I_2
Sulfate, SO_4^{2-}	Oxygen, O_2
Nitrate, NO_3^-	Oxygen, O_2

Year 10 SCIENCE Knowledge Organiser

DELTA Ash Hill

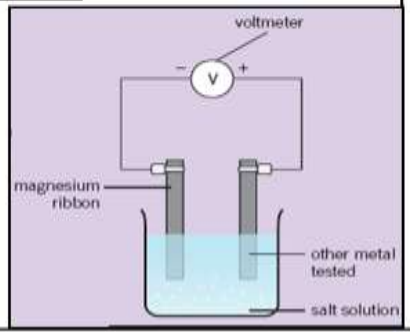
AQA Science: Chemical changes

Cells and batteries continued...

- Metals lose electrons and form positive ions.
- When 2 metals are dipped in a salt solution and joined by a wire, the more reactive metal will donate electrons to the less reactive metal. This forms a simple electrical cell.
- The greater the difference in reactivity between the 2 metals, the higher the voltage produced by the cell.

Investigating chemical cells

This apparatus is used to investigate the voltage produced by different metals paired with magnesium ribbon. You can compare magnesium against zinc, iron, copper & tin in your electrical cells.



Fuel Cells

Scientists are developing hydrogen as a fuel.

Hydrogen + Oxygen → Water

$$2H_2 + O_2 \rightarrow 2H_2O$$

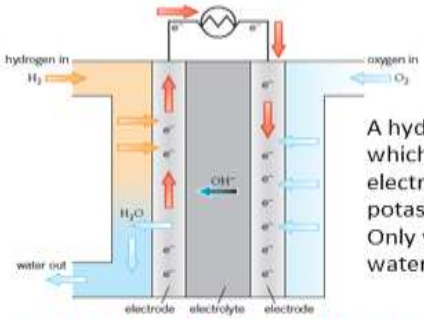
- The world relies on fossil fuels. However, they are non-renewable and they cause pollution.
- Hydrogen is one alternative fuel. It can be burned in combustion engines or used in fuel cells to power vehicles.
- Hydrogen gas is oxidised and provides a source of electrons in the hydrogen fuel cell, in which the only waste product is water.

Hydrogen gas is supplied as a fuel to the negative electrode. It diffuses through the graphite electrode and reacts with hydroxide ions to form water and provides a source of electrons to an external circuit.

$$2H_2(g) + 4OH^-(aq) \rightarrow 4H_2O(l) + 4e^-$$

Oxygen is supplied to the positive electrode. It diffuses through the graphite and reacts to form hydroxide ions, accepting electrons from the external circuit.

$$O_2(g) + 2H_2O(l) + 4e^- \rightarrow 4OH^-(aq)$$



A hydrogen fuel cell which has an alkaline electrolyte, such as potassium hydroxide. Only waste product is water.

Advantages of hydrogen fuel cells –

1) Do not need to be electrically recharged
2) No pollutants are produced
3) Can be a range of sizes for different uses

Disadvantages of hydrogen fuel cells–

1) Hydrogen is highly flammable
2) Hydrogen is sometimes produced for the cell by non-renewable sources
3) Hydrogen is difficult to store

Conservation of mass

Mass is never lost or gained in chemical reactions. We say that mass is always **conserved**. In other words, the total mass of products at the end of the reaction is equal to the total mass of the reactants at the beginning.

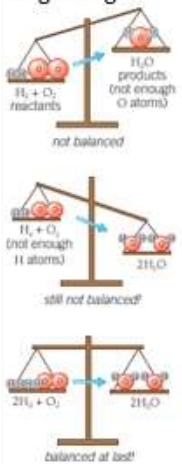


Figure 1 *Balancing an equation*

Balancing equations rules

- Never change the chemical formula
- Total number of reactants must equal total number of products
- Never put a small number yourself
- The big number in front applies to all the atoms in the compound/element
- The small number behind an element applies to that element only
- Use big numbers only and start with 2

Relative formula mass M_r

Mass number = number of protons + number of neutrons
Atomic number = number of protons
Neutron number = mass number – atomic number

The mass of a molecule is called the relative formula mass, M_r. This is calculated by adding up the relative atomic masses of all the atoms in the molecule.

What is the M_r (Relative Formula Mass) of carbon dioxide? Formula for carbon dioxide CO_2

Element	Number of atoms in compound		Mass Number (A_r)	=	Relative atomic mass of atom(s) in compound
C	1	×	12	=	12
O	2	×	16	=	32
Relative Formula Mass (M_r) of carbon dioxide (CO_2) is....					44

Examples of M_r below:
H_2SO_4 → M_r = (1x2=2) + 32 + (16x4=64) = 98
$Ca(OH)_2$ → M_r = 40 + (16 x 2=32) + (1 x 2=2) = 74
$Mg(HCO_3)_2$ → M_r = 24 + (1x2=2) + (12x2=24) + (16x6=96) = 146
$Al_2(SO_4)_3$ → M_r = (27x2=54) + (32x3=96) + (16x12=192) = 342

Moles and Reacting Masses

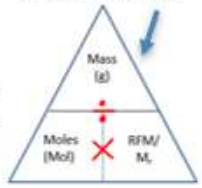
One mole of a substance contains the same number of the stated particles, atoms, molecules or ions as one mole of any other substance. The number of atoms, molecules or ions in a mole of a given substance is the Avogadro constant which is 6.02×10^{23} per mole.

The rules for working out reacting masses & example:

If 28 g of iron reacts with copper sulphate solution, what mass of copper will be made?

- **Step 1.** Write down the balanced symbol equation. Fe (28g) + $CuSO_4$ → Cu (?) + $FeSO_4$
- **Step 2.** Write down the relative atomic/formula masses. Fe = 56 Cu = 64
- **Step 3.** Write down the ratio of reactants and products. Fe : Cu = 1 : 1
- **Step 4.** Convert to ratio of reacting masses. Fe : Cu = 1 : 1 = 56 g : 64 g
- **Step 5.** Calculate the scale factor and apply this to the ratio of reacting masses. scale factor = 28 g / 56 g = 0.5 mass of Cu made = 64 g x 0.5 = 32 g

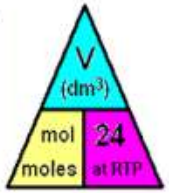
Formula to calculate moles



Limiting Reactant (LR)
Is the reactant that gets used up first in a reaction. This is the reactant that is NOT in excess. Therefore, the amounts of product formed in a chemical reaction are determined by the LR

Volume of Gases

One mole of any gas has a volume of 24 dm^3 or 24,000 cm^3 at rtp (room temperature (20°C) and pressure (1 atmosphere)). This volume is called the molar volume of a gas.



Concentrations

The **concentration** of a solution is usually expressed as the amount of **solute (mol)** dissolved in a given **volume (dm^3)** of solution.

Figure 1 *The orange squash is getting less concentrated going left to right (the darker colour indicates more squash is in the same volume of its solution)*

Figure 2 *Volumetric flasks are used to make up solutions. They have a graduation mark around their narrow necks. Water is added to the solute until the bottom of its meniscus (the curve at the surface of the solution when viewed from the side) is level with the mark*

Concentration continued...

The equations to calculate concentration:

$$\text{concentration (g/dm}^3\text{)} = \frac{\text{amount of solute (g)}}{\text{volume of solution (dm}^3\text{)}}$$

If you are working in centimetres cubed (cm^3), convert the volume to dm^3 by dividing it by 1000, and use the equation above. Alternatively, substitute your data in cm^3 into the following equation:

$$\text{concentration (g/dm}^3\text{)} = \frac{\text{amount of solute (g)}}{\text{volume of solution (cm}^3\text{)}} \times 1000$$

*** to convert cm^3→ dm^3, divide by 1000 (0.001 dm^3)**
*** to convert dm^3→ cm^3, multiply by 1000 (1000 cm^3)**

You can increase the concentration of an aqueous solution by:

- adding more solute and dissolving it in the same volume of its solution
- evaporating off some of the water from the solution so you have the same mass of solute in a smaller volume of solution.

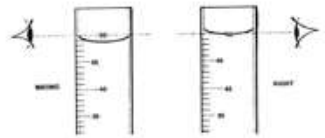
Titrations (TRIPLE ONLY)

Measuring the EXACT volumes of acid and alkali that are needed to react together. **What is this reaction called?** NEUTRALISATION

$H^+ + OH^- \rightarrow H_2O$

You can measure the exact volumes of acid and alkali needed to react with each other using a technique called **titration**. The point at which the acid and alkali have reacted completely is called the **end point** of the reaction. You judge when the end point has been reacted using an acid/base indicator.

Measuring to the meniscus

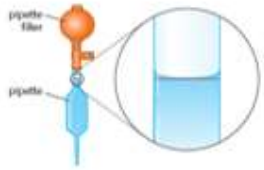


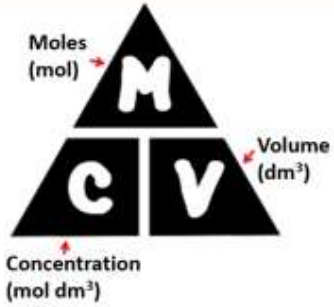
such as **Phenolphthalein Indicator**. It turns colourless in an neutral solution and pink in an alkaline solution.

Titrations continued...Carrying out a titration

1. First wash the pipette with distilled water, then with some alkali. Empty alkali into a conical flask.
2. Add a few drops of indicator to the conical flask. Swirl
3. Rinse a **burette** with distilled water and then with some acid. Acid added to burette, starting volume of acid is read accurately.
4. Record the reading on the burette. Open tap to release a bit of acid into flask, swirl.
5. Repeat step 4 until acid in burette has almost run in, then add one drop at a time. Neutralisation occurs. The volume of acid recorded.
6. Repeat 3 times. Discard anomalous results. Repeat the titrations until two results are within of 0.1 cm^3 each other. These precise results are called **concordant**. Calculate a mean.
7. Calculate the concentration of the acid or alkali.

- A volumetric pipette is used to accurately measure a volume of an alkali.
- A pipette filler is used to draw solution into the pipette safely.
- Neutralisation is a change in colour when acid and alkali have been mixed = titration is complete.
- Titre is the volume recorded from a burette





Percentage yield and Atom economy (TRIPLE)

$$\% \text{ yield} = \frac{\text{mass of product obtained}}{\text{maximum theoretical mass of product}} \times 100$$

- The reaction may be reversible – as products form they react to re-form the reactants again. You show reversible reactions using this symbol ⇌ instead of the normal arrow between reactants and products. Chemists can manipulate reversible reactions by the conditions they choose in the reaction vessels in chemical plants.
- Some reactants may react to give unexpected or unwanted products in alternative reactions.
- Some of the product may be lost in handling or left in the apparatus.
- The reactants may not be pure (as in the case of the lime kiln).
- Some of the desired product may be lost during its separation from the reaction mixture.

$$\text{Atom economy} = \frac{\text{mass of wanted product from equation}}{\text{total mass of products from equation}} \times 100$$

Yield Industrial processes –
Industrial processes need as high a percentage yield as possible, because this:
1) Reduces the waste of reactants
2) Reduces the cost of the process

Atom Industrial processes –
Industrial processes need as high an atom economy as possible, because this:
1) Reduces the production of unwanted products
2) Makes the process more *sustainable*
3) Conserve the Earth's resources and minimise pollution

Early and Current Atmosphere

During the first billion years of the Earth's existence there was intense volcanic activity that released gases that formed the early atmosphere and water vapour which condensed to form the oceans. Similar to the atmospheres of Mars and Venus today, consisting of mainly carbon dioxide with little or no oxygen gas.

Volcanoes also produced nitrogen which gradually built up in the atmosphere along small proportions of methane and ammonia. The carbon dioxide dissolved in the formed oceans and carbonates were precipitated producing sediments, reducing the amount of carbon dioxide

Present Atmosphere
~80% Nitrogen
~20% Oxygen
Trace amounts of CO2, Water Vapour and noble gases

Changes from the early atmosphere

Algae first produced oxygen about 2.7 billion years ago and soon after this oxygen appeared in the atmosphere. Over the next billion years plants evolved and the percentage of oxygen gradually increased to a level that enabled animals to evolve.

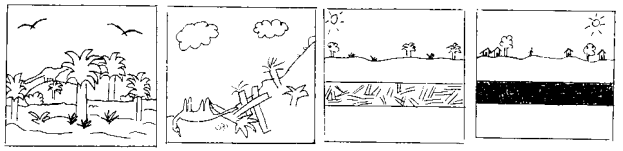
Photosynthesis

$6CO_2 + 6H_2O \longrightarrow C_6H_{12}O_6 + 6O_2$

carbon dioxide + water ⟶ glucose + oxygen

Algae also decreased the amount of Carbon dioxide in the atmosphere via photosynthesis, along with carbon dioxide forming sedimentary rocks and fossil fuels

Formation of Coal, Gas, Crude Oil



Coal is formed from trees in swamps millions of years ago. When these trees and animals die they get buried in mud. Layers form over them and the pressure and heat over time results in the formation of coal which is then mined. Oil and Natural gas are also formed in this process except they are formed by marine organisms in the sea.

Limestone is also produced from dead living organisms. The creatures themselves have decayed but their skeletons and shells undergo compaction form Limestone (Calcium Carbonate) $CaCO_3$

Global Warming

Scientists believe that greenhouse gases, such as Methane and Carbon Dioxide, are causing the planets temperature to increase, resulting in global climate change.

The burning of fossil fuels is one way in which we are increasing the amount of Carbon Dioxide in our atmosphere. The increase in the amount of cattle also results in more Methane which equally increases the temperature.

Global Warming can effect;
- Agriculture due to desertification
- Extreme weather conditions
- Increase in sea levels due to glaciers melting
- Changing of natural wildlife habitats

These will also have social effects on businesses who rely on the income generated from agriculture in the effected regions, furthermore homes will also be destroyed due to increased sea levels.

Atmospheric Pollutants

When fuels undergo combustion the gases released;
- Carbon Dioxide
- Carbon Monoxide
- Sulfur Dioxide
- Nitrogen Oxides
- Particulates

Fuels undergo either complete or incomplete combustion

fuel + oxygen ⟶ carbon dioxide + water

$C_xH_y + O_2 \longrightarrow CO_2 + H_2O$

fuel + oxygen ⟶ carbon + water

$C_xH_y + O_2 \longrightarrow C + H_2O$ (not enough)

carbon monoxide CO

carbon dioxide CO_2

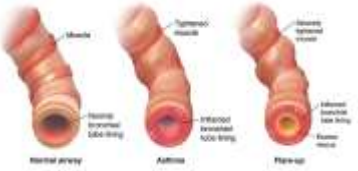
other carbon oxides C_xO_y

Atmospheric Pollutants

Carbon Monoxide is a toxic gas (the silent killer) as it is colorless, odorless and not easily detectable.

Sulphur Dioxide and Nitrogen oxides cause acid by dissolving into water droplets in clouds, this makes the rain more acidic which can damage buildings and wildlife.

Particulates are unburnt carbon particles. These are absorbed into the clouds and cause more water droplets to form in clouds. Theyr also make clouds better at reflecting sunlight, which causes global dimming.



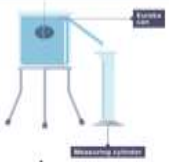
Sulfur dioxide, Nitrogen Oxides and particulates also cause respiratory health problems for humans

Year 10 SCIENCE Knowledge Organiser

DELTA Academies Trust

AQA Science: Physics Unit 3 Revision Notes – Particle model of matter

Density:



Density = Mass (kg)
(kg/m³) Volume (m³)

Calculating the density of an irregular shape, can be done using a Eureka can and measuring the volume of water displaced.

State of matter	Diagram of structure	Movement of particles	Can it be compressed?	Density
Solid		Vibrate around a fixed position. They don't have enough energy to move apart	No, the particles have no space between them to move into.	High, there are lots of particles in a unit of area.
Liquid		They have enough energy to move from place to place but are still attracted to each other	No, the particles have no space between them to move into.	Quite high, there are lots of particles in a unit of area.
Gas		The have so much energy that they are not attracted to each other. Collisions with containers cause pressure.	Yes, the particles have lots of space between them to move into.	Low, there are few particles in a unit of area.

Internal Energy

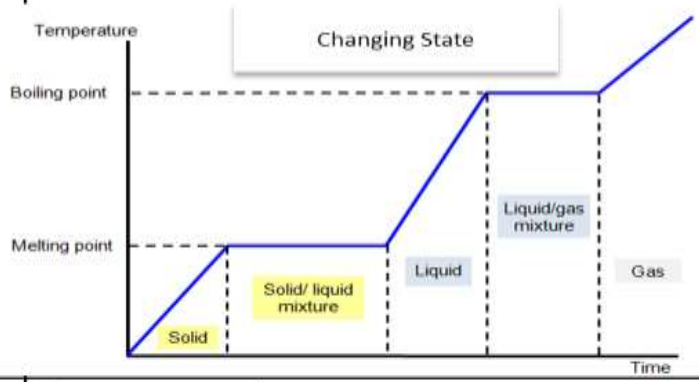
The energy in a substance is stored in its particles, this is called internal energy.

Internal energy = kinetic energy + potential energy.

Temperature: This is linked to the kinetic energy of the gas. The higher its temperature the higher its kinetic energy.
If the temperature remains constant so does the kinetic energy of the particles.

Changing State

When a material changes state (melting or boiling) its internal energy increases, but its temperature does not. This means that its kinetic energy remains constant until it has changed state.



Specific Latent Heat

The specific latent heat of a substance is the energy needed to change 1kg of the substance with no change in state.

Energy = Mass × Specific Latent Heat
(J) (kg) (J/kg)

E = m × L

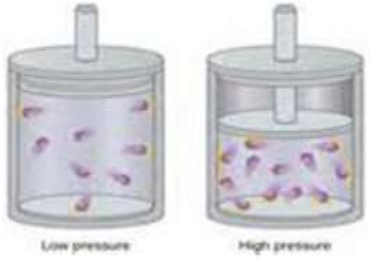
Specific heat of fusion: when turning from a solid into a liquid
Specific heat of vapourisation: when turning from a liquid into gas

Pressure and volume

Pressure × Volume = constant
(Pa) (m³)

so $P_1 \times V_1 = P_2 \times V_1$

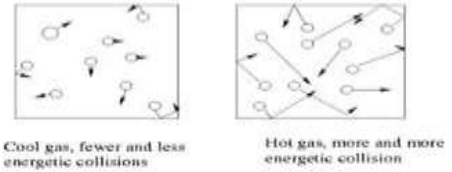
Increasing the volume of a gas (making the container bigger) whilst keeping the temperature constant will decrease the pressure of the gas.



Temperature and pressure

Increasing the temperature of a gas increases the kinetic energy of the gas particles, this increases the number of collisions with the surface, this increases the pressure acting on the sides of the container.

Temperature and gas



Particles move in different directions with a range of speeds.

As the particles hit the side of the container they create a net force which acts at right angles to the wall of the container.

Year 10 SCIENCE Knowledge Organiser

DELTA Academies Trust

AQA Science: Physics Unit 4 Revision Notes - Radioactivity

Atoms

$^{12}_{6}C$

12 ← Mass Number (Protons + Neutrons)

6 ← Atomic Number (Protons and electrons)

Number of Neutrons =
Mass Number – Atomic number (12 - 6 = 6)

Isotopes: An isotope is an atom with the same number of protons but different number of neutrons.

Ions: An atom that has gained (positive ion) or lost (negative ion) electrons.

Some atoms are radioactive, they give out radiation from the nucleus. This is measured in Becquerels (Bq)

Alpha, Beta & Gamma

Name	What it is	What is its charge	What is its mass	Ionising Power	Absorbed by
Alpha	Helium nucleus	+2	+4	High	Paper/ air
Beta	Electron	-1	Tiny	Medium	Thin steel
Gamma	EM Wave	0	0	Low	Thick Lead

Alpha Decay (Atomic number -2, mass number -4)

$$^{238}_{92}U \rightarrow ^{234}_{90}Th + ^{4}_{2}\alpha$$

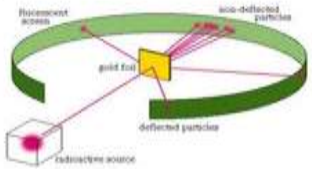
Beta Decay (Atomic number +1, mass number 0)

$$^{14}_{6}C \longrightarrow ^{14}_{7}N + ^{0}_{-1}\beta$$

Atomic Structure

1. In 1901 JJ Thompson suggested the '**plumb pudding**' model for the atom. With negative particles stuck in the middle of positive charge

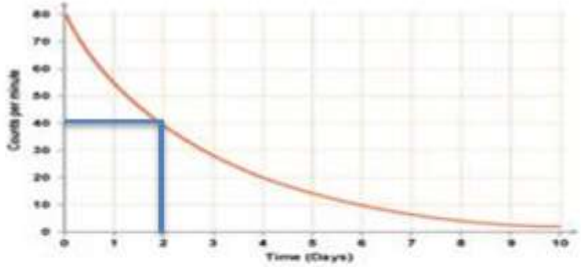
2. In 1909 Rutherford changed the accepted model using his alpha scattering experiment.



3a. He fired alpha particles at a sheet of gold foil.
3b. He expected them all to pass straight through
3c. Rarely one would bounce back
3d. This proved that the center of the atom was very small, held most of the mass and had a positive charge.
3e. The current model of the atom that we use today was born.

Half-life

The half-life of a radioactive source is **the time taken for half the material to decay.**



The half-life of the material above is 2 days.
The starting count was 80 half of it = 40
The time to get to 40 was 2 days.

In this example it would take: 2 days to get to get to 50%, 4 days to 25%, 6 days to get to 12.5%. The shorter the half-life the faster the radiation is emitted.

Nuclear fission (Triple Only)

1. Large radioactive atoms split in half (fission) because they are unstable.
2. When this happens a huge amount of energy is released.
3. Neutrons are released which hit and split more atoms, this is called a **chain reaction**.
4. This is the source of a nuclear power station or nuclear bomb's energy
5. Unfortunately a lot of radioactive waste is produced which stays radioactive for 1000's of years.

Nuclear Fusion (Triple Only)

1. Small light nuclei are forced together under huge heat and pressure – such as in the **core of the sun**.
2. The nuclei repel each other as they are both positively charged so it is hard to get them to fuse.
3. If the temperatures and pressures are large enough the nuclei will fuse to create a larger nuclei
4. A huge amount of energy is released
5. Fusion doesn't produce any radioactive waste
6. Scientists are yet to develop the technology to allow fusion to be used to produce electricity.

Radioactivity (Triple Only)

Radioactive atoms decay and release ionizing particles (alpha, beta and gamma)

There is a constant level of naturally occurring radiation all around us, this is known as **'background radiation'**. This is random when measured.

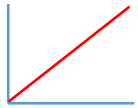
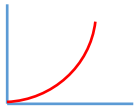
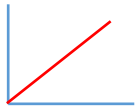
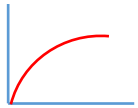
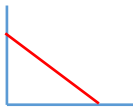
Background radiation comes from rocks, the air, our food and the sun. Very little comes from man-made devices such as powerstations.

Radiation is **ionizing**, this means it can damage your DNA and in large doses can cause cancer. It can also be used to kill cancerous cells.

Professionals working with radioactive sources protect themselves using lead glass.

Contamination is when the source is inside you
Irradiation is when the source is outside you

Graphs

Motion	Distance-Time	Speed-Time
Stationary		
Constant Speed		
Accelerating		
Decelerating		

Velocity, Acceleration & Weight

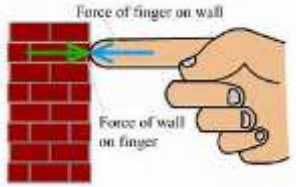
Velocity means speed with a direction.
Units: m/s

Acceleration means the rate of change of velocity. Units: m/s^2

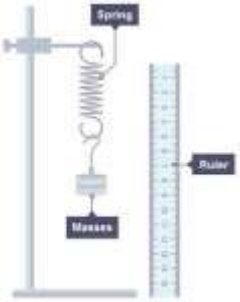
Weight = Mass x Gravity (gravity = 10)
(N)

Forces
Every force has a reaction force which is equal in size, opposite in direction and acts on a different object

Movement
Objects move by applying a force in one direction, the reaction pushes them in the opposite



Springs (Hooke's Law)



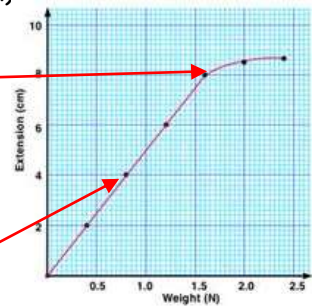
When you add a force (weight) to a spring it extends.

Extension = Stretched length – original length

Force = Constant x Extension
(N) (N/m) (m)

Elastic limit/limit of proportionality.
After this point it is permanently deformed

Proportional (Straight line)



Falling Objects

1. When an object is dropped it accelerates **as the force of gravity is larger than the force due to air resistance.**
2. **As it gets faster the air resistance increases.**
3. **Eventually the force due to air resistance is equal to the force due to gravity. This is known as terminal velocity.**
4. At terminal velocity the resultant force is zero.
5. The object remains at a constant speed.

Momentum

P = m x v

The Law of Conservation of Momentum states that the momentum before an event is equal to the momentum afterwards.

P = 0kgm/s

P = (-20x1) + (10x2) = 0Kgm/s

Car Safety

Stopping Distance = Thinking Distance + Braking Distance

Thinking Distance is the distance travelled before the driver has reacted.
Affected by: Alcohol, drugs, tiredness, age.

Braking Distance is the distance travelled whilst the brakes have been applied.
Affected by: Weather conditions (Ice/Snow), condition of the tyres/brakes, road surface.

Safety Devices – Seat belts, airbags, crumple zones

These devices make the time taken to slow down in the event of a crash longer, which makes the force felt by the driver smaller.

Reaction time
Reaction time for an adult is between 0.2s and 0.9s. It can be tested using a stopwatch.

Moments & Levers (Triple Only)

Moment = Force x perpendicular distance
If an object is balanced then the clockwise moment is equal to the anti-clockwise moment.

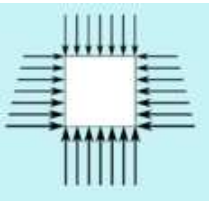
Levers and gears are used to transmit and magnify the force applied.

Pressure in a fluid (Triple Only)

A fluid (liquid or gas) causes a force at right angles to any surface that touches it.

The deeper an object is in a fluid the greater the pressure, this is because there are more particles above it pressing down on it.

The pressure on the underside of a submerged object is greater than the pressure on top, this causes a resultant force = upthrust

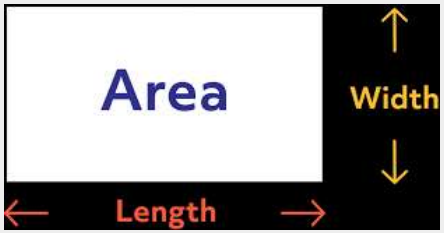


Engineering calculations

Calculating areas

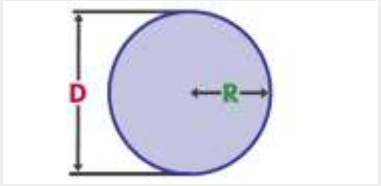
Area of rectangles

A = Area
L = Length
W = Width
A = L x W



Area of a circle

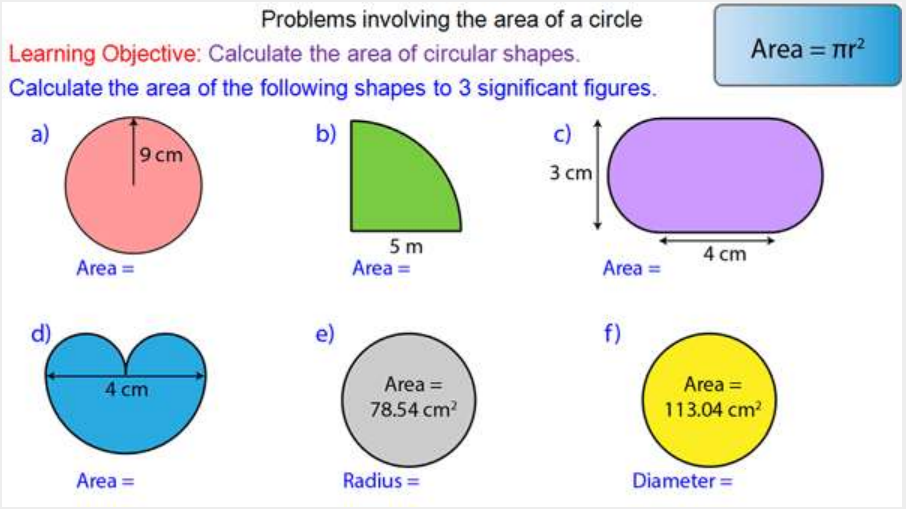
A = 𝜋 x r²



Diameter Ø is twice the Radius

Calculating the area of compound shapes

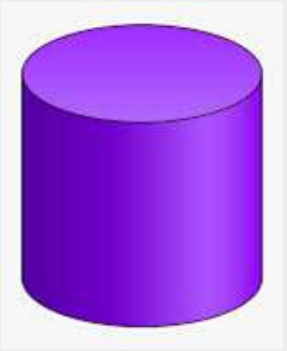
To calculate the area of a compound shape, start with the formulas your know, then add or divide them to make the shape you need, *e.g. for q.b below, you would calculate the area of a whole circle then divide by 4.*

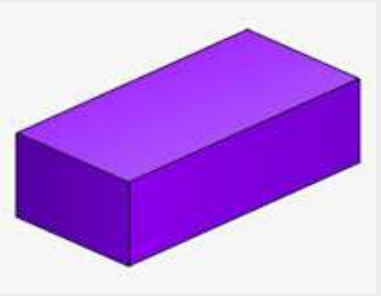


Calculating volumes

Volume of prisms

For the volume of prisms, you calculate the cross sectional area, then multiply by the height.





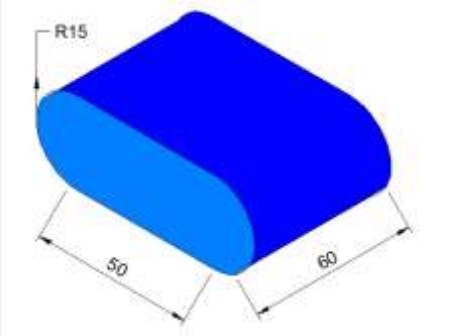
Cylinder
V = (𝜋 x r²) x h

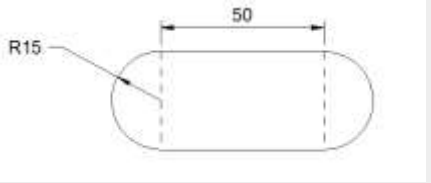
Cuboid
V = (l x w) x h

Calculating the volume of compound shapes

To calculate the volume of a compound shape, calculate the area by adding/ subtracting the simple areas, then multiply by the height, e.g:

For this pill shaped cuboid, we would first calculate the cross-sectional area





Semi circles = (𝜋 x r²) / 2
Rectangle = 50 x (R15 x2)
= 50 x 30
Area = 706+706+1500 = 2912mm²
Volume = 2912 x 60 = 174720mm³

Learning Outcome 1: Understand different factors which influence the risk of injury

Extrinsic Factors

Extrinsic factors are a risk or force from outside the body, they can cause harm to you although it is out of your control

1. **Coaching/Supervision**
   - Poor/incorrect coaching technique
   - Ineffective communication skills
   - Importance of adhering to the rules and regulations
2. **Activity types (contact/non-contact)**
3. **Safety Hazards**
   - Risk assessments
   - Safety checks
   - Emergency action plans
4. **Environmental factors**
   - Weather
   - Playing surface/ performance area and surrounding area
   - Other participants
5. **Equipment**
   - Protective equipment
   - Performance equipment
   - Clothing and footwear suitable for weather/surface/activity

Intrinsic Factors

Intrinsic factors are internal and generally within your own control

1. **Physical Preparation**
   - Training
   - Warm up
   - Cool down
   - Fitness levels
   - Overuse
   - Muscle imbalance
2. **Individual Variables**
   - Gender
   - Age
   - Flexibility
   - Nutrition
   - Sleep
   - Previous injuries
3. **Psychological Factors**
   - Motivation
   - Aggression
   - Arousal/Anxiety levels

Posture and causes of poor posture

1. **Poor stance/gait**
2. **Sitting positions**
3. **Physical defects**
4. **Lack of exercise**
5. **Fatigue**
6. **Emotional factors**
7. **Clothing/footwear**

Sports injuries related to posture

1. **Pelvic tilt**
2. **Kyphosis**
3. **Lordosis**
4. **Round shoulder**
5. **Scoliosis**

Learning Outcome 2: Understand how appropriate warm up and cool down routines can help to prevent injury

Components of a Warm Up

1. Pule raiser
2. Mobility
3. Dynamic movements
4. Stretching
5. Skill rehearsal

Physical Benefits of a Warm Up

1. Warming up muscles to prepare for physical activity
2. Increase in body temperature
3. Increase in heart rate
4. Increase in flexibility of muscles and joints
5. Increased pliability of ligaments and tendons
6. Increased blood flow and oxygen to muscles
7. Increased speed of muscle contractions

Psychological Benefits of a Warm Up

1. Heighten/controls arousal levels
2. Improves concentration/focus
3. Increases motivation
4. Mental rehearsal

Components of a Cool Down

1. Pulse lowering activity
2. Maintenance stretching (static)

Physical Benefits of a Cool Down

1. Helps the body return to resting
2. Gradually lowers heart rate
3. Gradually lowers temperature
4. Circulates blood and oxygen
5. Reduces breathing rate
6. Removal of waste products
7. Reduces the risk of muscle stiffness and soreness
8. Aids recovery by stretching muscles

Specific needs which a warm up and cool down needs to consider

1. Characteristics of the group/individual
   - Size of the group
   - Age of participants
   - Experience of participants
   - Individual fitness levels
   - Any medical conditions participants may have
2. Suitability as preparation for a particular activity/sport
3. Environmental factors – weather/temperature/available facilities

Learning Outcome 3: Know how to respond to injuries within a sporting context

Acute Injuries

- Caused as a result of sudden trauma to the body
- Result in immediate pain, usually with swelling and loss of function

Chronic Injuries

- Overuse injuries caused by continuous stress on an area
- These injuries tend to develop gradually over a period of time

Emergency Action Plans

- Emergency personnel
- Emergency communication
- Emergency equipment

Type	Cause	Treatment
• Soft tissue – sprains and strains	Muscle, tendon or ligament is overstretched i.e. hamstring pull	R.I.C.E, support bandages, slings to keep area still and supported
• Overuse injuries – tendonitis, golfers elbow, shin splints, tennis elbow	Repeated use of a muscle or joint in high impact/stress activities	Painkillers, R.I.C.E, Support bandages, joint braces
• Fractures – open and closed	Falling or trauma to the bone i.e. bad tackle in football	Serious cases – surgery, usually limbs are put in plaster casts for 6-8weeks
• Concussion	High impact to the head i.e. clash of heads in rugby	Medical assessment, rest, no activity, cold compress, avoid stress, painkillers
• Contusions i.e. bruises	Impacts to the body made by other players or equipment – hockey stick to the shin	R.I.C.E
• Abrasions i.e. grazes and cuts	Falling or making a tackle in football on hard surfaces	Clean the would, antiseptic cream, plaster or stitches if serious
• Blisters	Pocket of fluid appears as a result of rubbing. New or ill fitting footwear can cause this	Blister plaster, keep the area clean, antiseptic cream
• Cramp	Fatigue, build up of lactic acid and poor hydration levels	Rest the area, stretch the area carefully, gentle massage, hydrate the performer
• Injuries related to children – Severs disease and Osgood Schlatter's disease	Highly active young children who take part in activities that have a lot of running/ high impacts to the feet and knees	Severs – painkillers, rest, heel cups, ice packs Osgood Schlatter's – painkillers, rest

Other ways to respond...

- Stretching and massage
- Taping, bandaging, splints, slings
- Hot (chronic) and cold (acute) treatments
- Action plans to respond to injuries and medical conditions in a sporting context

RICE

- Rest
- Ice
- Compression
- Elevation

SALTAPS

- See
- Ask
- Look
- Touch
- Active
- Passive
- Strength

Learning Outcome 4: Know how to respond to common medical conditions

The symptoms of common medical conditions...

1. Asthma
- coughing
- wheezing
- Shortness of breath
- Tightness in the chest

2. Diabetes
- Increased thirst
- Going to the toilet a lot
- Extreme tiredness
- Weight loss

3. Epilepsy
- Seizures
- Tingling/pins and needles
- Twitching or muscle spasms
- Sudden muscle stiffness
- Becoming dizzy or losing consciousness
- Lip smacking
- Unable to communicate
- Memory loss
- Déjà vu
- Rubbing hands
- Sudden intense emotion

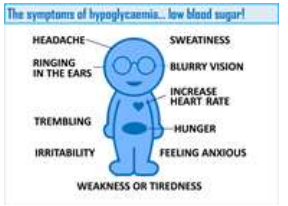
Type 1
- Pancreas does not produce insulin
- Insulin dependent

Type 2
- Where the pancreas doesn't produce enough insulin or the body's cells don't react to insulin
- Non-insulin dependent

How to respond to these medical conditions...

1. Ensure awareness of any participants medical conditions prior to commencing activity

Asthma
1. Reassurance
2. Inhaler
3. Emergency services (if needed)



Diabetes
1. Give them insulin if they are type 1 – reduces the sugar in the blood
2. If suffering from 'Hypoglycaemia – low blood sugar' then they need sugar – drinks, food, glucagon injection
3. In serious cases – call 999

Epilepsy
1. Emergency care plans in place for the individual

Know when to refer the performer to a professional, and how to do so

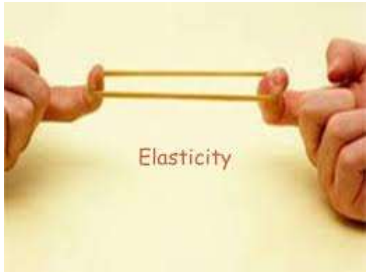
If they have a seizure...
- Call 999
- Follow emergency care plan
- Stay with them
- Support the head if safe
- Clear the area (avoid harm)
- When seizure is over – put in recovery position
- Keep them warm

Material properties

WJEC Engineering

Material properties are broken down into two main categories:

- **Physical properties** (the properties before it is used, appearance, conductivity etc)
- **Working properties** (how the material behaves)



Elasticity
The ability to regain its original shape *(e.g. rubber)*

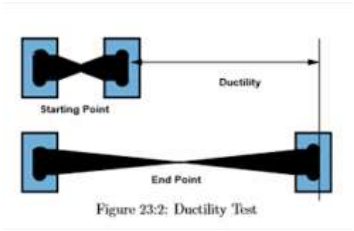
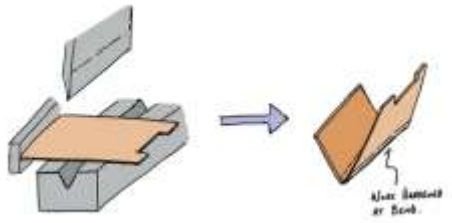


Figure 23:2: Ductility Test

Ductility
The ability to be stretched without breaking *(e.g copper stretches in wire)*

Malleability
The ability to be pressed, spread out or hammered *(e.g. lead can be easily shaped as it is malleable)*

Hardness
The ability to resist scratching, cutting or wear and tear *(e.g. high carbon steel drill bits don't get worn down by drilling into other materials.*



Work hardening
When the properties of a material change due to working *(e,g bending a sheet will make it stronger at the joint)*

Brittleness
Will snap easily and not bend *(e.g. glass)*

Toughness
Is resistant to breaking and bending *(e.g. cast iron)*

Tensile strength
Retains strength when stretched.

Compressive strength
Retains strength when under pressure, *e.g. concrete.*

Corrosion resistant
It will not corrode in its environment (e.g. doesn't rust)

Non-toxic
Is not harmful to humans (*e.g. non-toxic paint is used on baby toys)*

Shiny/ High lustre
When a material is very shiny and reflects light well. e.g. gold or brass when polished.

Matt finish
When a material does not reflect much light and appears dull

Density
How solid a material is. *(A denser material will weigh more than a another material of the same size)*

Conductivity
How well a material conducts heat (thermal conductivity) or electricity (electrical conductivity)

Music- Component 2 (Learning Aim B)

Developing Musical Skills What will I need to do?

- Complete of an initial skills audit for both chosen disciplines.
- Creation of a development plan that
  - identifies individual development routines
  - identifies technical exercises for development
  - includes set goals
  - Includes monitoring and tracking of progress.

Developing a practise routine

It is important when practising that you have a routine you follow.

- Warm Up
- Play a piece you like/know well
  Technical Exercise
- Play a new piece
- Warm down

Key Terms.	Definitions.
Melody.	A sequence of single notes. (The tune)
Phrasing.	Is the way a musician shapes a sequence of notes in a passage of music to allow expression, much like when speaking English, a phrase may be written identically but maybe spoken differently.
Preparation.	The action or process of preparing or being prepared for use or consideration.
Scale.	In music theory, a scale is any set of musical notes ordered by a set pattern. For example, all major scales will have the same pattern. • A scale ordered by increasing pitch is an ascending scale. • A scale ordered by decreasing pitch is a descending scale.
Syncopation.	Accents which are not on the beat, or rhythms that emphasise unusual parts of the beat.
Technical Exercise.	A technical exercise is something a performer would do to improve their technique. It includes practising scales, arpeggios, chord sequences etc.
Accompaniment.	Accompaniment is the musical part which provides the rhythmic and/or harmonic support for the melody or main themes of a song or instrumental piece.
Expression.	Musical expression is the art of playing or singing with a personal response to the music.
Timing.	Timing in music refers to the ability to "keep time" accurately and to synchronise to an ensemble, as well as to expressive timing.

Performing Arts – Dance - Component 1

Thriller

Creative Team	• Artist: Michael Jackson • Written by Michael Jackson and John Landis • Directed by John Landis • Choreographed by Michael Peters • Costumes designed by Deborah Nadoolman

STYLISTIC QUALITIES

Processes	Style and genre	purpose	Themes	Form/structure/Narrative	Response to stimulus
Basic Info to start off my research	**Dance** Style: commercial dance Broadway jazz and hip hop combined together to form a unique style of Michael Jacksons own style of dance Zombie inspired movements, pedestrian actions, jumps and leaps; all to portray this horror based dance style. **Music** style: pop Genre: disco and funk **Film/Video** Genre: Horror!	Entertainment	Zombies Death Resurrection Horror Concealment	A night at the movies turns into a nightmare when Michael and his date are attacked by a hoard of bloodthirsty zombies - only a "Thriller" can save them now. Michael Jackson and his date are watching a movie. They leave, and take a shortcut through the graveyard on the way home	Movie: An American werewolf in London

CONTEXTUAL INFLUENCES

Basic Info to start off my research	• An American werewolf in London • 80s music • 80s Horrors • The 1980s • Michael Jackson hype and fever

Performing Arts – Drama - Component 1

The Curious Incident of the Dog in the Night-Time

Relevant info	• The play premiered on 2 August 2012 • The playwright – Simon Stephens • Frantic assembly

STYLISTIC QUALITIES

Processes	Style and genre	Purpose	Theme	Form/structure/Narrative	Response to stimulus
Basic Info to start off my research	• Frantic assembly • Physical theatre • Brecht	• Entertainment. • Educate and inform. (Asperger's)	• Asperger's • Honesty and Dishonesty • Family • Infidelity • Juxtaposition • Linear • Metafiction • Metaphor • Non-Conformity • Self-Discovery • Social Skills • Love • The Disorder of Life	• Chronological order • Two acts • 15-year-old Christopher has Asperger's. He has never ventured alone before, yet the death of a dog (a murder!) leads him to a journey that upturns his world.	• Adaptation of the book.

CONTEXTUAL INFLUENCES

Basic Info to start off my research	• Development of asperger's • Labour government (Tony Blair 1998-2007) introduction of ASBOs

Performing Arts – Drama - Component 1

The Curious Incident of the Dog in the Night-Time – Page 2.

PRODUCTION ELEMENTS					
Techniques	**Stage**	**Set**	**Lighting**	**Costume**	**Music and accompaniment**
Basic Info to start off my research	• Originally performed 'in the round', now performed in a prosceniu m arch theatre	• Represents Christopher's mind. • Set is able to be changed instantly and quickly – small blocks are for multi-use purposes. • used A-level maths papers as an inspiration for the mathematical diagrams projected onto the floor. • imagery of a police incident room to reflect Christopher's idea that he is solving a murder mystery • The letters and numbers on the stage are used to help the cast place props and scenery. during the show. • There are 115 props in the show!	• Blocks that light up – colours and white. • The set lights up • The walls light up and change colours. • The floor lights up and changes colour. • Lights to light the actors and blackout to hide the actors. • The idea for the light up dots or pixels in the floor was based on the film The Matrix. • The lighting rig for Curious Incident is based on a grid that reflects the black shape of the playing space. • The entire idea of the lighting for The Curious Incident was based on things that Christopher would enjoy.	• Every day clothing • Must be costume that they can move in (for frantic physical theatre work)	• All the music in the show is based on prime number sequences. The very opening of the show counts out a 2-3-5-7 rhythm using sounds which are themselves based on prime numbers frequencies.

Visual Literacy

Subject
What

Describe it...
What is happening in the work?
What is the work about?

Is it based on observation or imagination?
Does it have any hidden meanings?

Elements
How

Colour, tone, line, space, shape, form pattern, texture
How is the work arranged?

Describe the composition...
How is line or space used to direct your eye?

Media
How

How has the work been made?
How have materials techniques and tools been used?

Does this type of technique have a name? (crosshatch, impasto, sgraffito, etc)
Is this typical of the artist?

Intent
Why

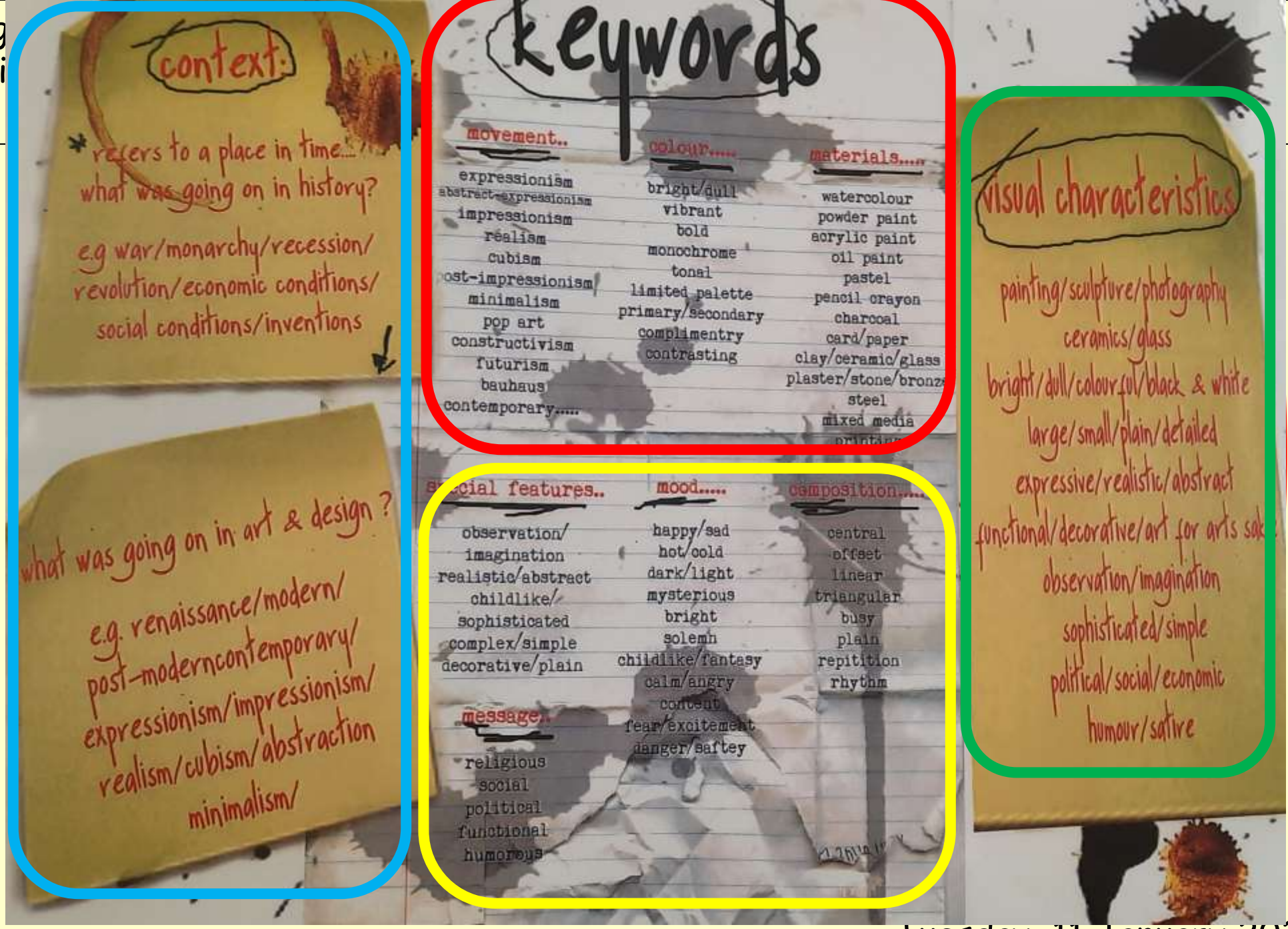
What is the purpose or meaning of the work?
Is the meaning clear or unclear?

Is the message personal, politica emotional, social?
How does the work affect you?

Title & Date
Name of the Photographer (dates)
Where were they born & where do they work now?
Any other interesting information?
What are they famous for?
Are there any key themes?
Context: what's happening in art and society
What is the first thing you notice about the work?
List 5 words that describe the work

analysing the work of others

Big
edi


context:
* refers to a place in time... what was going on in history?
e.g war/monarchy/recession/ revolution/economic conditions/ social conditions/inventions
what was going on in art & design ?
e.g. renaissance/modern/ post-moderncontemporary/ expressionism/impressionism/ realism/cubism/abstraction minimalism/
keywords
movement..
expressionism
abstract expressionism
impressionism
realism
cubism
ost-impressionism
minimalism
pop art
constructivism
futurism
bauhaus
contemporary.....
colour.....
bright/dull
vibrant
bold
monochrome
tonal
limited palette
primary/secondary
complimentry
contrasting
materials....
watercolour
powder paint
acrylic paint
oil paint
pastel
pencil crayon
charcoal
card/paper
clay/ceramic/glass
plaster/stone/bronz
steel
mixed media
observation/
imagination
realistic/abstract
childlike/
sophisticated
complex/simple
decorative/plain
mood.....
happy/sad
hot/cold
dark/light
mysterious
bright
solemn
childlike/fantasy
calm/angry
content
fear/excitement
danger/saftey
composition.....
central
offset
linear
triangular
busy
plain
repitition
rhythm
message..
religious
social
political
functional
humorous
visual characteristics
painting/sculpture/photography
ceramics/glass
bright/dull/colourful/black & white
large/small/plain/detailed
expressive/realistic/abstract
observation/imagination
sophisticated/simple
political/social/economic
humour/satire

LO1 Understand the environment in which the hospitality and catering providers operate

AC 1.1
The structure of the hospitality and catering industry

- The **Hospitality and Catering** sector includes: pubs, bars and nightclubs; restaurants; self-catering accommodation, holiday centres travel and tourist services; visitor attractions and hotels. Hospitals, prisons, schools armed forces and social care .
- It has grown over the last 20 years and, despite recession, is predicted to continue to grow .The sector as a whole currently employs almost 2 million people.

Residential establishments

Hotels
Guest houses
Bed and breakfasts
Farmhouses
Motels
Holiday parks
Some public houses

Services and food provided varies by price charged

Non commercial establishments

Hospitals
Prisons
Meals on wheels
Residential care homes
Armed services

Services and food provided varies by the situation and the needs of the clients. Not required to make a profit

Non residential establishments

Restaurants
Fast food outlets
Public houses
Bars
Delicatessens
Take away outlets
School meals
Burger vans

Services and food provided varies by the situation and price charged

AC 1.1
The structure of the hospitality and catering industry – styles of service

Styles of food service

- Depends on
- Type of establishment
- Type of food being served
- Cost of the meal or food
- Time available for the meal
- Type of customer
- Number of customers
- Availability of serving staff

Counter service	Table service	Personal service
Cafeteria Self service Fast food Take away Buffet Carvery	Plate service Family service Silver service Guerdon service	Travel service Tray service Vending service

AC 1.1
The structure of the hospitality and catering industry- hospitality at non catering venues

Contract Caterers

- food for functions such as weddings, banquets and parties in private houses.
- prepare and cook food and deliver it to the venue, or cook it on site.
- They may also provide staff to serve the food, if required.
- Complete catering solutions for works canteens etc

Planning menus

- **Who** is the event for ? Eg mixed ages, children, teenagers
- **How** is is going to be served? Eg hot buffet, plate service, finger food, sit down meal
- **What** are the special requirements? Eg vegetarians, non spicy food, traditional meal
- **What** foods are appropriate for the event? Egg wedding, Christmas meal, seasonal foods
- **How much** is the price per head? Eg cheap and cheerful, full gourmet experience, buffet

AC 1.1
The structure of the hospitality and catering industry- Standards and ratings

Benefits of ratings?

- A good establishment could see an increase in business from people wanting to try the food.
- It generates publicity for the establishment.
- Customers might come from further away to dine.
- Customers can identify less good establishments.

Food hygiene ratings is a different topic altogether.

Types of ratings

Michelin stars

Anonymous inspectors visit establishments and have a meal and write a review of the establishment can award stars for excellence.

Out of 3,600 establishments inspected in Great Britain and Ireland they awarded:

3
23
143

AA Rosettes & Stars

Inspectors visit restaurants or hotels and write a review of the establishment -award rosettes for restaurants, stars for hotels.

Restaurants 12
38
173

***** five star

- Excellent staffing levels with dedicated teams with management levels.
- Exceptional levels of proactive service and customer care.
- All areas of operation should meet the Five Star level of quality for cleanliness, maintenance, hospitality,
- Hotel open seven days a week all year.
- Enhanced services offered e.g. valet parking, escort to bedrooms, '24-hour reception, 24-hour room service, full afternoon tea.
- At least one restaurant, open to residents and non-residents for all meals seven days a week.
- Minimum 80% bedrooms with en suite bathroom with WC, bath and shower
- facilities e.g. secondary dining, leisure, business centre, spa,
- At least one permanent luxury suite available, bedroom, lounge and bathroom).

Poor reviews

- What could this do for their reputation?
- How could they address these?

Good Food Guide

Members of the general public who have visited the establishment fill in a review which is compiled into a guide. Award points for excellence ..

Online review sites

- There are a number of online review sites where anyone can post their reviews of an establishment.
- with a large number of reviews, a restaurant's average score is likely to be reasonably accurate.
- There are guidelines to clamp down on establishments that give away freebies for a good review or give themselves good reviews!

tripadvisor
yelp
OpenTable
Harden's
SquareMeal

Suppliers

- Hospitality and catering establishments usually need to purchase supplies in large quantities.
- From glassware to custard powder to meat to bed sheets and bathroom soap.
- Establishments use wholesalers and specialist markets where the price charged for large quantities is lower and the VAT is calculated by the establishment so not added to the cost.

****four star

- higher quality of service levels in all departments and in general higher staffing levels; as well as a serious approach and clear focus to the food and beverage offering.
- All areas of operation should meet the Four Star level of quality for cleanliness, maintenance and hospitality, residents should have 24 hour access, facilitated by on-duty staff.
- 24 hour room service, including cooked breakfast and full dinner during restaurant opening hours
- services offered, e.g. afternoon tea, meals at lunchtime
- At least one restaurant, for breakfast and dinner seven days a week.
- All bedrooms with en suite bathrooms showers.
- Wi-Fi or internet connection provided in bedrooms.

*** Three star

- All areas meet the Three Star level of quality for cleanliness, maintenance and hospitality
- Residents have access at all times during the day and evening Dinner served a minimum of six evenings a week with bar snack or equivalent available on seventh
- Room service as a minimum of hot and cold drinks and light snacks (e.g. sandwiches) during daytime and evening.
- All bedrooms with en suite bathrooms.
- Internal or direct dial telephone system required
- Wi-Fi available in public areas.

* one star

- minimum of five bedrooms.
- All bedrooms with en suite or private facilities.
- guests have access to the hotel at all times.
- Proprietor and/or staff on site all day and on call at night.
- A dining room,restaurant serving a cooked or continental breakfast seven days a week.
- A dining room, restaurant serving evening meals at least five days a week
- A bar or sitting area with a Liquor (alcohol) Licence.
- Hotel open seven days a week during its operating season
- Proprietor and or staff available during the day and evening to receive guests and provide information
- A clearly designated reception facility

LO1 Understand the environment in which the hospitality and catering providers operate

AC 1.1

The structure of the hospitality and catering industry- suppliers to hospitality and catering

Specialist markets

Advantages	Disadvantages
• Large choice of commodities • Several suppliers at the market means costs are kept down by competition • Supplies are always at their freshest • New supplies in every day	• May not be easy to get to eg London • Work through the night and close early in the morning • Costs of transport back may be expensive • Purchaser has to judge quality for themselves before they buy

Local suppliers

Advantages	Disadvantages
• Local deliveries, less environmental impact • May use local farms and companies for commodities • Smaller firms, personal business relationship • May be able to change order at short notice	• May not have a wide selection • Smaller companies buy in smaller quantities so costs more • May not be able to supply large orders

Large Wholesalers

Advantages	Disadvantages
• Very large range of commodities and sundries • Can have in house butchery department • Pre made and pre portioned food • Large bulk packaging of ingredients	• May be expensive for pre made foods • Have to order well in advance • Set delivery days • Have to order large quantities to get a discount

Frozen foods suppliers

Supply frozen ingredients as well as pre made and pre portioned food

Restaurant supplies

from specialist companies

Catering equipment

Specialist large scale catering and kitchen equipment from specialist companies

The kitchen brigade

Staff structure in a hotel

AC 1.2

Job roles in the Hospitality and Catering industry

- A smaller establishment may have one manager in overall control of the day to day running.
- A larger establishment may have several managers each responsible for a different area of the business. Eg
- Food services manager
- Head chef
- Bar manager
- Office manager
- Maintenance/housekeeping manager

Restaurant manager

Maitre d'Hôte

- The restaurant manager is in overall charge of the restaurant,
- Takes bookings, relays information to the head chef, completes staff rotas, ensures the smooth running of the restaurant

Head chef

The head chef (Executive chef) is a management level position
The head chef is responsible for

- Menu planning
- Food production
- Costing and purchasing
- Staff work rotas and training
- Hygiene of the kitchen and staff
- Stock control

Sous chef

- The Sous chef (sous=under in french) is directly in charge of food production, the minute by minute supervision of the kitchen staff, and food production
- A sous chef will also have many years experience in all stations of the kitchen and level 4 qualifications gained over years of study.
- this role is more kitchen based than the head chef which may have office based duties as well

Managers responsibilities

Depending on the size of the establishment, management responsibilities may include the following

- Dealing with complaints
- Setting budgets and monitoring spending
- Ensuring that wages are paid
- Complying with legislation
- Setting staff rotas
- Interviewing applicants for jobs
- Setting standards of service

Pastry chef

Le Patissier
The pastry chef is responsible for the preparation of baked goods such as pastries,cakes, biscuits, macarons, chocolates, breads and desserts ,special occasion cakes. In larger establishments, the pastry chef often has team in their own kitchen

Other areas- Chefs de partie

Poisonnier- fish
Legumier- vegetable accompaniments
Potager – soups
Boulanger – bread and baked goods
Boucher – prepares meat and charcuterie
Glacier – chilled and frozen desserts
Friturier – fry chef
Grillardin – grill chef

Commis chef *le commis*

Chef in training, helps in all areas of the kitchen to gain experience, and complete training, answers to the chefs de partie for the section they are working on

Kitchen assistants

Kitchen assistants carry out a range of jobs including washing up, fetching and carrying , preparation of vegetables and ingredients. They could be training to be a commis chef

Sauce chef

Le Saucier
Prepares sauces, stews and hot hors d'oeuvres and sautes food to order,
After the head chef and the sous chef the sauce chef is the next in line

Vegetable chef

L'entremetier
Prepares hot appetisers and often prepares the soups, vegetables, pastas and starches,side dishes
Sometimes split into soup (le potager) and vegetable (le legumier) chefs

Larder chef

Le garde manger
Responsible for preparing cold foods, including salads,
cold appetisers, pates and buffet items

Patience, tact and diplomacy

You need to be sensitive when dealing with others who have difficult issues, when solving problems or dealing with complaints. Always answer politely and make sure the customer is happy. Eg if they ordered a steak medium and then say it is undercooked even if it is medium

Team player

Hospitality jobs need people to be team players and communicate effectively and correctly with their co workers to ensure the smooth running of the establishment.

Personal presentation

Workers must have good standards of personal hygiene, tidy appearance and good posture . Smart dress, tidy hair and non visible tattoos give a good impression of the establishment

Honesty

When dealing with serving drinks and taking payments as well as other working situations you must be honest and transparent with your job. Telling the truth if something happens and being honest with money are essential

Initiative

Being able to work on your own initiative is a very important quality, anticipating customer needs and solving problems, if something spills , clear it up without having to be told, if a customer is looking unhappy with their food ask if everything is ok

Self motivation

Being self motivated means trying to do your best, not having to be constantly asked to do things, being at work on time, making sure things are done even if it was not your duty