

Year 10

Student Planner and Knowledge Navigators

2023-24 Cycle 3

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| Full Name: | | Advisory: | |
| Advisor: | | Head of Year: | |

| Page Number/s: | Title: |
|----------------|---|
| 3. | Academy Mission, My Sentence, Values and Drivers |
| 4-5. | Introduction to the Student Planner: Attendance, Punctuality and Safeguarding |
| 6-7. | Home Academy Agreement and Uniform Expectations |
| 8. | Learning Habits |
| 9-24. | Morning Meeting Pages |
| 25-31 | English Knowledge Navigators |
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Toilet during lesson permission

| Date | Time | Period | Subject | Staff |
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Parent permission - paracetamol

Occasionally students can develop headaches or other minor ailments in school. These can usually be resolved by staff in Mountain Rescue by supplying water; allowing a time out; providing a quiet space and by providing paracetamol.

Staff on site will always administer paracetamol in accordance with guidelines for a child's age and only where we have consent from a parent / carer. Paracetamol will be given by a trained first aider if it is deemed appropriate. If we issue paracetamol to your child in the school day, we will always call home to let you know that paracetamol has been given and the time the student took it.

If, after interventions above, your child continues to worsen or their condition does not improve, we will contact you to decide on the best course of action for the remainder of the day.

Consent

I agree, subject to the conditions above, to allow a trained first aider at the academy to administer an appropriate dose of paracetamol should my child present with a minor ailment.

Parent name: _____ Relationship to student: _____

Parent signature: _____ Date: ____ / ____ / ____

Mission

We ensured all students succeeded at university, or a real alternative, thrived in a rewarding career and had a purposeful and happy life.

My sentence:

Values

Determination - We never give up. No matter how challenging things get, we keep climbing.

Integrity - We do the right thing because it is the right thing to do. We do this even when people are not watching.

Respect - We value each other. We promote the hopes, qualities and achievements of every member of our community.

Drivers

Mastery - To get better at things that matter.

Autonomy - To direct our own lives.

Purpose - To connect to a cause larger than ourselves.

Wednesday Morning Meeting: Behaviour Curriculum and Cognitive Science

Behaviour Curriculum Brain Dump

Behaviour Curriculum: Retrieval Practice

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Cognitive Science Brain Dump

Personal Reflection: How will I apply what I have learnt in today's session?

Revision Space

| Revision Space |
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English Masterclass: Retrieval Practice

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English Masterclass: Application Practice

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English Masterclass: Additional Notes

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Wednesday Morning Meeting: Behaviour Curriculum and Cognitive Science

Behaviour Curriculum Brain Dump

Behaviour Curriculum: Retrieval Practice

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| 1. _____ | 4. _____ |
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Cognitive Science Brain Dump

Personal Reflection: How will I apply what I have learnt in today's session?

Revision Space

Quote of the day

"I hated every minute of training, but I said, 'Don't quit. Suffer now and live the rest of your life as a champion.'" — Muhammad Ali

What have you learnt from today's session? Write down at least three facts below.

- 1.
- 2.
- 3.
- 4.
- 5.

Review of Mastery Next Step:

Did you achieve your mastery next step from Monday? If so, how did you achieve it?

If not, why not?

Monday Morning Meeting - Cycle 3 Week 12

Mastery Next Step

Word of the Week:
Definition

Word of the Week:
Use in a sentence

| Specialist Material (timber) | |
|---|--|
| 46. Air Seasoning | A natural method of reducing the moisture content of wood by letting air flow around it in a controlled way. |
| 47. Kiln Seasoning | A quick method of reducing the moisture content of wood. A kiln is filled with steam and then gradually reduced which slowly dries out the wood. |
| <p>48. Timber Conversion</p> <p>Through and Through</p> <p>Quarter Cut</p> <p>Tangential Cut</p> <p>49. Wood Finishes</p> <p>Preservatives (repels water/moisture and insects)</p> <p>Stains (enhances/changes colour)</p> <p>Varnish (clear finish and adds protection)</p> <p>Oils (enhances the wood's natural oils)</p> | |

| Specialist Material - Tools and Materials | |
|---|---|
| 41. Marking Gauge | Used to make a parallel line to an edge. |
| 42. Planes | Used to create a smooth surface by slicing away thin shavings of waste wood. |
| 43. Chisels | Used to produce a variety of wood joints. |
| 44. Tenon Saw | Used to cut accurate and straight lines in wood. |
| 45. Coping Saw | Used to cut curved lines in wood. Can be used to cut fine and intricate cuts. |

| Material Categories | | |
|----------------------|--|---|
| 50. Timber and Board | <p>Hardwoods Oak, ash, mahogany.</p> <p>Softwoods Larch, pine, spruce.</p> <p>Manufactured Boards MDF (medium density fibreboard), plywood, chipboard.</p> | 54. Paper and Board |
| 51. Metals | <p>Ferrous Metals Low-carbon steel (mild steel), high-carbon steel (tool steel), cast iron.</p> <p>Non-Ferrous Metals Aluminium, copper, silver/gold.</p> <p>Alloys Brass, bronze, stainless steel.</p> | 53. Textiles |
| 52. Plastics | <p>Thermofforming Polymers Acrylic (PMMA), high-impact polystyrene (HIPS), polypropylene (PP).</p> <p>Thermosetting Polymers Epoxy resin, urea formaldehyde, melamine formaldehyde.</p> | 54. Paper and Board |
| 53. Textiles | <p>Natural Fibres Cotton, wool, silk.</p> <p>Synthetic Fibres Polyester, polyamide, elastane.</p> <p>Blended Textiles Polycotton.</p> | <p>Papers Bleed proof paper, layout paper, tracing paper.</p> <p>Boards Corrugated carboard, foam-core board, duplex board.</p> |

| Key Terms | |
|-------------------------------------|--|
| 1. Automation | The use of machinery to complete manufacturing tasks. |
| 2. Crowdfunding | Raising money from large numbers of people. |
| 3. Cooperatives | Businesses owned, governed and self-managed by its workers. |
| 4. Non-Renewable | Resources that will eventually run out (cannot be replaced). |
| 5. Renewable | Resources that can be replaced/regrown (will not run out). |
| 6. Technology Push | New technologies or materials that lead to designers using these to design new products. |
| 7. Market Pull | Products made/improved in response to customer needs. |
| 8. Flexible Manufacturing Systems | A system in which production is organised into cells of machines performing different tasks. |
| 9. Just in Time Manufacturing | Ensuring materials and components are ordered to arrive at the product assembly point just in time for production. |
| 10. Lean Manufacturing | Production focusing on reduction of waste to minimise costs and maximise efficiency. |
| 11. Photochromic | Changes colour in relation to light levels. |
| 12. Thermochromic | Changes colour in relation to heat. |
| 13. Shape-memory Alloys | Can be bent/deformed and returns to original shape when heated. |
| 14. Glass-Reinforced Plastic | A lightweight, chemical and heat resistant and waterproof composite material. |
| 15. Carbon Fibre Reinforced Plastic | A carbon fibre mesh set with adhesive which has an extremely high strength-to-weight ratio. |
| 16. Kevlar | Woven fabric with excellent impact resistance. |
| 17. Gore-Tex | Waterproof and breathable textile. |
| 18. Microfibres | Very fine synthetic textile which is breathable and durable. |
| 19. Conductive Fabrics | A textile that allows a small electrical current to pass through them. |

| Key Terms | |
|--------------------------------------|---|
| 20. First-Class Lever | A lever that has the fulcrum in the middle. |
| 21. Second-Class Lever | A lever that has the load in the middle. |
| 22. Third-Class Lever | A lever that has the force in the middle. |
| 23. Linear Motion | Movement in a straight line. |
| 24. Reciprocating Motion | Movement backwards and forwards in a straight line. |
| 25. Rotary Motion | Movement around a circle. |
| 26. Oscillating Motion | Movement swinging from side to side. |
| 27. Physical Properties | Traits/characteristics that a material has before it is used. |
| 28. Fusibility | Ability to be heated and joined to another material. |
| 29. Electrical Conductivity | Ability to conduct electricity. |
| 30. Thermal Conductivity | Ability to conduct heat. |
| 31. Resistance to Moisture | Ability to prevent liquid and moisture from permeating the surface. |
| 32. Absorbency | Ability to soak up and retain liquid, heat or light. |
| 33. Mechanical or Working Properties | How a material behaves when it is manipulated. |
| 34. Strength | Ability to withstand a constant force without breaking. |
| 35. Hardness | Ability to withstand scratching, cutting and abrasion. |
| 36. Density | How solid a material is. |
| 37. Toughness | Ability to withstand impact from a dynamic force. |
| 38. Malleability | Ability to be bent or shaped easily. |
| 39. Ductility | Ability to be drawn or pulled into a length or wire without breaking. |
| 40. Elasticity | Ability to be stretched and return to its original shape. |

| Maths Masterclass: Retrieval Practice | |
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| 1. _____ | 4. _____ |
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| Maths Masterclass: Application Practice | |
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| I Do | You Do |

| Maths Masterclass: Application Practice | |
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| 1. _____ | 4. _____ |
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| Maths Masterclass: Diagnostic Question |
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Behaviour Curriculum Brain Dump

Behaviour Curriculum: Retrieval Practice

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| 1. _____ | 4. _____ |
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Cognitive Science Brain Dump

Personal Reflection: How will I apply what I have learnt in today's session?

40. Nutritional Needs and Health

Nutritional Age Needs:

- **Babies:** Newborn babies only drink milk for the first 4-6 months before being weaned. First milk is called colostrum. Human milk provides all nutrients except iron, babies are born with an iron store in their liver.
- **Children:** 1-3 yrs grow quickly so needs a well-balanced diet for development. Toddlers are very active and need a good supply of fat for energy. this also helps with brain and nervous system development. New foods should be introduced in an attractive and appealing way. They should avoid sweets, fizzy drinks, sugary foods.
- **Teenagers:** Rapid growth and puberty occurs. They need a higher amount of nutrients and energy. Boys need protein for muscle growth. Girls need more iron to replace blood loss during menstruation, they are prone to iron-deficiency anaemia.
- **Adults and Older People:** Adults need to maintain a healthy balanced diet to keep the body working properly and prevent diet-related problems. In older people, energy requirements decrease so they need smaller portions and less calories. They must keep hydrated and drink plenty of fluids. Osteoporosis may occur and so a diet high in calcium and vitamin D is needed to strengthen bones.

Religious Needs

| | |
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| Judaism | <ul style="list-style-type: none"> • No Shellfish or pork. • No dairy food eaten in the same meal as meat • Only Kosher meat can be eaten |
| Hinduism | <ul style="list-style-type: none"> • No beef or beef products & will avoid pork • Some Hindus practice fasting • Foods such as onion, garlic and alcohol, thought to "excite" the body are forbidden • Many Hindus are vegetarian |
| Islam | <ul style="list-style-type: none"> • No pork • Only Halal meat can be eaten • Haram foods cannot be eaten • Ramadan is a fasting month, at the end of Ramadan, Eid-ul-Fitr takes place |
| Sikhism | <ul style="list-style-type: none"> • No beef • Many Sikhs are vegetarian or ovo-lacto vegetarian |
| Christianity | <ul style="list-style-type: none"> • No particular dietary requirements, though some foods are associated with celebrations e.g. pancakes on Shrove Tuesday and hot cross buns at Easter |
| Buddhism | <ul style="list-style-type: none"> • Vegetarian |
| Rastafarianism | <ul style="list-style-type: none"> • Vegetarian or Vegan • White fish are sometimes eaten (but no shellfish) |

41. Food Labelling



Each serving (150g) contains
of an adult's reference intake
Typical values (as sold) per 100g: 697kJ/167kcal

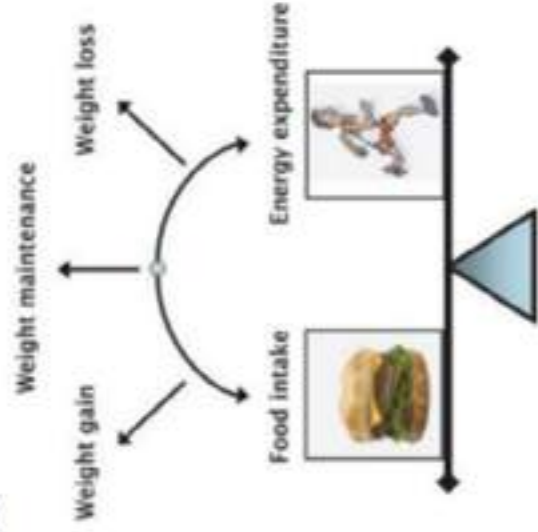
Eatwell Guide and Government Guidelines:



The Eatwell Guide shows the proportions of food groups that should be eaten daily in a well-balanced diet. There are 8 main government guidelines for a healthy diet.

- Base your meals on starchy carbohydrates.
- Eat lots of fruit and veg (5-7 portions a day).
- Eat plenty of fish, including oily fish.
- Cut down on saturated fat and sugars.
- Eat less salt - no more than 6g a day.
- Get active and maintain a healthy weight.
- Drink 6-8 glasses of water a day.
- Always eat a healthy breakfast.

Energy Balance:



- Energy balance is when you use the same amount of energy that you intake through food. This results in weight maintenance.
- Too much energy intake can result in weight gain.
- Too little energy intake can result in weight loss and lethargy.
- You can work out how much you should be eating: $BMR \times PAL = EAR$.
- Guidelines suggest at least 60 minutes of activity a day.

English Masterclass: Retrieval Practice

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English Masterclass: Application Practice

I Do

You Do

English Masterclass: Additional Notes

Quote of the day

'It's never too late to be what you might've been.' — George Eliot

What have you learnt from today's session? Write down at least three facts below.

- 1.
- 2.
- 3.
- 4.
- 5.

Review of Mastery Next Step:

Did you achieve your mastery next step from Monday? If so, how did you achieve it?


If not, why not?

Monday Morning Meeting - Cycle 3 Week 13

Mastery Next Step

Word of the Week:
Definition

Word of the Week:
Use in a sentence

| 38. Heat Transfer | | | 39. Food Provenance | | |
|--|----------------------|--|--|----------------------|---|
|  | Radiation | Energy is transferred to cook the food by waves of heat or light striking the food. Two types - infrared or microwave. |  | Convection | Transfer of heat through a liquid or air circulation into food, e.g. boiling. |
|  | Conduction | Transfer of heat through a solid object into food, e.g. frying pan. |  | Red Tractor | ASSURED FOOD STANDARDS |
|  | Organic | Soil Association Organic |  | British Lion | Safe Food |
|  | Eatwell Guide | |  | MSC | CERTIFIED SUSTAINABLE SEAFOOD |
|  | Fairtrade | |  | Maine Council | |

| Food Science | |
|---|---|
|  | 31. Gelatinisation Gelatinisation is a chemical reaction involving starch. When heat and moisture are applied to starch, it starts to thicken. For instance, adding flour to a roux (cheese sauce) helps to thicken the sauce. |
|  | 32. Dextrinisation Dextrinisation is the process involving the browning (breakdown) of starch foods when subjected to dry heat, such as toasting. It is defined as breakdown of starch (polysaccharides) into dextrins (disaccharides - simple sugars). |
|  | 33. Gluten Gluten is a group of proteins that occur in various cereal grains (wheat = flour). |
|  | 34. Plasticity Plasticity means the ability to be spread, manipulated or shaped, which occurs at different temperatures for different types of fats. |
|  | 35. Aeration The process of allowing air to be combined into ingredients to make them lighter and/or create more volume, such as whisking. |
|  | 36. Denaturation Denaturation refers to the physical changes that take place in a protein. Maintaining or tenderising can denature - break down the bonds - of a protein. |
|  | 37. Emulsification Emulsifying something means you're dispersing fat into water (mayonnaise) or water into fat (butter). Remember hydrophilic and hydrophobic. |

| Key Terms | |
|----------------------------------|---|
| 1. Environment | The impact of food production on the natural environment, e.g. water, wildlife, soil. |
| 2. Food Miles | The distance a food has travelled to reach the customer, e.g. tea coming from Africa. |
| 3. Food Availability | The ability to produce enough food to feed everyone. |
| 4. Food Source | Where the food comes from, e.g. food that's caught, such as fish. |
| 5. Food Marketing | The methods companies use to promote a product, e.g. TV adverts, coloured packaging, logos. |
| 6. Best Before Dates | A date that the food tastes the best and has the best nutritional value before but is not harmful to eat after, e.g. flour. |
| 7. Use By Dates | A date that the food must be used by to ensure safety for the customer, e.g. milk or meat. |
| 8. Macronutrient – Carbohydrates | Required by all mammals, these are the nutrients required for energy. Produced in plants during photosynthesis. |
| 9. Monosaccharide | A simple carbohydrate, made up of one sugar molecule. Fast-release carbohydrates – sugary cereal. |
| 10. Disaccharide | A carbohydrate made of two sugar molecules. Still fast-release carbohydrates. |
| 11. Polysaccharide | A complex carbohydrate with multiple sugars joined together. They do not taste sweet. |
| 12. Macronutrient – Protein | A macronutrient made up of chains of amino acids. Essential for building muscle. Proteins can be Low Biological Value and High Biological Value – do or don't contain all essential amino acid. |
| 13. Macronutrient – Fats | Macronutrient that supplies the body with energy, cushion the organs and help break down fat-soluble vitamins. |
| 14. Macronutrient – Vitamins | A, D and E, fat-soluble and found in fruits and vegetables (also antioxidant). K is also fat-soluble. B group vitamins. All needed for body function. |

| Key Terms | |
|-----------------------------------|---|
| 15. Micronutrient – Minerals | Chemical substances – such as calcium and potassium – needed for body functions; they're found in most foods. |
| 16. Excess/Deficiency | Eating too many or too few macro or micronutrients, which can lead to health problems. |
| 17. Microorganisms | Pathogenic (causing disease) microorganisms, such as bacteria and mould. |
| 18. Raising Agents | Mechanical: Whisking, beating, sieving, creaming, rubbing in or folding to trap air. Chemical: Bicarbonate of soda or baking powder to release CO ₂ . Biological: Yeast to release CO ₂ . All help foods to rise, such as bread or cakes. |
| 19. Fortification | Adding vitamins and minerals to food during its manufacture, e.g. calcium to flour. |
| 20. Additives | Natural or synthetic added to food during manufacture to improve quality, flavour, texture, etc. |
| 21. Flavourings | Added to food to improve or modify the natural flavours and odours of food. |
| 22. Nutritional Needs | Amount of nutrients a person needs (macro and micro), determined by age and health needs. |
| 23. Food Choices | The choice a person makes about what they eat, e.g. being vegetarian. |
| 24. BMR (Base Metabolic Rate) | The amount of energy kilojoules (KJ) a body needs to live. |
| 25. PAL (Physical Activity Level) | The amount of energy the body uses for movement and physical activity. |
| 26. Nutritional Analysis | The nutrient breakdown in different foods. |
| 27. Danger Zone | Range of temperatures between 5-63 degrees at which bacteria begin to multiply rapidly. |
| 28. Cutting Technique | The different methods used to cut vegetables and meat to help cook and garnish foods. |
| 29. Sensory Analysis | Analysing how food looks, smells, tastes and feels so we can select what we like to eat. |
| 30. High-Risk Foods | Foods that are high in moisture and protein that enable pathogenic microorganisms to grow, e.g. bacteria on cream. |

Maths Masterclass: Retrieval Practice

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Maths Masterclass: Application Practice

| I Do | You Do |
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Maths Masterclass: Application Practice

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Maths Masterclass: Diagnostic Question

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Behaviour Curriculum Brain Dump

Behaviour Curriculum: Retrieval Practice

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Cognitive Science Brain Dump

Personal Reflection: How will I apply what I have learnt in today's session?

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What you need to do to achieve the best grades:

1. Present your work as neatly as possible - clean lines, clear presentation, and beautiful lettering.
2. Draw as much as possible - to show you have clearly observed the artist's work.
3. Write about what you intend to do - and reflect on what you have already done.
4. Be as independent as you can - by researching other artists besides those that have been suggested.
5. Take photographs of images that are relevant to the project theme.
6. Meet all the deadlines set - if you fall behind, it is difficult to catch up on missing work.

Key words to learn for GCSE art annotation:

| | |
|-----------------|--|
| SPACE: | positive; negative; open; closed; deep; foreground; composition; position; perspective |
| COLOUR: | primary; secondary; tertiary; bright; bold; radiant; dull; vivid; contrasting; monochrome; harmonious; analogous; complementary; tint; tones; warm; cool |
| SHAPE: | regular; irregular; circle; triangle; square; angular; asymmetrical; bent; bulbous; chunky |
| FORM: | 3-Dimensional; model; construct; mould; |
| VALUE: | tone; gradations; dark; light; mid; bright; faded; smooth; |
| TEXTURE: | smooth; rough; coarse; bumpy; spiky; silky; broken; serrated; |
| LINE: | fluent; free; controlled; powerful; geometric; angular; thick; thin; horizontal; vertical; overlapping; inflected; continuous |

BTEC Level 1/2 Tech Award in Enterprise – Component 3



12. Calculations

Profit = Total revenue – Total Costs

Gross profit = Turnover – Cost of sales

Net profit = Gross profit – Expenditure

14. Asset: Something that an enterprise (or the owner of an enterprise) owns.
Fixed asset: Does not change in the short term or the owner of the enterprise will use to make money. E.g. A vehicle.
Current asset: An item that will change with every transaction. E.g. stock.
Liability: Something an enterprise owes.
Current liabilities: Money that must be paid back within a year. E.g. bank overdraft.
Long-term liabilities: Money that can be repaid over a longer period of time. E.g. loans.

13. Turnover: the total revenue an enterprise receives in a given financial period.

Capital: Money put in to start up or grow a business.

Cash: The money an enterprise actually has including cash in the till and money in the bank.

Profit: All revenue minus expenses over a period of time.

15. Profitability: An enterprise's ability to turn revenue into profit.

Gross profit margin (%) = (Gross profit / Sales revenue) x 100

Net profit margin (%) = (Net profit / Sales revenue) x 100

Liquidity: The ability of an enterprise to pay its debts.

Current ratio = current assets / current liabilities

Liquid capital ratio = (current assets – inventories) / current liabilities

BTEC Level 1/2 Tech Award in Enterprise – Component 3



16. Cash inflows: The amounts of money entering a business's bank account.

Cash outflows: The amounts of money leaving a business's bank account.

Cash flow statements: Actual cash inflows and outflows over a period of 12 months.

Cash flow forecasts: Cash flow statements that predict the cash inflows and outflows for an enterprise over a period of time.

Net cash flow: The difference between cash inflows and cash outflows over a particular time period.

Purpose of cash flow forecast:

- Identify the possible inflows
- Identify the possible outflows
- Work out the net cash flow.

17. Break-even: Occurs when an enterprise has made enough money through product sales to cover the cost of making or producing them. There is no profit and no loss.

$$BE = FC / (SP - VC \text{ per unit})$$

Benefits of break-even

Both the fixed and variable costs can be identified

- The owner knows how many items must be sold to make a profit.

Limitations of break-even

- Assumes for example all wages and rent will stay the same over all levels of output.
- Assumes that revenue and total costs are linear.

18. Internal sources of finance

Finance that comes from within an enterprise.

Retained profit: Profit that is not shared out to shareholders but is reinvested in the business.

Selling assets: Items owned by the business that are sold and the money is reinvested in the business.

External sources of finance

Finance that comes from outside of the enterprise.

Overdraft: Short-term loan facility.

Trade credit: Current assets, such as raw materials are purchased on credit and must be paid within 90 days.

Bank loan: Agreed amount of money that will be paid back over a period of time.

English Masterclass: Retrieval Practice

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English Masterclass: Application Practice

I Do

You Do

English Masterclass: Additional Notes

Quote of the day

“Twenty years from now you’ll be more disappointed by the things you did not do than the ones you did.” — Mark Twain

What have you learnt from today’s session? Write down at least three facts below.

- 1.
- 2.
- 3.
- 4.
- 5.

Review of Mastery Next Step:

Did you achieve your mastery next step from Monday? If so, how did you achieve it?

If not, why not?

Revision: Advice and Guidance

One of the best revision techniques is Look, Cover, Write, Check. The process is outlined below.

1. Look at the first bullet point or sentence.
2. Read it through three to five times.
3. Cover the page so that you can no longer see it.
4. Write it out exactly (word for word) as it appears in your knowledge navigator from memory.
5. Check what you wrote. Tick if correct, change if incorrect.
6. Repeat.
7. When you get it 100% correct then move on to the next chunk of information.

Remember

If information retrieved (remembered) often enough then it will gradually form part of our long term memory. Then we will never forget it.

This process is hard. If it isn’t hard then it isn’t working.

BTEC Level 1/2 Tech Award in Enterprise – Component 3

| | | |
|---|---|--|
| <p>1. Enterprise: Word used to represent the ideas and initiative involved in starting a new business.</p> <p>Promotion: Enterprises use promotion to communicate with their current and potential customers.</p> <p>Main aims:</p> <ul style="list-style-type: none"> • Build positive associations with the enterprise • Encourage customers to purchase products or services. <p>Features and benefits:</p> <ul style="list-style-type: none"> • Inform customers • Remind customers • Persuade customers. <p>Medium: refers to the type of advertising that a business chooses to use e.g. TV, radio, magazines, etc.</p> | <p>2. Advertising: This entails an enterprise paying for space in the media to communicate with the public about its goods and services.</p> <p>Purpose of advertising</p> <ul style="list-style-type: none"> • To inform people: an enterprise needs to make potential customers aware of a new product and its benefits. • To persuade people to make a purchase: an enterprise might tell people about the benefits its products offer or their value for money. <p>Examples = moving image, print, ambient [e.g. on the sides of buses], digital and audio.</p> <p>3. Sales promotion: This gives customers an incentive (often limited to a period of time) to buy an enterprise’s products.</p> <p>Purpose of sales promotion</p> <ul style="list-style-type: none"> • To entice people in • To boost sales figures • To attract first-time buyers • To clear old stock. | <p>5. Personal selling: Where a representative of an enterprise contacts potential customers directly. E.g. face-to-face, by telephone, via email or through video or web conferencing</p> <p>Public relations: Involves promoting an enterprise, a brand, a product or service by placing information about it in the media without paying for the time or media space directly. E.g. exhibitions, sponsorship or press releases</p> <p>6. Types of market</p> <p>Business to consumer (B2C): Products or services that you buy for yourself. E.g. Clothes, toys, food, etc.</p> <p>Business to business (B2B): When an enterprise sells goods or services to other enterprises. E.g. Kellogg’s selling to Tesco and Sainsbury’s.</p> <p>7. Direct marketing: When an enterprise communicates with a customer directly to try and sell them a product or service. E.g. direct mail (junk mail), mail order catalogues, magazines and telemarketing.</p> |
|---|---|--|

BTEC Level 1/2 Tech Award in Enterprise – Component 3

| | | | |
|--|---|--|---|
| <p>8. Market segmentation: Markets can be divided into different sections or market segments. Each segment is made up of customers who have similar characteristics and needs.</p> <p>Benefits of segmenting the market</p> <ul style="list-style-type: none"> • Understand the characteristics and needs of their customers better • Develop goods and services for a specific market segment • Identify and choose a target market to specialise in • Choose promotional strategies that are better suited to their target market. | <p>9. Different market segments:</p> <ul style="list-style-type: none"> • Demographic – age, race, religion, gender, family size, ethnicity, income, education level and socio-economic group • Geographic – location • Psychographic – social class, attitudes, lifestyle and personal characteristics • Behavioural – spending, consumption, usage, loyalty status and desired benefits. | <p>10. Factors influencing the choice of promotional methods:</p> <ul style="list-style-type: none"> • Size of enterprise – large enterprises can use all promotional strategies, whereas small enterprises can’t • Budgetary constraints – the amount of money an enterprise has available to spend on promotion • Appropriateness for product/service - choosing the best method for the product / service the enterprise is selling • Target market – the enterprise must ensure their target market sees their promotion. | <p>11. Financial documents: Enterprises need to fill in a range of documents when completing financial transactions. The purpose of these documents is to ensure that the business, its customers and its suppliers have an accurate record of all trading that has taken place.</p> <p>Revenue: The income of an enterprise receives through various activities.</p> <p>Revenue = Number of sales x price per unit</p> <p>Fixed costs: The costs that have to be paid no matter how many products the business sells. E.g. rent on a factory.</p> <p>Variable costs: The costs that are directly related to the number of items sold or produced. E.g. materials to manufacture products.</p> |
|--|---|--|---|

Knowledge Organiser: Computer Crime & Cyber Security

Summary

Malware is a general term that describes lots of different programs that try to do something unwanted to your computer. Malware is made to stop your device from running properly and sometimes to steal your information.

Anti-malware software is designed to find and stop malware from damaging your computer or a network. To protect your computer you need to install **anti-malware** software and run regular scans.

When you are online you need to watch out for **phishing** and **spam emails** and protect your private information. **Phishing** emails are trying to trick someone into giving out information over email. **Spam emails** can contain **malware**.

Smartphones and mobile devices allow for photos, videos and your location to be shared instantly on the internet. **Be careful what you get up to in public as anyone might have a smartphone pointed at you.** Do not post photos or videos of other people online without their permission.

Phishing emails are trying to trick someone into giving out information over email.

What to look out for in a phishing email

The greeting is not personalised

Poor spelling and grammar

Forged link

Sense of urgency

Request for personal information

The sender's address is often a variation on a genuine address

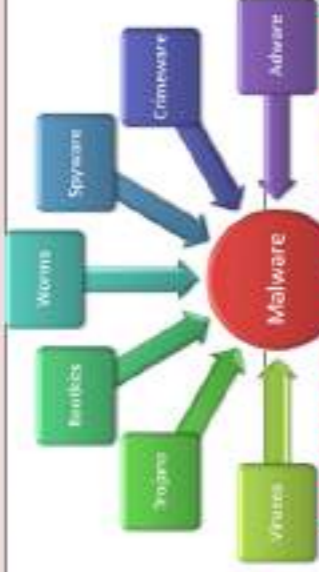
Spam emails offer all kinds of things like money and prizes and can contain malware too.

Ways to reduce spam:

Use a spam filter - most email clients try to stop spam from reaching you by using a spam filter.

Do not give your email address out – if you don't trust the website or if supplying your email address is optional, don't give it to them.

Keep an eye out for tick boxes – when you sign up to a website, it might try to sign you up to its newsletter.



Malware is software that can harm devices
Typical actions of malware include deleting or modifying files.

Spyware—secretly monitors user actions, e.g. key presses, and sends information to the hacker. Some spyware can even use your webcam without your knowledge.

Viruses—spreads through normal programs and might slow down your device or change your applications and documents.

Worms— spread from device to device and copy themselves hundreds of times. A worm might copy itself onto your email account and then send a copy to all of your email contacts!

Trojan horse— pretends it will be a useful and safe program, when actually it will try to attack your device.

Adware—displays adverts while it is running; some can serve as spyware, gathering information about you from your hard drive, the web sites you visit, or your keystrokes.

staying safe online

Never disclose your name telephone number address or school

It's wise not to share your location. Especially on websites and apps that are accessible by anyone.

Never accept someone as a 'friend' on social media simply because they claim to know another friend of yours.

Always be cautious about what you say online.

Visit these websites for advice



Key Vocabulary

| | |
|---------------------|--|
| Backup | A copy of important files that is kept separately in case your original files are lost or damaged. |
| Chat room | Accessed on the internet, users can meet to chat in real-time, messages are typed out but voice chat rooms exist too. |
| Copyright | A set of rights that prevents people copying and distributing a piece of work without the copyright holder's permission. |
| Data | Values, typically letters or numbers. |
| File sharing | The act of sharing files over the internet. |
| Firewall | An application that prevents unauthorised connections to and from the internet. |
| Hack | Gaining unauthorised access to a computer. |
| Information | Data that has meaning, not just a number or a letter. |
| Licence | A legal agreement between the company who published the software and the end user covering areas such as copyright. |
| Malware | Malicious software created to damage or gain illegal access to computer systems. |

English Language, Paper 1: Explorations in Creative Reading and Writing (Section A)

Active Reading - Before you answer any questions, read the text and questions very carefully.

With a pencil, not highlighters:

1. Read and underline the **focus** of the questions
2. Underline **key words** and **quotations** in the source(s)
3. **Bracket or box** longer sections of important text that relate to the key focus of the questions
4. **Margin note** – briefly summarise the **key point** of each paragraph
5. **At the end** – summarise the **whole source** in one sentence

| Question wording | What To Do |
|--|---|
| Question 1: List four things about... | Lines to find the information will be given to you (i.e. lines 1-5). Don't use very long quotes. Can write in own words. Only one point per line. |
| Question 2: How does the writer use language to... You could include the writer's choice of: • words and phrases • language features and techniques • sentence forms. | Lines to analyse will be given to you (i.e. lines 1-5). Underline possible quotes. Choose 3 richest. Can be groups of micro-quotes. Write 3 small paragraphs. Link back to focus of question. Use correct terminology. Include effect on reader. |
| Question 3: How has the writer structured the text to interest you as a reader? You could write about: • what the writer focuses your attention on at the beginning • how and why the writer changes this focus as the source develops • any other structural features that interest you. | This question uses the whole source. Divide it into 3 sections - start/middle/end. Find a structural feature in each section. Use either 3 small quotes or 3 small descriptions of where the structural device is. Write 3 paragraphs (1 about the start, the middle and end) analysing how the structure interests you. Use correct terminology. Lines to analyse will be given to you (i.e. lines 39 to end). Decide if you agree or disagree. |
| Question 4: To what extent do you agree? In your response, you could: • write about your own impressions of the characters • evaluate how the writer has created these impressions • support your opinions with references to the text. | Find quotes and language/structural devices to support your ideas. Aim for 4-5 paragraphs, all of which must have quotes and devices. Refer back to the question each paragraph. Use correct terminology. |

Questions

| | | | | |
|---|------------|---|----------|------------|
| 1 | Identify | Identify explicit/implicit information & select evidence. | 4 marks | 5 minutes |
| 2 | Language | Explain how writers use language. Use terminology | 8 marks | 10 minutes |
| 3 | Structure | Explain how writers use structure. Use terminology | 8 marks | 10 minutes |
| 4 | Evaluation | Evaluate texts and support with textual references | 20 marks | 20 minutes |

Academic Writing Toolkit

| |
|--|
| Verbs of Inference: suggests/implies/indicates/conveys/depicts/signifies/illustrates/emphasises/highlights/alludes to/insinuates/intrinsically |
| Analytical Verbs: accentuates/intensifies/enhances/heightens/creates/establishes/builds/incapacitates/optomises/hypifies/reinforces/strengthens/symbolises/represents/evokes |
| Reader's Response: Shocks/horifies/digests/surprises/astounds/amazes/intigues/entices/confuses/perplexes/bewilders/denotes/isolates/overwhelms/frustrates/angers/embarrasses/inspires/emboldens/empowers |
| Adverbs of Affirmation: definitely/surely/certainly/soberly/frequently/regularly/unquestionably/invariably/characteristically/typically |
| Adverbs of Clarity: especially/particularly/notably/prominently/markedly/predominantly |

| Question 2 - Language Terminology | |
|-----------------------------------|---|
| Word Class | |
| Noun | Identifies a person, thing, idea or emotion |
| Adjective | Describes a noun |
| Verb | Describes an action, event, situation or change |
| Adverb | Gives information about a verb, noun or adjective |
| Vocabulary | |
| Semantic Field | Words from a text with related meanings |
| Simile | Something presented as like something else. |
| Metaphor | Something presented as something else. |
| Personification | Giving human traits to something non-human |
| Alliteration | A hissing sound made by s or sh |
| Plosive | Harsh consonant sounds such a t, d, b, p |
| Juxtaposition | Two ideas together which contrast each other |
| Oxymoron | Contradictory terms together |
| Hyperbole | Extreme exaggeration |
| Repetition | A word, phrase or idea repeated for effect |
| Sentence Types | |
| Short, simple | One main clause. |
| Fragment | An incomplete sentence to create drama |
| Long, complex | One main clause and several dependent clause. |
| Exclamation | Expresses strong emotions |
| Command | Use imperative verbs |
| Interrogative | Ask questions |

| Question 3 - Structure Terminology | |
|------------------------------------|--|
| Narrator | |
| First Person | Told from 1 character's perspective |
| Omniscient Third Person | External narrator - knowledge of more than 1 character's thoughts |
| Limited Third Person | External narrator - knowledge of only 1 character's thoughts. |
| Unreliable narrator | What they say makes us question their credibility. |
| Narrative Styles | |
| Linear | Events told in order |
| Non-linear | Events told not in order |
| Cyclical | Ends the way it begins |
| Points in Narrative | |
| Exposition | At start; ideas established |
| Development | Earlier point developed |
| Climax | Most intense or decisive point |
| Resolution | The answer to a conflict |
| Structure Techniques | |
| Flashback | Presents past events |
| Flash-forward | Presents future events |
| Foreshadowing | Hints at what is to come |
| Shift | Change of focus to... |
| Tension / Suspense | Feeling of emotional strain |
| Fiction Trigger | An event that initiates an action or other event |
| Atmosphere | Tone or feel set by the writer, often through description of setting |
| Setting | A geographical/historical moment in which the text is set |
| Dialogue | Lines spoken by characters, often revealing of their personality |
| Motif | A recurring element in a story |

Knowledge Organiser: Understanding computers Discover how computers work

Summary

Computers require input hardware, processing hardware and output hardware. The hardware that defines a computer is the **CPU and memory**. Without these a computer could not function. The CPU and memory work together to run programs.

CPU - executes programs using the **fetch-decode-execute cycle**.

Memory - stores program operations and data while a program is being executed. There are several types of memory, including: **registers, cache, RAM and virtual memory**.

Storage - stores programs and files long term, even when they are not in use. Devices such as hard drives, USB memory sticks or SD cards are used to store files such as photos, music and software applications long term.

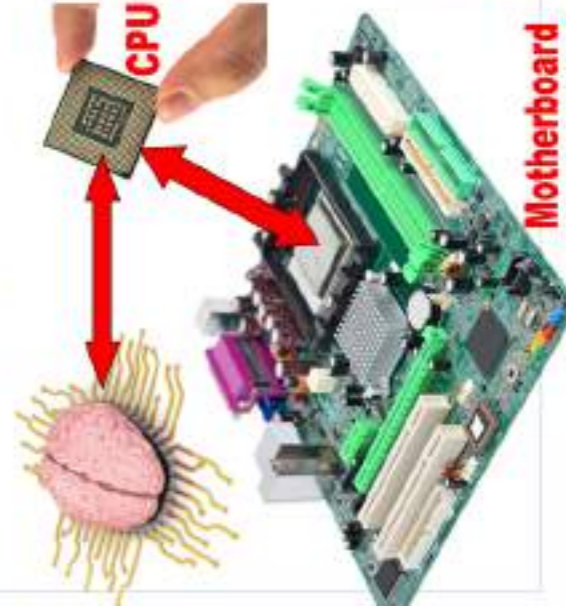
An **input device** is any piece of computer hardware used to provide data to a computer system. Examples include: keyboard, mouse, scanner, digital camera and webcam.

An **output device** is any piece of computer hardware used to communicate the results of data that has been processed.

Central Processing Unit

The **Central Processing Unit** or **CPU** is arguably the most important component of a computer. You can think of the CPU as being like the brain in a human.

It is responsible for all of a computer's processing.



Key Vocabulary

| | |
|-----------------------|---|
| Clock speed | The speed of a computer CPU, measured in hertz. |
| Cache | A piece of temporary memory. It can refer to a part of the RAM, storage disk, CPU, or an area for storing web pages. |
| CPU | Central Processing Unit - the brains of the computer that processes program instructions. Also called a microprocessor . |
| Execute | To run a computer program. |
| GHz | Gigahertz. One billion hertz per second = one gigahertz. This is a measure of frequency and is used to describe bus speeds and CPU clock speeds. |
| Hardware | The physical parts of a computer system, e.g. a graphics card, hard disk drive and CD drive. |
| Mother-board | The circuit board inside a computer that houses the CPU, memory and connections to other devices. |
| RAM | Memory that is constantly being written to and read from. It does not retain its contents without a constant supply of power, i.e. when a computer is turned off, everything stored in its RAM is lost. |
| Registers | The section of high speed memory within the CPU that stores data to be processed. |
| Software | Software is the programs that run on a computer. |
| Virtual memory | A section of a computer storage drive which is temporarily used as RAM. |

Binary Units

Remember the units used in the binary system.

| | |
|--------------|----------------|
| 1 byte = | 8 bits |
| 1 Kilobyte = | 1024 bytes |
| 1 Megabyte = | 1024 Kilobytes |
| 1 Gigabyte = | 1024 Megabytes |
| 1 Terabyte = | 1024 Gigabytes |



The Fetch - Decode - Execute cycle

The **CPU** operates by repeating three operations:

FETCH - causes the next instruction and any data involved to be fetched from main memory

DECODE - decodes the instruction to make sure it can be carried out

EXECUTE - carries out the instruction Repeat...



| | | | | |
|--|---|--|--|--|
| BOX 1: KEYWORDS | <p>energy surplus</p> <p>energy deficit</p> <p>energy demand</p> <p>energy supply</p> <p>energy consumption</p> <p>energy exploration</p> <p>energy exploitation</p> <p>energy conservation</p> <p>sustainable energy</p> <p>renewable energy</p> <p>non-renewable energy</p> <p>fossil fuel extraction</p> | <p>more than enough energy (energy security) → uninterrupted/affordable</p> <p>not enough energy (energy insecurity) → interrupted/unaffordable</p> <p>the amount of energy that is needed</p> <p>the movement of energy to where it is being used</p> <p>using energy</p> <p>searching for/discovering energy resources e.g. areas with oil and gas</p> <p>using energy resources to maximum, for profit → environmental damage</p> <p>reducing energy consumption → using less energy</p> <p>energy that can be used long into future without harming future generations → does not release greenhouse gases</p> <p>energy sources which cannot be exhausted/run out e.g. wind power</p> <p>energy sources which will run out e.g. fossil fuels</p> <p>removing fossil fuels from the ground e.g. mining or drilling</p> | BOX 6: RENEWABLE STRATEGIES TO INCREASE ENERGY SUPPLY | <p>wood, crops → burned for electricity or made into biofuels → but this releases greenhouse gases e.g. carbon dioxide</p> <p>electrical energy generated from the wind e.g. wind turbines</p> <p>HEP → river dammed → water flows through dam to spin turbines</p> <p>water level changes between high tide and low tide → spins turbines</p> <p>energy generated by heat stored deep in the Earth e.g. in volcanic areas</p> <p>waves used to generate energy → but wave strength varies day to day</p> <p>solar energy converted into heat or electricity e.g. by solar panels</p> |
| BOX 2: GLOBAL DISTRIBUTION OF ENERGY CONSUMPTION AND SUPPLY | <p>global demand</p> <p>global consumption</p> <p>global supply</p> | <p>global demand for energy is rising → global consumption rising</p> <p>HICs → consume more energy (e.g. transport, industry, technology)</p> <p>places with more energy resources → high supply → energy security</p> | BOX 7: NON-RENEWABLE STRATEGIES TO INCREASE ENERGY SUPPLY | <p>coal, oil, gas → formed from remains of living organisms → releases greenhouse gases when burnt → e.g. CO₂ → climate change</p> <p>nuclear reaction (uranium) → heats water → steam rises → turns turbines → electricity → no greenhouse gases → but nuclear waste</p> |
| BOX 3: REASONS FOR INCREASING ENERGY CONSUMPTION | <p>1. economic development → energy demand increases → high demand in HICs and NIEs e.g. agriculture, industry, transport, domestic energy</p> <p>2. rising population</p> <p>3. technology</p> | <p>more people → more energy needed e.g. population rising fast in Africa</p> <ul style="list-style-type: none"> today more devices to use energy, especially in the home technology has made it easier for fossil fuels to be extracted | BOX 8: THE EXTRACTION OF NATURAL GAS → ADVANTAGES AND DISADVANTAGES | <p>advantages of gas</p> <ul style="list-style-type: none"> produces less carbon dioxide than coal and oil gas leaks are less environmentally damaging than oil leaks easily transported by pipelines can be used for both heating and cooking <p>disadvantages of gas</p> <ul style="list-style-type: none"> gas is a fossil fuel → releases carbon dioxide → climate change 'fracking' can be used to release gas → causes water pollution gas leaks can cause explosions or fires and gas is toxic to humans needs expensive pipeline infrastructure to transport gas political issues can disrupt transportation of gas e.g. Russia |
| BOX 4: FACTORS AFFECTING ENERGY SUPPLY | <p>1. physical factors</p> <p>2. cost of exploitation</p> <p>3. technology</p> <p>4. political factors</p> | <p>geology for coal? climate for solar energy? coastline for tidal power?</p> <p>when cost of extracting energy is low → cheap energy → more demand</p> <p>e.g. new fracking technology (to extract gas), new renewable technology</p> <p>political factors can reduce energy supply</p> <p>e.g. war in Ukraine → reduced oil and gas imports from Russia</p> | BOX 9: MOVING TOWARDS A SUSTAINABLE RESOURCE FUTURE | <p>reducing carbon footprints</p> <p>energy conservation</p> <p>demand reduction</p> <p>technology</p> |
| BOX 5: IMPACTS OF ENERGY INSECURITY | <p>1. more exploration of environmentally sensitive areas</p> <p>2. economic costs</p> <p>3. food production</p> <p>4. industrial output</p> <p>5. conflict</p> | <p>e.g. increased searching for energy resources → harm environment → oil drilling in Alaska threatens tundra, flooding of land for HEP reduces biodiversity, rainforest destruction for biofuel causes climate change</p> <p>more energy insecurity → energy prices rise</p> <p>energy insecurity → less energy for food production → food insecurity</p> <p>unreliable energy → power cuts → less manufacturing and job cuts</p> <p>when demands exceeds supply → energy insecurity can cause conflict: e.g. River Nile HEP dam to increase energy for Ethiopia → but possible conflict between Sudan, Egypt, Ethiopia due to reduced water supplies</p> | BOX 10: LOCAL RENEWABLE ENERGY SCHEME IN LIC/NEE → SUSTAINABLE ENERGY | <p>case study example Darbang community, Nepal, Asia (LIC) → Micro Hydro Scheme</p> <p>features of the micro hydro scheme</p> <ul style="list-style-type: none"> HEP → sustainable, renewable → no greenhouse gases uses powerful Himalayan rivers to generate electricity cheap/easy to construct and maintain in remote rural areas energy for 700 homes → powers small factories e.g. noodle factory |

Exam Paper 2 (Challenges in the Human Environment) Section C (The Challenge of Resource Management) Topic (Energy)

English Language, Paper 1: Explorations in Creative Reading and Writing (Section B - Writing)

| Question | Describe /Narrate | Write a description or a narrative. | 40 marks | 45 minutes |
|----------|-------------------|-------------------------------------|----------|------------|
| 5 | | | | |

| Question Wording | What To Do |
|--|--|
| <p>Question 5:</p> <p>Either: Write a description suggested by this picture / Describe a time when ...</p> <p>Or: Write a story in which ... / Write a story called ...</p> | <p>Read both questions carefully and select the one you think will suit your strengths.</p> <p>Plan your answer carefully (use box planning for the picture; use a list or detailed mind-map for the other task). 5 minutes</p> <p>Write your response. 30 minutes</p> <p>Re-read your work carefully and make any corrections or additions. 5 minutes</p> |

| Content and Organisation | Content and Organisation | Technical Accuracy |
|--|---|---|
| <p>Description</p> <ul style="list-style-type: none"> Box off 5/6 areas of the image (if appropriate to the question) Each box will make up a paragraph Describe each in detail, zooming in on small details Link ideas together cohesively Use linguistic devices for effect <p>Narrative</p> <ul style="list-style-type: none"> Focus on a single moment Use an interesting structural feature Build tension through the introduction of a conflict Build the scene in the first paragraph Have only 2-3 characters Decide whether to use 1st or 3rd person Write in the past tense (was/were) Limit the amount of dialogue (speech) Use linguistic devices for effect | <p>Descriptive and Narrative</p> <p>Paragraphs</p> <ul style="list-style-type: none"> Start a new paragraph when you start to write about a new person, time, place, topic. Vary your paragraph lengths: some may be very long and detailed; include a 1 sentence paragraph for effect Sequence your paragraphs logically Ensure paragraphs link together by using discourse markers Make sure your opening paragraph has impact and hooks the reader In the middle, each paragraph should start with a topic sentence Your final paragraph may bring about resolution or create mystery | <p>Description and Narrative</p> <ul style="list-style-type: none"> Use a variety of different sentence constructions: simple, fragment, compound, complex Use a variety of different sentence types: exclamatory, interrogative, imperative, declarative Use a wide variety of punctuation – , : ; ! ? – – Standard English should be used consistently Use ambitious vocabulary throughout Spelling should be highly accurate |

| Language Techniques to use in your writing | |
|--|--|
| Figurative Language | Something presented as like something else. |
| Simile | Something presented as like something else. |
| Metaphor | Something presented as something else. |
| Personification | Giving human traits to something non-human |
| Alliteration | A hissing sound made by s or sh |
| Plosive | Harsh consonant sounds such a t, d, b, p |
| Other Methods | Two ideas together which contrast each other |
| Juxtaposition | Contradictory terms together |
| Oxymoron | Extreme exaggeration |
| Hyperbole | A word, phrase or idea repeated for effect |
| Repetition | |

| Structure Techniques to use in your writing | |
|---|--|
| Narrator | Told from 1 character's perspective |
| First Person | External narrator – knowledge of more than 1 character's thoughts |
| Omniscient Third Person | External narrator – knowledge of only 1 character's thoughts. |
| Limited Third Person | What they say makes us question their credibility. |
| Unreliable narrator | Events told in order |
| Linear | Events told not in order |
| Non-linear | Ends the way it begins |
| Cyclical | Presents past events |
| Flashback | Presents future events |
| Flash-forward | Hints at what is to come |
| Foreshadowing | Change of focus to... |
| Shift | Feeling of emotional strain |
| Tension / Suspense | An event that initiates an action or other event |
| Fiction Trigger | Tone or feel set by the writer, often through description of setting |
| Atmosphere | A geographical/historical moment in which the text is set |
| Setting | Lines spoken by characters, often revealing of their personality |
| Dialogue | A recurring element in a story |
| Motif | |

YEAR 9 GEOGRAPHY – CYCLE 1 – UK RESOURCES

| | |
|--|--|
| BOX 1: KEYWORDS PART 1 | when something is unequal (and usually unfair) |
| inequalities | compares the number of people living in places of the same size |
| population density | the importance of something |
| significance | enough resources → good quality of life → economic development |
| social wellbeing | enough jobs → people have money for good quality of life |
| economic wellbeing | to consume resources → food, water, energy being used |
| consumption | the movement of resources to where they are used |
| supply | |
| BOX 2: GLOBAL RESOURCE MANAGEMENT | |
| resources and wellbeing | 3 most important resources → food, water, energy → important for social and economic wellbeing → quality of life and development |
| inequalities → food resources | over 1 billion people do not have enough food → drought and lack of infrastructure (difficult to transport food) in many African countries |
| inequalities → water resources | some places less water than others → physical reasons e.g. climate → human reasons e.g. not enough infrastructure (water pipes) |
| inequalities → energy resources | energy resources → energy needed for economic and social development e.g. electricity needed to power factories and hospitals |
| BOX 3: KEYWORDS PART 2 | |
| agribusiness | turning small farms (agriculture) into large profitable businesses |
| carbon footprint | amount of greenhouse gases we individually produce |
| crops | plants grown on farms |
| demand | the amount of a resource that is wanted/needed |
| exports | a country selling goods (e.g. computers, bananas) to another country |
| food miles | distance food travels from farms to customers |
| imports | when a country buys goods from abroad |
| local food sourcing | reduces food miles → reduces carbon footprint |
| organic produce | food produced without artificial fertilisers and pesticides |
| seasonal food | food that only grows at certain times of year in certain seasons |
| yield | the amount produced → lots of crops grown → high yield of plants |
| BOX 4: FOOD RESOURCES IN THE UK | |
| high-value food exports to UK | Increasing incomes in UK → people want/can afford to eat exotic foods → from LICs/NEEs → e.g. Vanilla from Madagascar → expensive |
| all-year demand for seasonal food in UK | people in UK like eating favourite fruits all year → most fruits only grow in certain seasons → so fruits imported from warmer countries |
| demand for organic produce in the UK | people in UK choosing organic food → difficult to grow → grown without pesticides/artificial fertilisers → more expensive to buy |
| larger carbon footprints in UK | food miles increasing → often food is imported by airplane → releases greenhouse gases → large carbon footprint |
| local sourcing of food in the UK | local food becoming more popular in UK → people buy food from local farms → smaller food miles → reduces the carbon footprint |

| | |
|--|--|
| trend towards agribusiness in UK | small farms bought by large companies → to maximise profits → field sizes increased → more machines and fewer workers → increase yields |
| BOX 5: KEYWORDS PART 3 | |
| deficit | not enough of something (also called resource insecurity) |
| irrigation | to water crops artificially e.g. by using large sprinklers |
| leached | e.g. rain washes fertilisers out of soil and into rivers |
| surplus | having too much of something (also called resource security) |
| water pollution | when harmful substances have entered water e.g. rivers and the sea |
| water transfer | water moved from area of water surplus to area of water deficit |
| BOX 6: WATER RESOURCES IN THE UK | |
| changing demand for water in the UK | amount of water used by UK homes risen 70% since 1985 → more appliances e.g. dishwashers → due to more frequent showering |
| improving water quality in the UK | water pollution → pesticides, fertilisers, oil, sewage → pollution management improves water quality → illegal to pollute rivers |
| water deficit and surplus in UK | areas with highest population in UK are however areas with least rainfall → 1/3 UK population lives in south east → driest part of UK |
| water transfer to maintain supplies | water transferred from one place to another in the UK → e.g. from area of water surplus (Wales) to area of water deficit (Liverpool) |
| BOX 7: KEYWORDS PART 4 | |
| domestic energy mix | about the home → can mean 'about the country you live in' |
| exploitation | the different energy sources used by a place |
| fossil fuel | resource exploitation → using too many resources → damages planet |
| fracking | natural fuel → coal, oil, gas → formed from remains of living organisms |
| renewable | forcing high pressure liquid into ground → extract oil/gas from rocks |
| non-renewable | energy sources that do not run out e.g. solar, wind, tidal etc. |
| | energy sources that will run out e.g. coal, oil, gas, nuclear |
| BOX 8: ENERGY RESOURCES IN THE UK | |
| changing energy mix in the UK | <ul style="list-style-type: none"> the energy mix in the UK is changing → UK decreasing reliance on fossil fuels → using less fossil fuels UK → growing significance of renewable energy → using more |
| issues of energy exploitation in UK | <ul style="list-style-type: none"> fossil fuels release greenhouse gases into atmosphere → cause climate change → coal mines → destroy habitats for animals nuclear power stations → very expensive → Hinkley Point → estimated over \$22 billion to build → radioactive nuclear waste renewable energy can be expensive and not completely reliable → wind turbines → noisy → can reduce tourism (visual impact) |

| BOX 1: THE CHARACTERISTICS OF WAVES | |
|--|---|
| <ul style="list-style-type: none"> constructive waves deposition of beach material wind from storms far away low (under 1 metre) long low (6-10 waves per min) low energy strong (beach deposited) weak | <ul style="list-style-type: none"> destructive waves erosion of beach material wind from storms close by high and steep (over 1 metre) short high (10-14 waves per min) high energy weak strong (beach eroded) |

| BOX 2: THE FIVE COASTAL PROCESSES | |
|--|--|
| <ul style="list-style-type: none"> the decomposition or disintegration of rocks in their original place the downhill movement of weathered material due to gravity wearing away and removal of material e.g. by a wave the movement of eroded material e.g. in waves material transported by water is dropped when water loses energy | |

| BOX 3: COASTAL PROCESS 1 → WEATHERING | |
|--|---|
| <ol style="list-style-type: none"> mechanical weathering chemical weathering | <ul style="list-style-type: none"> disintegration of rock e.g. by freeze thaw weathering → when water freezes into the cracks in rocks → causes rock to expand and break up decomposition of rock due to chemicals e.g. the chemicals in sea water or precipitation → causes rock to rot away and crumble |

| BOX 4: COASTAL PROCESS 2 → MASS MOVEMENT | |
|---|--|
| <ol style="list-style-type: none"> sliding slumping rock falls | <ul style="list-style-type: none"> after heavy rain → cliff becomes saturated and heavy → extra weight causes material to become unstable → material slides rapidly downhill cliff segment slumps down along line of weakness e.g. rotational slump chunks of rock fall from cliff in sudden movement |

| BOX 5: COASTAL PROCESS 3 → EROSION | |
|--|---|
| <ol style="list-style-type: none"> hydraulic power abrasion attrition | <ul style="list-style-type: none"> waves compress air into cracks in cliff → pressure → cracks widen sediment thrown at cliff by breaking waves → cliff worn away rocks transported by waves bump into each other → break up smaller |

| BOX 6: COASTAL PROCESS 4 → TRANSPORTATION | |
|---|---|
| <ol style="list-style-type: none"> longshore drift | <ul style="list-style-type: none"> swash moves material up beach at oblique (diagonal) angle to coastline → due to prevailing wind direction backwash returns material to sea at a right angle to coastline gradual zig zag movement of material along coastline |

| BOX 7: COASTAL PROCESS 5 → DEPOSITION | |
|---|--|
| <ul style="list-style-type: none"> Why is sediment deposited in coastal areas? | <ul style="list-style-type: none"> deposition is when sediment carried by waves is dropped happens when water slows and loses energy e.g. sheltered areas (near spits/bars) or where strong swash (constructive waves) |

| BOX 8: GEOLOGICAL STRUCTURE AND ROCK TYPE | |
|---|---|
| <ul style="list-style-type: none"> discordant coast resistant rocks less resistant rocks | <ul style="list-style-type: none"> bands of rock are perpendicular to coastline bands of rock are parallel to coastline hard rocks → erode less easily e.g. granite, chalk, limestone soft rocks → erode more easily e.g. clay, sandstone |

| BOX 9: LANDFORMS RESULTING FROM EROSION | |
|---|---|
| <ol style="list-style-type: none"> headlands and bays cliffs and wave cut platforms caves, arches and stacks | <ul style="list-style-type: none"> discordant coast → less resistant rocks erode easily forming a bay → more resistant rocks erode slowly forming headlands → bays sheltered by headlands → deposition from constructive waves builds beach in bay waves break at cliff base → erodes wave-cut notch → cliff unsupported → cliff collapses → cliff retreats → leaves a smooth wave cut platform wave refraction focuses wave energy onto headlands → increases erosional processes → creates crack-notch-cave-arch-stack-stump |

| BOX 10: LANDFORMS RESULTING FROM DEPOSITION | |
|---|---|
| <ol style="list-style-type: none"> beaches sand dunes spits and bars | <ul style="list-style-type: none"> Constructive waves = sandy beaches. Destructive waves = pebble beaches. sand at back of beach dries out and is blown backwards by wind → sand builds up against objects → marram grass stabilises embryonic dune longshore drift moves sand along coast → sand deposited past the edge of coast forming spit or bar → hook shape on end → salt marsh behind |

| BOX 11: MANAGEMENT STRATEGY 1 → HARD ENGINEERING → ARTIFICIAL | |
|--|--|
| <ul style="list-style-type: none"> sea walls rock armour gabions groynes | <ul style="list-style-type: none"> benefits → positives very effective at reducing erosion can be used for fishing plants grow and disguise the cages can rust and break apart in storms reduce longshore drift costs → negatives very expensive, unattractive can be dangerous to walk on increase erosion down coastline |

| BOX 12: MANAGEMENT STRATEGY 2 → SOFT ENGINEERING → NATURAL | |
|--|---|
| <ul style="list-style-type: none"> beach nourishment and reprofiling dune regeneration | <ul style="list-style-type: none"> benefits → positives builds up sand on beach which protects against erosion attractive, tourism, biodiversity costs → negatives constant maintenance required easily damaged by storms |

| BOX 13: MANAGEMENT STRATEGY 3 → MANAGED RETREAT → ALLOWS FLOOD/EROSION | |
|--|---|
| <ul style="list-style-type: none"> coastal realignment | <ul style="list-style-type: none"> benefits → positives creates saltmarsh ecosystem costs → negatives farmland flooded by the sea |

| BOX 14: CASE STUDY → COASTAL MANAGEMENT SCHEME IN THE UK → LYME REGIS | |
|--|--|
| <ul style="list-style-type: none"> needed because effects of strategy conflicts of strategy | <ul style="list-style-type: none"> Lyme Regis Environmental Improvement Scheme → cost £40 million → sea walls, rock armour, rock groynes, beach nourishment/reprofiling homes threatened by eroding cliffs, landfills, beach mostly eroded away new sandy beach has increased tourism, homes and businesses safer more traffic from tourists, some people believe scheme is unattractive |

Exam Paper 1 (Living with the Physical Environment) Section C (Physical Landscapes in the UK) Topic (Coastal Landscapes)

| Timeline of events (AO3) | |
|--|--|
| 1533 – Henry VIII breaks from the Catholic Church and sets up the Church of England. | |
| 1597 – James VI of Scotland writes <i>Daemonologie</i> – a guide to hunting witches. | |
| 1601 – Queen Elizabeth I dies without an heir. She chooses James VI of Scotland (her nephew) as her successor. | |
| 1601 – James VI of Scotland becomes James I of England and Scotland | |
| 1605 – The Gunpowder Plot – Catholics try to blow up Parliament and the King. | |
| 1609 – Shakespeare writes <i>Macbeth</i> . | |

| Key Concepts (AO3) | |
|---------------------------------|---|
| Ambition | Ambition, if left unchecked leads to ruthlessness. Ambition is Macbeth's fatal flaw or hamlet. |
| Power | Power, without responsibility, is a corrupting influence. |
| Natural Order | The natural order must be adhered to or it will lead to anarchy. Includes The Divine Right of Kings and The Great Chain of Being. |
| The Great Chain of Being | The Great Chain of Being cannot be broken or disorder will take over. Has God at the top and the King ruling on his behalf on Earth. |
| Divine Right of Kings | Monarchs rule by Divine Right which states that the monarch is anointed by God and is selected to be their ruler on Earth. |
| Mortal Sins | Mortal sins are grievous sinful acts, leading to damnation. Include regicide, infanticide and suicide and will be punished through madness and death. |
| Equivocation | Deliberately using vague language to hide the truth or to avoid commitment. |

| Summary – Act by Act (AO1) | |
|--|--|
| Act One – Treason and Predictions | The witches foretell a great future for Macbeth. Macbeth's bravery is celebrated; his ambition takes hold. Macbeth rebels against this deed. |
| Act Two – Murder | The regicide takes place. Macbeth kills King Duncan. Macbeth begins to plot against him. |
| Act Three – Ghosts and Guilt | Macbeth's ghost haunts Macbeth at the banquet. Macbeth's lords begin to plot against him. |
| Act Four – Further Predictions | Macbeth visits the witches to learn more of his fate. Macbeth arranges the murder of Lady Macduff and her children. |
| Act Five – Retribution and Punishment | Macduff allies with Malcolm and Edward against Macbeth. Macbeth kills Macduff's wife and children. Macbeth kills Macduff. |

| Dramatic/Stylistic Devices (AO2) | |
|----------------------------------|--|
| Soliloquy | One character speaking to audience; M uses to make audience complicit. |
| Dramatic Irony | Audience knows more than characters. |
| Hamartia | Tragic flaw. |
| Hubris | Excessive pride. |
| Catharsis | Purging or cleansing of pity and fear. |
| Anagnorisis | Recognition of the tragedy to come. |
| Peripetia | Sudden reversal of fortune. |

| Key Characters (AO1) | |
|-------------------------------|--|
| Macbeth | Trajectory: ambitious, treacherous, usurer. |
| Lady Macbeth | driving force at start of play; ambitious, glib, mad. |
| Duncan | fatherly, kind, good and gracious ruler; old, plus, benevolent. |
| Banquo | Macbeth's best friend; brave, noble, loyal. |
| Macduff | hostile to Macbeth; starts and fails to be loyal; stoic; steadfast. |
| The Witches | use charms, spells, and prophecies to toy with Macbeth; equivocations, supernatural, unearthly. |
| Key Themes (AO1) | |
| Appearance and Reality | the way that so many things in life are not what they seem. |
| Ambition | Shakespeare saw this as a corrupting force; transforms Macbeth from a good man to an evil one. |
| Guilt | Both Macbeth and Lady Macbeth suffer the most torturous guilt as a result of their regicide. |
| Sin and Retribution | An Old Testament way of describing crime and punishment. |
| Motifs (AO2) | |
| Blood | And on thy blade and dudgeon gouts of blood...It is the bloody business which informs thus to mine eyes. |
| Hands | Upon my head they placed a fruitless crown, / And put a barren sceptre in my gripe, / Thence to be dexter'd with an unfeeling hand, / No son of mine succeeding. |
| Light and Dark | Come, sealing night, / Scarf up the tender eye of pitiful day! |
| Sleep and Dreams | Nature seems dead, and wicked dreams abuse / The curtain'd sleep! |
| Children | I have given suck, and know / How tender 'tis to love the babe that milks me! |
| Nature | 'Tis unnatural, / Even like the seed that sows the corn. |

| Plot | Themes and Priestley's Message | Phrase bank and thesis: |
|--|---|--|
| <p>Act 1: Mr Birling family are celebrating Sheila's engagement to Gerald Croft. Mr Birling makes a speech saying 'a man should after himself' and that the Titanic is 'unsinkable, absolutely unsinkable'. The maid announces 'An Inspector's called'. Inspector Goole arrives, saying Eva Smith has committed suicide – 'burnt inside out' – from drinking disinfectant. Mr Birling sacked Eva from his factory for protesting against low wages, and Sheila got her sacked from <u>Milwards</u> because she was jealous of <u>her</u>. The inspector says she changed her name to Daisy Renton and Gerald is shocked.</p> <p>Act 2: Gerald describes how Daisy became his mistress, after he helped her due to being 'sorry for her'. He describes his role as the 'wonderful Fairy Prince' but reveals he 'dropped her' when it suited him. Sheila gives the engagement ring back to Gerald and he leaves. The inspector gets Mrs Birling to say she persuaded the Brumley women's charity to reject Daisy's appeal for money – even though she was pregnant. She 'accepts no blame at all' – instead blaming the father of the child, who Sheila guesses before she does it. Act 3: Eric returns and knows everyone is aware he is the father. He describes meeting Daisy when drunk and forced her to have sex with him ('used her... like she gets an animal or a thing'). They had sex a few more times and Daisy became pregnant. When Eric found out, he stole money from his dad's company – that she refused as it was stolen, so went to Mrs Birling's charity for help. Eric accuses his mother – 'you killed them both -damn you!' when he finds this out. The inspector reminds the family they are all 'responsible for each other' and there are 'millions and millions and millions of Eva Smiths and John Smiths left' and leaves. Gerald returns, having discovered there is no police inspector called Goole from an officer, and Birling calls the police station and confirms this. Gerald calls the hospital and finds out nobody has committed suicide. Gerald, Birling and Sybil decide it was a 'hoax' and there will be 'no public scandal'. Sheila points out 'it doesn't make any real difference' if he was a real inspector or not, and accuses the others of just 'beginning to pretend all over again'. Eric <u>agrees</u>. The phone rings. It is a police officer saying a young girl has committed suicide and will be coming to ask them some questions.</p> | <p>Responsibility</p> <ul style="list-style-type: none"> - Priestley uses the play to suggest that those who possess power in society should be responsible for the welfare of those who may need help. This is a socialist ideology. - He could also have been suggesting individuals need to take responsibility for their actions. - Priestley uses his perspective of 1912 to demonstrate the virtues of a more generous, socialist society in 1945. <p>Equality and Social Class</p> <ul style="list-style-type: none"> - At the time the play was set, social class was important, and there were big differences between rich and poor. - Life was difficult for the lower classes, which Priestley highlights through the character of Eva Smith. - Priestley shows the upper class are selfish and do not take responsibility. - He makes the older Birlings look foolish to criticise the upper classes. <p>Men and women</p> <ul style="list-style-type: none"> - The women and men in the play begin as stereotypes, with women obsessed with clothes and marriages, and men with work. - However, the young women challenge these stereotypes more and more as the play progresses. - As Birling, Gerald and Eric get weaker, Sheila gets stronger and begins to undermine and interrupt the men – she starts to think for herself. - Priestley could have been doing this to challenge the audience's view of women as passive and weak. <p>Generations – old and young</p> <ul style="list-style-type: none"> - Priestley highlights the contrast between old-fashioned traditional views held by older people, and the better views of the younger generation. - Arthur and Sybil Birling have entrenched and traditional views and attitudes and are not open to being challenged. Priestley mocks them, and makes them seem outdated and foolish. They are symbols of the Edwardian ruling classes. - The younger generation (Eric and Sheila) are willing to learn and to take responsibility for their actions. Priestley could have been demonstrating there is hope for creating a more equal society. - they symbolise progressive attitudes in society. | <p>dismantles the archaic ideology of classism to position his post-war audience to the callous indifference of the bourgeoisie to advocate the significance of the collective to expose the hubris of the Empire to critique the regressive ideology of a bygone era that typified the Edwardian Era critiques, ridicules and dismantles the ideology that supported the growth of the bourgeoisie in pre-war Europe satirises the illusions of the Edwardian era to ridicule the ideology of capitalism to celebrate the power of collective responsibility to expose 'the harsh economic realities' of our time the galling caricature of Arthur Birling the ethereal Inspector the frivolous materialism of the Edwardian elite the facade of respectability the veneer of benevolence of the aristocratic class the vitriol mindset of the elder generation a trumpet call for change transcends the walls of the theatre the journey to enlightenment of the younger generation the genteel household interrupts Birling's political diatribe a paragon of the socialist viewpoint</p> <p>Core thesis: In his post-war drama, 'An Inspector Calls', Priestley consciously exposes the inhumanity of capitalism to position his post-war audience to understand the virtues of a more sympathetic and generous socialist society.</p> <p>Adapted thesis: In his post-war drama, 'An Inspector Calls', Priestley consciously exposes the inhumanity of capitalism through the caricature of Mr Birling. The galling construct of Arthur Birling is used by Priestley to ridicule the pursuit of individual wealth, at the expense of the welfare of the proletariat, to position his 1945** audience to understand the virtues of a more generous society.</p> |

20th Century 1900-2000

Why People Came, Their Impact, Official and Unofficial Responses

Commonwealth migrants since 1945

- After India and Pakistan gained their independence in 1947-8 Britain accepted that her empire was over.
- In 1948 Parliament passed the **Nationality Act**.
- All citizens of the Commonwealth had full rights to enter Britain.
- Britain **urgently needed** workers after the Second World War

Black and British – Initial Welcome

- In **June 1948** the ship, the **Empire Windrush** arrived in London from Jamaica carrying **492 West Indians**.
- Conditions in the Caribbean islands were **poor** – low wages and a lack of jobs.
- The migrants hoped to be able to **send money back** to their families.
- At **first** they were welcomed. The London Evening Standard newspaper had a headline saying: **'Welcome Home!'**. They were called **'sons of empire'**.
- The migrants were given temporary accommodation, food and bedding.
- By 1960 the number of West Indian migrants to Britain was **100,000**.
- They worked in factories and as **nurses and bus conductors**.

Prejudice, Discrimination and Racism

- Many Black migrants faced discrimination on a **daily basis**.
- Hotels, restaurants and dance halls refused entry to Black people.
- Notices went up on windows saying: **'No Blacks, No Dogs, No Irish'**.
- Caribbean migrants ended up living together in the poorest areas such as **Chapelton in Leeds and Moss Side in Manchester**.
- In **1958 in Notting Hill** a fascist gang beat up five innocent Black men.
- A survey showed that: **55% of people** wanted restrictions on the number of white people coming to the country

Growing numbers: 1962-1972

- Commonwealth migrants also came from **India, Pakistan and Africa**.
- They were usually **young men** seeking work.
- Pakistanis worked in the **textile mills** in West Yorkshire
- Africans from **Nigeria** came as workers or as students
- Because of these growing numbers, British politicians started to bring in laws to **limit immigration**.



The Empire Windrush arrives in London in 1948



This sign (above) appeared in a window in London



A textile mill in Bradford where many young Pakistanis came to work

Attempts to Limit Immigration

1962 Commonwealth Immigrants Act

- No longer an automatic right of people from the Commonwealth to live and work in Britain
- They now had to apply for **employment vouchers** – most went to Australians, New Zealanders and Canadians.
- **But**, in the months before the Act there was a rush of migration.
- In **1960** there had been **58,000 migrants**, by **1961** it was **136,000**.
- Most brought their families over before the Act was passed

1968 Commonwealth Immigrants Act

- Denied entry to anyone without a father or grandfather born in the UK.
- **BUT**, a public outcry led to thousands of Kenyans migrating to Britain.

1971 Immigration Act

- Vouchers were replaced with work permits.
- Staying in Britain was **only temporary**.
- **BUT**, Britain accepted Asians fleeing Uganda in 1972.

Actions Against Prejudice

- Inspired by the non-violent civil rights movement in the USA, a group of **young West Indians** in Bristol organised a **boycott of the city's buses**
- This was because the bus company had refused to employ non-white crews.
- After four months the company **backed down** and appointed non-white bus conductors
- The **1965 Race Relations Act** made it an offence to refuse to serve someone on grounds of their race.
- Communities gave **spiritual strength** to each other
- The **National Front**, which wanted to ban all non-white immigration was opposed by the **Unite Against Fascism** group.
- **Rock Against Racism (RAR)** started in 1976 to oppose racism by bringing people together through music

Gradual Integration

- Despite evidence of racism in the **Stephen Lawrence case (1993)**, discrimination and racism has declined over time.
- By the **2010 election** there were **27 MPs** from ethnic minorities
- **BAME** students are **more likely** to go to higher education than white students
- The number of **mixed race** children has **risen quickly**
- **50% of people** believe that people from different backgrounds get on well



In 1968 Enoch Powell gave 'the Rivers of Blood' speech saying that immigration would result in civil war. Around 75% of people agreed with him.



Singers from the Rock Against Racism group



The first black female MP, Diane Abbott

20th Century 1900-2000

Why People Came: Their Impact, Official and Unofficial Responses

The Era of the First World War – 1905-1919

- Before 1914**
- In 1905 Parliament passed an **Aliens Act** to restrict immigration.
 - One of its main objectives was to control **Jewish immigration** from Eastern Europe

The Era of the First World War – 1905-1919

- 1914-1918 – Belgians**
- In 1914 however, over **250,000 Belgians** fled to Britain after the Germans had invaded their country during the First World War.
 - Charities found homes for them across the country.
 - They were **greeted warmly** when they arrived but some British people **resented** their presence as the war dragged on.
- 1914-1918 – Germans**
- When war broke out on **4 August 1914** there were thousands of Germans living in Britain.
 - The government passed the **British Nationality and Status of Aliens Act – 29,000 ‘enemy aliens’ were deported.**
 - From the start of the war, mobs broke the windows and looted shops owned by Germans.
 - The hatred grew after a German submarine torpedoed a British ocean liner, the *Lusitania*, **1,197 passengers and crew died.**

The Era of the First World War – 1905-1919

- After the war**
- By 1919, there were many **Lascars** (Indian sailors) who had homes in ports in Britain.
 - British-born workers were worried that they wouldn't get the jobs as the Lascars would be prepared to work for **lower wages.**
 - A riot broke out in Cardiff. The Chief Constable blamed **White people** for the riot but still said that the Lascars should be sent back to India.

The Era of the Second World War – 1938-1947

- After the war**
- During the 1930s **anti-Semitism** (hatred towards Jews) grew in Germany
 - Over **500,000 Jews** applied for entry, by 1938, **11,000** were accepted
 - Kristallnacht** (the Night of Broken Glass) led to Britain to accept about **60,000 Jews.**

The Era of the Second World War – 1938-1947

- Jews**
- Just days after **Kristallnacht**, a group of Jewish and Christian leaders persuaded the British government to allow all Jews under the age of 17 to come to Britain, providing that someone would take full financial responsibility for them.
 - These rescue efforts became known as **Kindertransport.**
 - One English diplomat, **Nicholas Winton**, became a key player and saved almost **700 children.**
 - After the war many stayed in Britain, but others started new lives in America or the new state of Israel.

The Era of the Second World War – 1938-1947

- Italians and Germans**
- In 1940 when Italy joined the war against Britain, and German armies threatened to cross the Channel.
 - British mobs attacked Italian and German shops** in London, Liverpool and Glasgow
 - The Government began **mass internment** (putting people in to prison) of German and Italian residents.

The Era of the Second World War – 1938-1947

- Polish allies**
- In **September 1939** Poland was occupied by Germany and the Soviet Union (Russia). Thousands fled to Britain as Britain was an ally.
 - There was soon a community of **160,000 Poles** in Britain.
 - Many fought on the British side, **14,000** joined the **Royal Air Force (RAF).**
 - Polish pilots shot down **one** in seven of the German planes destroyed during the Battle of Britain
 - Polish experts helped to break the **German Enigma secret codes** which shortened the war significantly

The Era of the Second World War – 1938-1947

- After 1945**
- In 1947 the **Polish Resettlement Act** was passed: the Poles now had a choice – they could either return home and live under Communist rule or stay in Britain. **120,000** decided to stay, most becoming British citizens.
 - By 1950, there were hundreds of Polish shops, farms, businesses, pubs and schools. **Over 56%** of British people wanted them to return home.
 - But Polish people settled all over Britain and mixed into society quickly.



Belgian refugees arriving in Britain by boat, October 1914



A British newspaper reports anti-German riots in London in 1915



Kristallnacht was a push factor for many Jews hoping to leave persecution



Nicholas Winton was knighted by Queen Elizabeth II for services to 'humanity'



Polish fighter pilots during the Battle of Britain

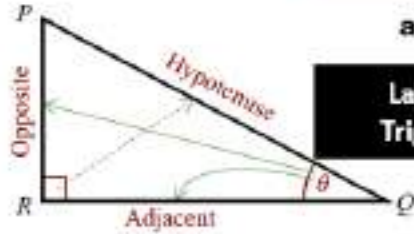
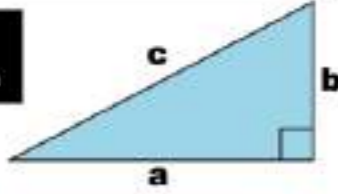


A German Enigma code machine

| CHARACTER | RESPONSIBILITY | GENDER | AGE | CLASS | WEALTH, POWER & INFLUENCE | |
|---------------------------------|--|--|--|---|--|--|
| Mr Birling | A man has to mind his own business and look after himself and his own. If we were all responsible for everything that happened to everybody we'd had anything to do with, it would be very awkward! | 'Clothes mean something quite different to a woman...not only something to make her look prettier, but a token of their self-respect.' 'Nothing to do with you, Sheila. Run along! The girl had been causing trouble in the works. I was quite justified.' | The famous younger generation who know it all. And they can't even take a joke! 'Why, you hysterical young fool – get back or fly.' But you youngsters just remember what I said. We can't let these Bernard Shaws and H.G.Wellses do all the talking. | If you don't come down sharply on these people, they'll soon be asking for the earth. I have an idea that your mother – lady croft – while she doesn't object to my girl – feels you might have done better for yourself socially. | Perhaps I ought to warn you that he's an old friend of mine, and that I see him fairly frequently. We play golf together sometimes up at the west Brumley. And this girl, Eva Smith, was one of them. She'd had a lot to say – for too much – so she had to go. Look, Inspector – I'd give thousands – yes, thousands – I wasn't satisfied with the girl's claim – she seemed to me not a good case – and so I used my influence to have it relaxed... I did my duty. You know of course that my husband was Lord Mayor only two years ago and that he's still a magistrate | |
| Mrs Birling | I blame the young man who was the father of the child she was going to have...he ought to be dealt with very severely I'm sorry she should have come to such a horrible end. But I accept no blame for it at all. | I think Sheila and I had better go into the dining room and leave you men When you've married you'll realize that men with important work to do sometimes have to spend nearly all their time and energy on their business And I've told you – I was awfully busy at the works all that time. (suspiciously) Well, I never said I hadn't. I don't see why. I think Mrs Birling ought to be excused any more of this questioning. She's nothing more to tell you. She's had a long wedding and sitting day | They're over-sized. In the morning they'll be as amused as we are. What an expression, Sheila! Really the things you girls pick up these days! she looked young and fresh and charming and altogether out of place down here. Old Joe Meggs, half-drunk and goggle-eyed, had waddled her into a corner with that obscene fat carcass of his – | I did for a time, nearly any man would have done. Getting a bit heavy-handed, aren't you, Inspector? I was in that state when a chap easily turns nasty – and I threatened to make a row. She'd no money left – so I hesitated on giving her enough money to keep her going – until she refused to take any more – | | |
| Gerald | For god's sake – don't say anything to the Inspector. I'm sorry, Sheila. But it was all over and done with, last summer... I don't come into this suicide business. There isn't any such Inspector. We've been had! | Yes. I wasn't in love with her or anything – but she was pretty and a good sport. No, she didn't want me to marry her. Said I didn't love her – and all that. In a way, she treated me – as if I were a kid. You not only know her but you know her very well. Otherwise, you wouldn't look as guilty. Sorry! It's just that I can't help thinking about this girl – deprecating herself so humbly – and I've been so happy tonight. No, she wanted to end her life. She felt she couldn't go on any longer. She wasn't pretty when I saw her today, but she had been pretty – very pretty. But she had been pretty – very pretty. | My child – your own grandchild – you killed them both – damn you, damn you! Because you're not the kind of father a chap could go to when he's in trouble – that's why. I hate those fat old farts round the town 'Mother, I think that was cruel and vile' Mother, she's just died a horrible death – don't forget. | Why shouldn't they try for higher wages? I'd have let her stay. Oh – for God's sake! What does it matter now whether they give you a knighthood or not? "But these girls aren't cheap labour – they're people." Yes, she was a lucky to get taken on at Mitsubishi | I did for a time, nearly any man would have done. Getting a bit heavy-handed, aren't you, Inspector? I was in that state when a chap easily turns nasty – and I threatened to make a row. She'd no money left – so I hesitated on giving her enough money to keep her going – until she refused to take any more – | |
| Sheila | We really must stop these silly pretences. This isn't the time to pretend that Eric isn't used to drink. "All right Gerald, you needn't look at me like that. At least I'm trying to tell the truth." Each of you helped kill her. Remember that. We are responsible for each other. Public men, Mr Birling, have responsibilities as well as privileges. | I have those fat old farts round the town 'Mother, I think that was cruel and vile' Mother, she's just died a horrible death – don't forget. There are a lot of young women living that sort of existence in every city and big town in this country. Miss Birling. | My child – your own grandchild – you killed them both – damn you, damn you! Because you're not the kind of father a chap could go to when he's in trouble – that's why. I hate those fat old farts round the town 'Mother, I think that was cruel and vile' Mother, she's just died a horrible death – don't forget. | "But these girls aren't cheap labour – they're people." Yes, she was a lucky to get taken on at Mitsubishi | I told him that if they didn't get rid of that girl, I'd never go near the place again. I was absolutely furious I was very rude to both of them. He creates an air of an impression of meanness, nobility and purposefulness... He speaks carefully, weightily. "Don't stammer and jammer at me again, man. I'm losing all patience" | |
| Inspector | | | | | | |
| GCSE Exam Style Question | How does Priestley present the theme of responsibility? | How does Priestley present attitudes to women? | How does Priestley present conflict between young and old? | How does Priestley present attitudes to class? | How does Priestley present the importance of power, wealth and influence? | |

| Pythagoras' Theorem | |
|---------------------------|---|
| Pythagoras' theorem | a relationship between the 3 sides on a right angled triangle |
| Pythagoras' theorem | $a^2 + b^2 = c^2$ 'c' is always the hypotenuse |
| Pythagoras' theorem in 3D | $a^2 + b^2 + c^2 = h^2$ |

Labelling for Pythagoras theorem



Labelling for Trigonometry

TRIGONOMETRIC RATIOS

| | |
|----------------------|--|
| trigonometric ratios | sine (sin), cosine (cos) and tangent (tan) use with right angled triangles ratios between 2 lengths and an angle |
| hypotenuse | the longest side on a right angled triangle it is always opposite the right angle |
| opposite side | this side depends on the angle you are using (θ) it is the angle opposite θ |
| adjacent side | this side depends on the angle you are using (θ) it is the angle next to θ |
| sine | $\sin \theta = \frac{\text{opposite}}{\text{hypotenuse}}$ |
| cosine | $\cos \theta = \frac{\text{adjacent}}{\text{hypotenuse}}$ |
| tangent | $\tan \theta = \frac{\text{opposite}}{\text{adjacent}}$ |
| SOHCAHTOA | to remember: $s = \frac{o}{h}$ $c = \frac{a}{h}$ $t = \frac{o}{a}$ |

EXACT TRIG VALUES

| | 0° | 30° | 45° | 60° | 90° |
|-----|-----------|----------------------|----------------------|----------------------|------------|
| sin | 0 | $\frac{1}{2}$ | $\frac{\sqrt{2}}{2}$ | $\frac{\sqrt{3}}{2}$ | 1 |
| cos | 1 | $\frac{\sqrt{3}}{2}$ | $\frac{\sqrt{2}}{2}$ | $\frac{1}{2}$ | 0 |
| tan | 0 | $\frac{1}{\sqrt{3}}$ | 1 | $\sqrt{3}$ | — |

Unit 17: Triangles and Transformations

| TRANSFORMATIONS | |
|------------------|--|
| translation | translate means to move a shape the shape does not change (congruent) to translate a shape you need a vector in the form $\begin{pmatrix} x \\ y \end{pmatrix}$ |
| rotation | to turn a shape the shape does not change (congruent) to rotate a shape you need a centre of rotation, the number of degrees to turn, and a direction of turn (clockwise or anticlockwise) |
| reflection | reflection means to flip a shape over a mirror line the shape does not change (congruent) to reflect a shape you need a mirror line |
| enlargement | to change the size of a shape the shape does change size (similar) to enlarge a shape you need a centre of enlargement and a scale factor of enlargement an enlargement with a fractional scale factor makes the shape smaller an enlargement with a negative scale factor changes the size and flips a shape |
| invariant points | points on a line or shape which do not move when a specific transformation is applied |

OTHER NON-LINEAR GRAPHS

| | |
|------------------------------------|---|
| sine graph $y = \sin(x)$ | Important points: (0,0), (90,1), (180,0), (270,-1), (360,0) |
| cosine graph $y = \cos(x)$ | Important points: (0,0), (90,-1), (180,0), (270,1), (360,0) |
| tangent graph $y = \tan(x)$ | the graph has asymptotes at $x=90^\circ$ and $x=270^\circ$ Important points: (0,0), (180,0), (360,0) |

Industrial Period 1750-1900

Why People Came: Their Impact: Official and Unofficial Responses



Painting of the death of Nelson shows African sailors



The anti-slavery campaigner Olaudah Equiano



A portrait of Sir John Lubbock

Africans - Impact on Britain

- For many Africans it was difficult to make a living.
- Some had little choice but to beg on the streets as there was little work available. No help from the government was available.
- By 1800 there were an estimated 15,000 Black people living in London.
- Many also lived in the port cities of Liverpool and Cardiff
- Glimpses in paintings suggest that Africans worked alongside White people in a range of manual jobs
- Some joined to British army and navy. In the painting of the death of Admiral Nelson in 1805 you can see an African sailor on Nelson's ship.

Africans - Official and Unofficial Responses

- A group of wealthy people set up the Committee for the Relief of the Black Poor to give out food and clothing to ex-African soldiers who had fought on the British side during the American War of Independence
- By 1787 however Black people begging in the streets were forcibly rounded up and 401 were deported to Sierra Leone.
- Racist ideas which grew out of enslavement and empire had spread throughout society and were deep-rooted in all classes
- Africans played a key role in the abolition of the slave trade. Olaudah Equiano published an autobiography that was hugely popular.
- Some made amazing contributions to arts and entertainment. Ira Aldridge was a famous actor who performed in Shakespeare's plays such as King Lear, Macbeth and Othello.

Indians - Impact and Responses

- Many Indians lived in Britain because they worked as servants, or ayahs, for wealthy families as they were seen as status symbols
- Many found living in Britain very difficult. They lived in cheap and overcrowded houses in London and other port cities.
- Most Indians were employed as sailors. They were known as Lascars.
- Many were paid than British sailors and were often harshly treated. On much lower wages the ships they made up around 80% of the crew.

Chinese migration - Liverpool

- Chinese sailors worked on British ships carrying cargoes of Chinese silk, tea and opium. They worked for low wages, did not drink, and were hard-working
- Many settled in Liverpool and Limehouse Street in London



An 1881 pogrom in Russia



Rothschild's Headquarters in London



Marks and Spencer, founded in 1885

Jews - Why did they come?

Reasons - Pull Factors

- In the period after 1750, Britain's Jewish population became much larger. By 1880, their community numbered 65,000.
- This was because many restrictions had been lifted.
- In the 1830s Jews were allowed to trade in the city of London.
- They were allowed to serve on juries and work as lawyers.
- As a result, they largely became assimilated (integrated) into British society
- For example, in 1798 Nathaniel Rothschild founded Rothschild's Bank which helped to finance Britain's war against Napoleon.

Reasons - Push Factors

- In the 1880s there was a sudden massive influx of Jewish migrants to Britain. The new arrivals were very different to Britain's settled Jewish population.
- They were traditional clothes, spoke Yiddish and the majority were desperately poor.
- These Jews were fleeing persecution in the Russian Empire.
- There had been frequent pogroms against Jewish in Russia and Eastern Europe. 1881-4 there were over 200 pogroms.

Jews - Impact on Britain

- Earning money for rent and food was the first challenge for Jewish refugees.
- In Whitechapel, London, Jews were crammed into overcrowded houses.
- Many worked in the sweatshops, sewing cheap clothes and working long hours for low wages
- The clothes they made were sold cheaply all across the country.
- Three major high street clothing 'names' of today - Marks and Spencer, Burtons and Moss Bros - were all started by Eastern European Jewish migrants who arrived in Britain in the late 1800s.

Africans - Why did they come?

- When Africans came to Britain in theory they were no longer slaves.
- However, this rule was largely ignored and freedom had to be fought for
- Many Africans ran away from their owners, some bought their freedom or were 'given it'.

Industrial Period 1750-1900

Why People Came, Their Impact, Official and Unofficial Responses

Irish – Why did they come?

- Reasons – Push Factors**
- Potatoes was the **main food** for millions of Irish people.
 - But, in **1845**, potatoes across Ireland were hit by a terrible disease – **potato blight**. About a **third** of the 1845 crop was destroyed.
 - When the blight returned in **1846** almost all of the crop was wiped out.
 - Food prices **rose quickly** and people could no longer pay their rents. In 1846 people in Ireland began to starve.
- Reasons – Pull Factors**
- Between **1846 and 1850** more than a million people left Ireland.
 - Industrialisation meant that there were **opportunities for work**.
 - By 1861, the Irish made up **13%** of the population in Manchester and **25%** of the population in Liverpool



Painting of an Irishman arriving in Liverpool

Irish – Impact on Britain

- Often, Irish migrants were forced to take the **dirtyest and lowest paid** jobs, work as dock labourers, miners, quarry-men and builders.
- Some became soldiers. By **1868** there were **55,000** Irish soldiers in the British army.
- Between 1750-1900 many worked as **'navvies'**, building canals and later railways. The work was often tough and dangerous.
- Even before the Irish came, British cities were becoming **overcrowded**.
- Families often lived in **back-to-back houses** and cellars
- Many died from water-borne diseases such as **cholera**.



Irish railway 'navvies' working in Leicester

Irish – Official and Unofficial Responses

- From 1750-1900 Irish migrants often faced hostility and prejudice. There were **five** main reasons for this:
- Poverty and crime:** As many Irish migrants were desperately poor some turned to theft and crime – this increased hostility towards them
 - Jobs:** Irish workers accepted lower wages than English workers. This undercutting of other workers kept wages low.
 - Religion:** England, Scotland and Wales had mainly become Protestant. The vast majority of Irish were Catholics.
 - Nationalism:** Some Irish groups wanted independence – they did not want to be ruled by Britain.
 - Racism:** Some defined the Irish as a separate race – the Celts.



Newspaper cartoon portrays the 'threat' of the Irish to Britain

Italians – Why did they come?

- Reasons – Push Factors**
- In the late 1800s Italy became a united, independent nation.
 - Many Italians were forced to endure warfare and military conscription
 - Changes in **agriculture** (farming) left many in **poverty**
 - Outbreaks of **typhus and cholera** added to their misery
- Italians – Impact**
- In 1861 there were **5,000** Italians in Britain. By 1901 there were over **20,000**.
 - Half settled in London. Clerkenwell became known as **'Little Italy'**.
 - As competition for work was high, Italians often did unpopular jobs such as **laying asphalt** on roads.
 - Irish craftsmen produced tiles, ceramics, picture frames and mosaics.
 - An important source of employment was **ice-cream**. Homemade ice cream was sold to factory workers from carts around the streets.



Italian ice cream cart in London

- Italians – Official and Unofficial Responses**
- Italians sometimes faced **prejudice**. Some were hostile because the Italians were **Catholics**. Others blamed cholera outbreaks on their dirty glasses when serving ice cream.
 - Despite this, Italian communities **grew and prospered**.
 - By 1900 there were **Italian schools, churches and even a hospital** in London.



King George III

Germans – Why They Came

- Between 1750 and 1900 the largest group of migrants came from **Germany**.
- In 1750 Britain had a German king – **George III**
- Many Germans fled to **avoid the warfare** in Germany.
- Others joined because they enjoyed the **freedom of expression** and lack of interference from the government

Germans – Impact

- Many **German entrepreneurs** built successful companies.
- Paul Reuter developed a telegraph communications company which became the leading supplier of international news – **Reuter's News Agency**.
- Germans were as bankers, bakers and brewers. German sausages became part of a typical English breakfast.
- German migrants **rarely** encountered the hostility and prejudice faced by Irish and Italian migrants.



The English breakfast - © iStockphoto.com

Unit 18: Probability and Statistics

| PROBABILITY | |
|------------------------------------|---|
| probability | the likelihood or chance of something happening. It is given on a scale between 0 (impossible) and 1 (certain), and can be a fraction, decimal, or sometimes a percentage |
| theoretical probability | the probability of something in theory |
| relative frequency | the probability of something worked out from real life data , also called empirical probability |
| experiment (in probability) | when a number of trials are conducted to determine the probability of an event |
| event | one possible outcome in a probability experiment, e.g. <i>getting a 5 on a die</i> |
| expectation | what you predict will happen in a probability experiment, you multiply the probability by the number of trials |

| OUTCOMES / EVENTS | |
|--------------------------------|---|
| exhaustive | outcomes are exhaustive if they cover the entire range of possible outcomes |
| mutually exclusive | events are mutually exclusive if they cannot happen at the same time |
| independent events | events where the outcome of an event is not affected by the outcome of a previous event |
| dependent events | events where the outcome of an event is affected by the outcome of a previous event |
| conditional probability | the probability of an event happening, given that another event has already happened |

| PROBABILITY NOTATION | |
|----------------------|---|
| $P(A) =$ | the probability of an event A = |
| $P(A') =$ | the probability that event A will not occur = the complement of A |
| $P(A \cap B) =$ | the probability that both events A and B will occur = the intersection |
| $P(A \cup B) =$ | the probability that event A or B or both will occur = the union |

| REPRESENTING PROBABILITIES | |
|----------------------------|---|
| sample space | the set of all possible outcomes of an experiment |
| probability tree | a diagram shaped like a tree used to display a sample space by using one branch for each possible outcome |

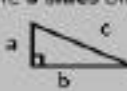
| Links to: LINEAR GRAPHS | |
|-------------------------|--|
| gradient | how steep a line is can be positive or negative (Change in y) / (Change in x) It gives the rate of change |

| DISPLAYING GROUPED DATA | |
|-------------------------------------|---|
| cumulative frequency | a running total |
| cumulative frequency diagram | a curve plotting the end-points of grouped data against the running total makes an 'S' shape |
| box plots | |



| SPREAD OF DATA: QUANTILES | |
|----------------------------|---|
| lower quartile | the value one quarter of the way through the data |
| median | the middle value (half way through the data) |
| upper quartile | the value three quarters of the way through the data |
| interquartile range | a measure of spread calculated by: the upper quartile subtract the lower quartile |

| AVERAGES AND RANGE FROM A FREQUENCY TABLE | |
|---|--|
| mean | method: multiply the variables by their frequencies (fx column), total the fx column, divide by total frequency |
| mode / modal class | the most frequent value or class; the one with the highest frequency |
| median | use half the total frequency to find the middle position , then locate the row this occurs in using the 'subtotal' column |
| range | difference between the largest and smallest values of the variable (first column) |



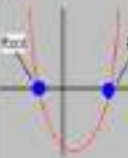
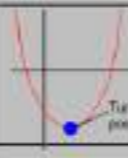
| REAL LIFE GRAPHS | |
|-----------------------------|--|
| real life graph | a graph that mathematically models a real life situation |
| conversion graph | a line graph to convert one unit to another |
| distance-time graphs | the gradient of the line is the speed |
| velocity-time graphs | the gradient of the line is the acceleration the area under the graph is the distance |
| gradient of a curve | the gradient of a curve at a point is the same as the gradient of the tangent at that point |

| COORDINATES | |
|------------------------|--|
| line segment | a line joining two points |
| length of line segment | distance between two points calculated using Pythagoras' theorem. |
| Pythagoras' theorem | a relationship between the 3 sides on a right angled triangle $a^2 + b^2 = c^2$  |
| midpoint (3,2) | the middle of a line segment |

| LINEAR GRAPHS | |
|------------------------------------|--|
| $y = mx + c$ | the general equation of a linear graph m is the gradient c is the y-intercept when plotting: use a table of values, substitute in values of 'x' to generate 'y', plot the coordinates, join with line |
| gradient | how steep a line is can be positive or negative (Change in y) or $\frac{dy}{dx}$ (Change in x) dx It gives the rate of change |
| y-intercept | where the line crosses the y-axis (0, a) |
| equation from gradient and a point | substitute the gradient for 'm', and the 'x' and 'y' values from the coordinates to find 'c' re-write the equation in the form $y = mx + c$ |
| equation from two points | find the gradient using $\frac{dy}{dx}$, then use the method as above |
| parallel lines | lines with the same gradient ('m' is the same) they never meet they are always the same distance apart |
| perpendicular lines | two lines that meet at a right angle (90°) the product of the two gradients is always -1 the gradient of one line will be the negative reciprocal of the gradient of the other line |

| REAL LIFE GRAPHS | |
|---------------------|---|
| gradient of a curve | the gradient of a curve at a point is the same as the gradient of the tangent at that point |
| tangent to a curve | a straight line that touches a curve at exactly one point  |
| area under a curve | to estimate the area under a curve, split it up into simpler shapes – such as rectangles, triangles and trapeziums  |

Unit 19: Algebraic Graphs

| QUADRATIC GRAPHS | |
|----------------------|---|
| quadratic graph | a graph where the highest power of x is x^2 It is always a parabola (a U-shape) $y = x^2$  $y = -(x^2)$  |
| roots (of graphs) | the 'solutions' of a graph, where a function equals zero can be found in a graph where the curve meets the x axis  |
| turning point | the point where a graph turns, from negative to positive gradient or positive to negative gradient  |
| sketching quadratics | decide if it is a U or \cap shape factorise to find the roots, mark them on complete the square to find the turning point, mark it on use the 'd' value as the y-intercept, mark it on |

| SOLVING QUADRATIC EQUATIONS | |
|---------------------------------|--|
| quadratic | a polynomial where the highest power of x is x^2 |
| solving a quadratic | finding the roots of the graph there are usually two roots / solutions |
| general quadratic equation | a quadratic equation is of the form $ax^2 + bx + c = 0$ where a, b and c are numbers, $a \neq 0$ |
| the quadratic formula | $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ |
| factor | a quantity which divides equally into a number, e.g. factors of 8 are 1, 2, 4 and 8 |
| factorising a general quadratic | quadratic: $x^2 + bx + c$ factorised form: $(x + ?)(x + ?)$ '?' are two numbers whose product is 'c' and sum is 'b' |
| difference of two squares | quadratic: $a^2 - b^2$ factorised form: $(a - b)(a + b)$ square root each number from the original expression |
| completing the square | a quadratic in the form $x^2 + bx + c$ written in the form $(x + p)^2 + q$ the turning point of the quadratic is (-p, q) |

Early Modern Period 1500-1750

Why People Came: Their Impact: Official and Unofficial Responses

Huguenots – Why did they come?

- England was often a place of refuge for Protestants
- This was because parts of Europe were Catholic and so the Protestants often faced persecution for their beliefs
- The first arrivals were Walloons and other French-speaking refugees from Belgium and northern France
- Reasons – Push Factors**
 - Many Huguenots arrived after the St Bartholomew's Day Massacre in 1572, but most arrived between 1670 and 1710 (50,000).
 - In the 1670s, the Catholic King of France, Louis XIV made life very difficult for the Huguenots.
 - He made Protestantism illegal. Their services were banned, businesses attacked and many forced to convert to Catholicism.
- Reasons – Pull Factors**
 - At first the Huguenots were welcomed by King Edward VI as he was a Protestant
 - King Charles II offered Huguenots denizen status (equal rights) if they came to England and the Anglican Church raised funds to support the refugees.

Huguenots – Impact on Britain

- Many Huguenots lived in London and the south of England
- Many were hard-working and skilled craftsmen.
- They transformed Britain's silk industry (which was expensive cloth) by working as silk-weavers and then selling the clothes abroad
- They designed and created uniforms for the East India Company
- They made the paper for banknotes used by the Bank of England
- The Huguenots played a crucial part in Britain's transformation to an industrial nation.

Huguenots – Official and Unofficial Responses

- Most Huguenots were accepted into English society.
- We know this because many married into English families – which suggests that they successfully integrated into the English way of life
- The vast majority settled in England – they never returned home
- It is estimated that 25% of London's population comes from the Huguenots
- Occasionally there were acts of hostility as they were criticised for being too wealthy

The Palatines – Why did they come?

- In 1709, thousands of German migrants came to London.
- They were known as the 'Poor Palatines'. The majority were Protestants.
- Reasons – Push Factors**
 - Most Palatines came to England because they wanted to escape religious persecution, warfare and bad harvests that were ruining their lives.
- Reasons – Pull Factors**
 - Many were encouraged to migrate to Britain because the Carolina Company advertised for people to settle in America
 - They portrayed America as a 'promised land' where people could live in peace and prosperity (wealth)

Palatines: Impact on Britain

- 13,000 Palatines arrived in London during just one summer
- Many ended up in refugee camps with only tents for shelter
- Most were poor peasants who worked on the land as farm labourers
- Official and Unofficial Responses**
 - At first, the Palatines were received fairly kindly.
 - People assumed that they were all Protestant refugees and deserved support. A relief fund of £20,000 was raised.
 - However, when the government discovered that a third were Catholics, attitudes changed.
 - The government sent many back home, 3,000 were granted passage to America, and another 5,000 were deported to Ireland.
 - In the autumn of 1709 the government banned further German migration.

African and Indian Migration

- It is quite possible that Africans were integrated into British society – the example of John Blanke who was black trumpeter at the court of Henry VIII suggests this. Blanke, asked for, and was granted, a pay rise.
- Large numbers of black people can be found in parish registers.
- From the 1560s the English started to become involved in the transatlantic slave trade – John Hawkins captured and sold enslaved Africans
- Many Africans were now treated as property. Some advertisements in newspapers provide a reward for capturing servants who had run away
- From the 1580s the British started to develop trading links with India through the East India Company
- When officials and soldiers returned from India they brought with them 'ayahs' (servants) or Indian children as they were seen to be fashionable



Palatinate on the Rhine



A portrait of the Duchess of Portsmouth with her African servant



St Bartholomew's Day Massacre, 1572



King Louis XIV of France



Early Modern Period 1500-1750

Why People Came: Their Impact: Official and Unofficial Responses

Hansa Merchants – Who were they?

- The Hansa Merchants were a German-speaking trade organisation
- Their trade networks covered the North Sea, the Baltic and the rivers of northern Europe – see map showing where the major towns were located. They owned many buildings in London.
- The ships of the Hansa merchants carried English wool to the cities of Northern Europe and brought back high-quality metal and wooden goods from German cities.
- One of the most famous German migrants was the artist Hans Holbein.
- He painted many famous paintings of important Tudor figures, such as Anne Boleyn (right) and Henry VIII's Chief Minister, Thomas Cromwell.



Anne Boleyn, pictured above, was the second wife of Henry VIII and one of Hans Holbein's clients



An illustration of a gypsy pot-maker in London, 1687

Gypsies – Who were they?

- Gypsies were people who lived a nomadic lifestyle – they often didn't have a permanent home and preferred to travel from one place to the next.
- They became known as Gypsies as people wrongly assumed that they came from Egypt.
- In fact, many lived in Eastern Europe where they were known as 'Roma'
- When the Turks invaded the Balkans (south eastern Europe), many Gypsies began to migrate to westwards and to England.

Gypsies: Impact and How People Responded

- The Gypsies were a nomadic, wandering people.
 - They set up their tents and carts in temporary camps and worked as pot-makers, animal dealers and herbalists
 - They often faced prejudice from people in settled communities who were suspicious of migrants with such a different culture
- Responses**
- Tudor governments were concerned that Gypsies brought little economic benefit (unlike the Hansa Merchants) and undermined England's Christianity. They introduced harsh laws against them:
 - In 1530 Henry VIII passed England's first anti-Gypsy law. The Egyptians Act ordered all Gypsies to leave the country within 16 days, otherwise they would be imprisoned and deported.

Jews: Why They Returned

- For hundreds of years after 1290 Jews had been banned from England
- In 1655 this changed when a Rabbi (priest) from Amsterdam – Menasseh ben Israel – travelled to London to seek help from Oliver Cromwell – see right.
- He hoped to persuade Cromwell to allow Jews to come to England since they were facing terrible hostility in Europe.
- Cromwell supported this idea partly for religious reasons – Jews would support Cromwell against English Catholics.
- He also thought that Jewish merchants (traders) would help the English economy



Oliver Cromwell was Lord Protector of England after King Charles I had been executed

Jews: Impact on Britain

- Many Jews when the first arrived in England settled in Aldgate, London
- Within a year they had established their own community and created a synagogue – a Jewish place of worship
- When Jews arrived in Britain they often worked in trade and finance
- After 1660, as banks opened and England's trade grew, more Jews became wealthy
- For example, Moses Hart was a Jewish merchant who migrated from Germany in the 1690s.
- He made a fortune by trading at London's Royal Exchange, built a huge synagogue and bought a huge house in Twickenham, London.
- By 1700 the Jewish population had grown to around 8,000.
- London remained the largest Jewish community, but many Jewish families also lived in the port cities such as Liverpool, Hull and Portsmouth.
- Not all were rich however. Some sold second-hand clothes and other goods from street carts for a living.



London's Royal Exchange today. A place of trade and international finance



Moses Hart's mansion in Twickenham, London

Jews: Official and Unofficial Responses

- Despite being invited to England, Jews still faced some restrictions.
 - For example, they were not allowed to serve in the army, attend university or become lawyers – which explains why many worked in trade and finance
- Unofficial Responses**
- It is difficult to know exactly how Jews were treated in local communities, but the fact that popular songs sometimes portrayed Jews as cheats and criminals suggests that they may have faced prejudice in England.

Unit 20: Limits and 3D Geometry

APPROXIMATION AND ESTIMATION

| | |
|-------------------------------|--|
| rounding | writing a number less accurately so it is easier to work with below 5, stay the same, 5 or above, round up |
| truncating | to shorten by 'chopping off' the end |
| decimal place | the position of a digit after the decimal point |
| money | when working in pounds (£) and pence, all answers should be given to 2 decimal places |
| significant figure | 1 st significant figure: the first digit in a number which is not a zero |
| estimate a calculation | the process of rounding numbers to one significant figure and then calculating to get an approximate answer |
| approximate | an answer close to the exact value |
| other estimates | estimated mean – from a grouped frequency table as using the mid-point estimate from a graph – as we all draw graphs slightly differently so will get different answers |

BOUNDS

| | |
|--------------------------------|--|
| lower bound (LB) | the smallest value that would round up to the estimated value |
| upper bound (UB) | the smallest value that would round up to the next estimated value |
| error interval | the range of values that a number could have taken before being rounded or truncated written as an inequality: lower bound ≤ x < upper bound |
| adding with bounds | UB + UB = UB LB + LB = LB |
| subtracting with bounds | UB – LB = UB LB – UB = LB |
| multiplying with bounds | UB x UB = UB LB x LB = LB |
| dividing with bounds | UB ÷ LB = UB LB ÷ UB = LB |

PROPERTIES OF 3D SHAPES

| | |
|--------------------------|--|
| surface | the outside layer of an object, it has an area and can be flat or curved |
| face | any of the individual flat surfaces of a solid object |
| edge | for a 3D shape, the line segment where two faces meet |
| vertex (vertices) | for a 3D shape, the point where two or more edges meet, a corner |

2D REPRESENTATIONS OF 3D SHAPES

| | |
|------------------|---|
| plan | a 2D view of a 3D solid as viewed from above, birds-eye view |
| elevation | the 2D view of a 3D solid from the front or the side |
| net | a pattern that you can cut and fold to make a model of a 3D shape |

SURFACE AREA

| | |
|---------------------------------|---|
| surface area | the total area of all the surfaces on a 3D shape, find the area of each face separately, then add them together |
| surface area of a sphere | $A = 4\pi r^2$ |
| surface area of a cone | curved surface area = $\pi r l$ circle base area = πr^2 add these together |



3D SOLIDS: OTHERS

| | | |
|----------------|---|--|
| sphere | 1 face no edges no vertices | |
| frustum | a frustum is a solid (usually a cone or pyramid) with the top removed | |

VOLUME

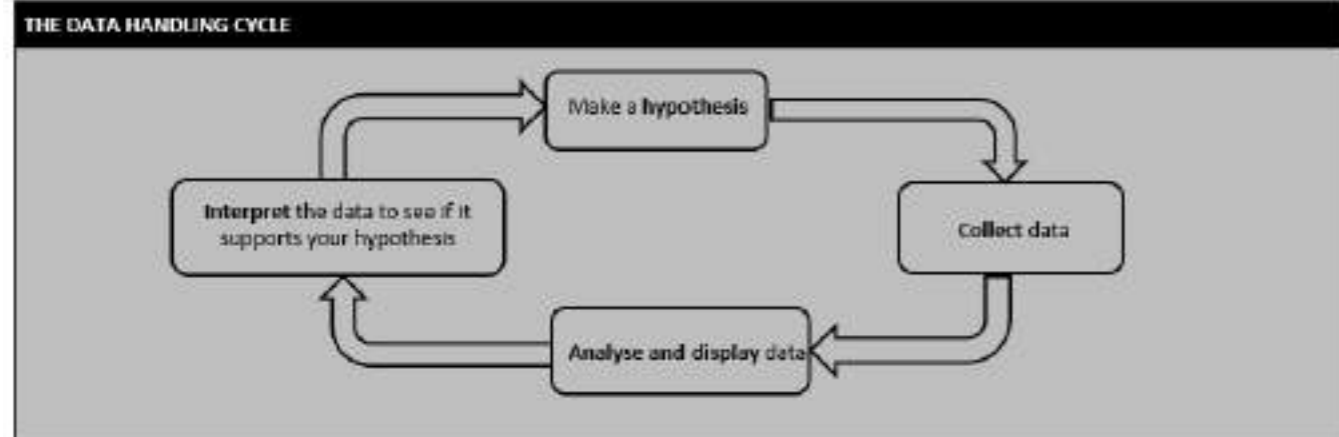
| | |
|-----------------------------|--|
| volume | the amount of space a 3D shape takes up |
| prism | volume = area of cross section x length |
| cube | volume = one side cubed (or, area of square x length of prism) $V = l^3$ |
| cuboid | volume = area of rectangle x length of prism $V = lwh$ |
| triangular prism | volume = area of triangle x length of prism $V = \frac{bh}{2} \times l$ |
| cylinder | volume = area of circle x length of prism $V = \pi r^2 h$ |
| pyramid | volume = $\frac{1}{3}$ x area of cross section x length |
| square based pyramid | volume = $\frac{1}{3}$ x area of square base x height of pyramid $V = \frac{lwh}{3}$ |
| cone | volume = $\frac{1}{3}$ x area of circle base x height of cone $V = \frac{\pi r^2 h}{3}$ |
| sphere | $V = \frac{4}{3} \pi r^3$ |

Unit 21: Further Probability

| SETS | |
|-------------|---|
| set | a collection of items with one of each member |
| { } | brackets are written at the start and end when listing elements in the set |
| ξ | the universal set – everything we are interested in |
| \in | 'element of a set' or member of a set (a value in the set) |
| \notin | 'not an element of a set' |
| \emptyset | the 'empty set' |
| $n(A)$ | the number of elements in a set A |

| VENN DIAGRAMS | |
|------------------|--|
| Venn diagram | a diagram using circles or other shapes, to show the relationship between sets |
| set | a collection of items with one of each member |
| the intersection | $(A \cap B)$ in A and in B |
| the union | $(A \cup B)$ in A or in B or in both |
| the complement | A' not in A |

| PROBABILITY NOTATION | |
|----------------------|--|
| $P(A) =$ | the probability of an event A = |
| $P(A') =$ | the probability that event A will not occur = the complement of A |
| $P(A \cap B) =$ | the probability that both events A and B will occur – the intersection |
| $P(A \cup B) =$ | the probability that event A or B or both will occur = the union |



| SAMPLING | |
|---------------------|---|
| population | in statistics, the whole group being studied, (not the population of a city or country) |
| sampling | taking a small group of the population to use for your study (to save the money and time needed to ask everyone) |
| random sampling | sampling where each member of the population is equally likely to be picked, e.g. names out of a hat |
| systematic sampling | a form of random sampling using intervals , e.g. picking every 10 th person on the register |
| stratified sampling | a form of sampling that is more representative of the groups of people within a population |
| biased | when something is not fair |

| OUTCOMES / EVENTS | |
|-------------------------|---|
| exhaustive | outcomes are exhaustive if they cover the entire range of possible outcomes |
| mutually exclusive | events are mutually exclusive if they cannot happen at the same time |
| independent events | events where the outcome of an event is not affected by the outcome of a previous event |
| dependent events | events where the outcome of an event is affected by the outcome of a previous event |
| conditional probability | the probability of an event happening, given that another event has already happened |

| Links to: SYSTEMATIC LISTING | |
|------------------------------|--|
| product rule for counting | if there are x ways of doing something and y ways of doing something else, then there are xy ways of performing both (the product of the two numbers) |

| REPRESENTING PROBABILITIES | |
|----------------------------|---|
| sample space | the set of all possible outcomes of an experiment |
| probability tree | a diagram shaped like a tree used to display a sample space by using one branch for each possible outcome |

Medieval Period 1250-1500

Why People Came: Their Impact, Official and Unofficial Responses



Impact of Italian Bankers: 1250-1500

- Many Italian bankers from northern Italy, such as Florence and Venice (see right) set up businesses in London.
- In return for lending money to English kings they gained **privileged rights** to trade in English wool and other goods.
- The earliest **Italian loans** helped King Edward I to fund the **armies and castles** he needed to conquer Wales.
- Italian bankers had a lasting effect on banking in London. For example, words such as 'credit', 'debit', 'bank' and the £ symbol all come from Italian words.
- Italian bankers played a **significant role** in England's transition from being simply a producer of raw materials, such as wool, to becoming a powerful **manufacturing and trading economy**.

Official (Government) Responses to Migrants: 1250-1500

Positive Responses

- English kings invited Italian bankers to England and gave them **special privileges** over England's wool trade.
- Edward III warmly invited Flemings who worked in the cloth trade to England and ensured that they were always protected.
- Letters of denization were introduced: these granted migrants the same rights and protection as any English person.

Negative Responses

- By 1250 Henry III was no longer keeping the royal promise to protect Jews from harm.
- 1290: Jews were **expelled** by Edward I once they were of no use as moneylenders.

Unofficial (Public) Responses to Migrants: 1250-1500

Positive Responses

- A clue that many migrants integrated successfully into society might be found in people's surnames.
- For example, surnames such as Fleming (from Flanders) and Johnson (son of John or Jean in Europe) suggest that migrants from the Low Countries married English women.

Negative Responses

- The most serious outbreaks of violence towards migrants were **against Jews in 1255 in Lincoln**.
- Throughout his reign King Edward III had to **frequently remind mayors and sheriffs** that no harm must come to **Flemish cloth workers** – suggesting that they may have been targets by local people since this message would not have been needed if there were not threats against them.
- During the **Peasants' Revolt of 1381**, rebels reached London and murdered over **150 foreigners**, deciding who was guilty by whether they had a **foreign accent** when asked to say 'bread and cheese'.



Why People Came: 1250-1500

- The **Low Countries** is the name for the countries that now make up Belgium, Holland Luxembourg – see map on the right.
- A very large number of England's medieval migrants came from here **after 1300**. This was because of the following reasons:
- England was a **short sea journey** and ships regularly sailed across the English Channel.
- Wars and rebellions** (such as the **Hundred Years War**) frequently broke out in the Low Countries between 1300 and 1500. Refugees were looking for **safer places** to live and work.
- By comparison, England was **relatively stable** and offered **better wages**, especially for skilled workers.
- After the **Black Death, 1348-51**, England was desperately short of workers.

Impact on Britain: 1250-1500

- A high proportion of migrants were **craftsmen**, such as tailors (who designed clothing), shoemakers and dyers (who turned cloth into colours).
- Flemish glaziers made wonderful **stained glass windows** for many churches.
- Dutch women used **hops to brew beer**. This became more popular than the beer the English had used from barley.
- Flemings were some of England's first **printers, clock makers and opticians**.

Impact on Britain: Flemish Weavers

- Gradually traders realised that they could earn more money if they could turn raw wool from sheep into cloth in England.
- To do well in the cloth trade, the English would have to match the skills of those in Europe.
- Edward III (1327-1377) persuaded significant numbers of Flemish weavers to move to Britain from the **1330s onwards**. He did this by:
 - Letting the Flemish set up their own **weavers' guilds** (organisations)
 - Letting the Flemish work wherever they wanted
- The impact was significant: **Lavenham in Suffolk** only had a population of **2,000 in 1450** but it paid **more tax** than the great towns of **York and Lincoln** due to its thriving wool trade.
- In **1363** Flemish weavers arrived in the small town of **Manchester**.
- 500 years later the city was the powerhouse of Britain's wealth.

GCSE HISTORY 100% SHEET: MIGRANTS TO BRITAIN 1250-PRESENT

| Migrants to Britain before 1250 | |
|---------------------------------|--|
| Roman Empire | Between 43 AD and 410 AD Britain was part of the Roman Empire. The Romans who settled in Britain came from a far away as the Middle East (such as Syria) or North Africa (such as Libya), they didn't all come from Italy! |
| Anglo-Saxons | From around 450 AD people from north Germany and Denmark came to live in Britain. Two of the main tribes were called the Angles and the Saxons, hence Anglo-Saxons. |
| Vikings | The Vikings started raiding Britain from 793 AD and continued for over 250 years. Their influence was particularly noticeable in the North East of England. |
| Normans | In 1066, the Anglo-Saxon king, Harold Godwinson, was famously defeated at the Battle of Hastings by William, Duke of Normandy. Normandy is in northern France. This started a period of Norman migration to Britain. |

1250 – Jewish Settlement in England

- William the Conqueror (1066-1087) invited the Jews to live in England.
- He needed their expert skills, particularly in money lending.
- This was because medieval popes told Christians that it was a sin to lend money.
- The Jews loaned money to market traders and to the king which helped him build cathedrals and castles.

1250 – Jewish Life and Work

- Jews often lived close together. They were the only people in England that weren't Christian. Each Jewish community had its own *kehilla* (Council).
- Jews mixed freely with their Christian neighbours. Not all were money lenders.
- For example, we know that some were fishmongers, doctors, artists and cheesemakers.
- Jews were generally accepted as part of Christian society.
- This was because businesses could flourish thanks to Jewish moneylending.
- This led to more trade and more taxes for the king.
- Their financial skills helped England to build many castles and cathedrals.

Keyword: Prejudice
An assumption or opinion about someone simply based on that person's membership of a particular group

Medieval Period: 1250-1500

1250: Reasons for Prejudice and Violence against Jews

- As Jews were invited to England by the king, they were always treated as royal property.
- This meant that they could take shelter in any of the king's castles.
- This special relationship caused many people to resent (dislike) the Jews, especially at a time when a king was unpopular.
- The deepest cause of resentment was religion. Christians were taught that the Jews were responsible for the crucifixion of Jesus.
- This intense religious hatred led to many mass murders of Jews before 1250.

1250-1290: Persecution and Mass Murder

- In London, on Palm Sunday, 1263, four hundred Jews were murdered and in 1264 another hundred were beaten to death in the same city. There were similar brutal attacks in Bristol and Lincoln.
- In several cases mobs destroyed Jewish local councils so that there would be no records of debts owed to Jews.

1275: Statute of Jewry

- By 1265 Italian bankers had created new ways of making money from clients that provided loans without charging interest. Jewish moneylenders were no longer needed. There was no reason for them to be protected.
- In England, King Edward I made this official. In 1275 he passed a law called the Statute of Jewry. It said the following: Jews were no longer allowed to collect interest on loans.
- People who owed money to Jews no longer had to pay.
- Jews had to wear yellow badges on their clothes.
- Jews could only live in a few selected towns.

1250-1290: Conversion and Expulsion

- One option for Jews was to convert to Christianity.
- Henry III (1216-1272) set up a special home in London called the *Domus Conversorum*.
- This was for Jews who abandoned their faith and became Christians.
- From 1250 onwards a growing number converted, mainly women and children because their own Jewish community could no longer support them.
- From 1280 Edward I forced all Jews to attend weekly sermons given by monks who tried to convert them. At least 300 Jews converted to Christianity.
- In 1290 Edward I decided to expel all the 3,000 Jews that were left in his kingdom.
- All Jewish homes were confiscated and they were forced to take boats to Europe.
- Several hundred of the poorest died when the boat taking them to France sank in a storm.
- One sea captain dumped his Jewish passengers on a sandbank in a river estuary and left them to drown when the tide rose.



A picture of a Jewish man forced to wear a yellow badge

1 – Structure of Atoms

| | |
|-------------------------------|---|
| Atoms | All substances are made of atoms. Radius of atom = 0.1 nm ($1 \times 10^{-10} \text{ m}$) |
| Protons | Mass = 1, charge = +1, location = nucleus. |
| Neutrons | Mass = 1, charge = 0, location = nucleus. |
| Electrons | Mass = very small, charge = -1, location = shells. |
| Nucleus | Most of the mass is concentrated here. Positively charged. Radius of nucleus = $1 \times 10^{-14} \text{ m}$ ($1/10000$ of radius of atom). |
| Shells / Energy Levels | 1 st shell = 2 electrons max, 2 nd shell = 8 electrons max, 3 rd shell = 8 electrons max. |
| Overall Charge on Atom | Zero charge (neutral) because proton charge = +1, electron charge = -1. Same number of protons and electrons so charges cancel out. |

2 - Atomic Number, Mass Number and Isotopes

| | |
|---|--|
| Atomic number | Number of protons. (Also gives number of electrons) |
| Mass number | Total number of protons and neutrons. |
| Isotopes | Atoms of the same element with same number of protons and different numbers of neutrons. |
| Relative Atomic Mass (A_r) | The weighted average of the masses of all of the isotopes of an element |
| Calculating A_r | 1. Multiply each mass by the % abundance. 2. Add them up. 3. Divide by 100. |

3 – History of the Atom

| | |
|---------------------------------|--|
| Dalton's Model | Described atoms as tiny solid spheres. |
| Plum Pudding Model | Described atoms as a ball of positive charge with negative electrons stuck in it. |
| Rutherford's Experiment | Fired positive alpha particles at a thin sheet of gold. |
| Rutherford's Result | Most alpha particles went straight through or slightly scattered. Very small number deflected back. |
| Rutherford's Explanation | Nucleus is tiny and positively charged. Most of the atom is empty space. Cloud of negative electrons surround nucleus. |
| Bohr's Nuclear Model | Discovered that electrons orbit the nucleus in fixed shells. |
| Protons & Neutrons | Rutherford discovered protons. Later, Chadwick discovered neutrons. |

4 – Elements, Compounds, Mixtures and Separation Processes

| | |
|------------------------|---|
| Element | A substance made up of one type of atom. |
| Compound | A substance made up of two or more types of atom chemically joined together. |
| Mixture | A substance made up of two or more substances mixed together but not chemically joined. |
| Filtration | Separates an insoluble solid from a liquid using filter paper. |
| Evaporation | Heat solution to evaporate liquid until dry crystals are left. |
| Crystallisation | Heat solution until crystals form, leave to cool, filter out crystals and leave to dry. |
| Distillation | Separates out a liquid from a mixture. Liquid evaporates then condenses. Two types – simple and fractional. |
| Chromatography | Separates a mixture of coloured liquids. |

GCSE Science
Chemistry C1 – Atomic Structure

| 1 – Modern Periodic Table | |
|-----------------------------------|--|
| Periodic Table | 118 elements in order of atomic number. |
| Groups | Vertical columns. Contain elements with similar chemical properties. |
| Group number | Tells you the number of electrons in the outer shell. |
| Periods | Horizontal rows. |
| Period Number | Tells you the number of shells. |
| Metals | Found on left side. Conductors of heat and electricity, strong, malleable and high melting and boiling points. |
| Non-metals | Found on right side. Insulators of heat and electricity, dull, brittle, lower melting and boiling points. |
| 2 – Development of Periodic Table | |
| Early tables | Fewer elements (e.g. no noble gases). Arranged in order of atomic weight (no knowledge of atomic number yet). |
| Newland's table | Not well accepted. Elements in same group often had different properties, some boxes had 2 elements. |
| Mendeleev's table | Well accepted. Left gaps for undiscovered elements and switched places of some to ensure elements with similar properties in same group. |
| Mendeleev's predictions | Used table to predict properties of undiscovered elements. Turned out to be correct. |

| 3 – Group 1 Alkali Metals (lithium, sodium, potassium) | |
|--|--|
| Properties | Soft, low density, shiny when cut but quickly go dull when they react with oxygen in air. |
| Reactions with water | Vigorous reactions - produce an alkaline solution. metal (s) + water (l) → metal hydroxide (aq) + hydrogen (g). |
| Reactions with chlorine | Produce a white metal chloride salt. metal (s) + chlorine (g) → metal chloride (s) |
| Reactions with oxygen | Forms dull metal oxide layer. metal (s) + oxygen (g) → metal oxide (s) |
| Trends down the group | Increasing reactivity and decreasing melting and boiling points. |
| 4 – Group 7 Halogens (fluorine, chlorine, bromine, iodine) | |
| Properties | Fluorine = pale yellow gas, chlorine = yellow-green gas, bromine = red-brown liquid, iodine = grey solid with purple vapour. |
| Diatomic Molecules | Made of pairs of atoms → F ₂ , Cl ₂ , Br ₂ , I ₂ . |
| Trends down the group | Decreasing reactivity and increasing melting and boiling points. |
| Reactions with metals | React with metals to form metal halide salts. |
| Displacement Reactions | A more reactive halogen can displace a less reactive halogen from its salt. |
| 5 – Group 0 Noble Gases (helium, neon, argon, krypton) | |
| Properties | Inert (very unreactive), colourless gases, non-flammable. |
| Electrons | Full outer shell of electrons → very stable → do not react. |
| Trends down the group | Increasing boiling point. |

GCSE Science

Chemistry C1 – Periodic Table

What did Nazi rule mean for the people of Europe, 1939-1945?

The Contrasting Nature of Nazi Rule: East and West and The Holocaust

Nazi Rule in Poland

- Nazi leaders believed that Germany needed **Lebensraum**. So when the Nazis invaded Poland in September 1939, they aimed to remove any element of Polish control or culture. Their plan was to totally Germanise the country.
- From 1940, thousands of native Polish citizens were expelled, and 500,000 'ethnic Germans' were settled in their houses

Treatment of the Poles

- The Nazis considered Slavic Poles to be racially inferior and, from the outset, large numbers were murdered by the Wehrmacht and the SS.
- It is estimated that 1.9 million non-Jewish citizens were killed. Other Poles were sent to work in Germany through forced labour schemes.
- Between 1939 and 1945, over 1.5 million were deported and forced to work in labour camps. In May 1940, the Polish Decrees established rules for Poles working in Germany.

Nazi Rule in the Netherlands (Holland)

- By May 1940 the German Luftwaffe had bombed the city of Rotterdam and forced the Dutch to surrender.
- The Dutch shared the same ethnic background as Germans and were therefore treated very differently from the Slavs of the east.
- Civil servants were allowed to continue working if they chose to, although 30 per cent of town mayors stepped down.
- The Dutch education system was not changed as the Nazi rulers realised there would be a backlash if they tried to interfere

Responses to Nazi Rule

- Collaboration:** working with the Nazis and helping them to rule
- Accommodation:** doing as you were told by the Nazis
- Resistance:** Opposing the Nazis
- Collaboration Example:** In Latvia, the SS created the Latvian Auxiliary Security Police. The group took up the job of killing Jews and Communists. The group alone murdered 26,000 Jews, half the Jewish population of Latvia.
- Accommodation Example:** Many if not most people in France, Holland and Belgium simply got on with their lives.
- Resistance Example:** The 'French Resistance' undertook guerrilla warfare against the Nazis, publishing underground newspapers and providing intelligence to the Allies.



The First Solution: Persecution and Emigration (1938-39)

- In the countries the Nazis occupied before the start of the Second World War, the first solution was to force Jews to leave the country.
- This policy was adopted in Austria following the Nazi invasion in March 1938.
- During the Nazi occupation of Austria, Jews were beaten and humiliated by being forced to scrub the pavements to get rid of pre-Austrian graffiti.
- The persecution led many Jews to consider emigration. This was actively encouraged by the Nazis, who created a Central Office for Jewish Emigration.
- According to official reports, 110,000 Jews emigrated in two years.

The Second Solution: Concentration in Ghettos (1939-41)

- When the Nazis invaded Poland in 1939 they controlled over 3.5 million Polish Jews – too many for emigration.
- Polish Jews were now forced into ghettos – enclosed districts that isolated Jews from the rest of the population.
- The largest ghetto in Nazi-occupied Poland was in Warsaw.
- Completed in November 1940, the ghetto had three metre-high walls topped with barbed wire. By March 1941, the Warsaw Ghetto held 405,000 Jewish inhabitants.
- This was a third of the city's population, in just 2.4 per cent of its area.
- On average, fifteen people shared a small apartment. Unsurprisingly, these conditions led to disease and death, particularly among the vulnerable, like the young and old.

The Final Solution: Murder (1941-5)

Phase One: The Einsatzgruppen

- The mass murder of Jews began with the Nazi invasion of the Soviet Union in June 1941. For the Nazis, this was a life-and-death struggle against communists and Jews in the east. The men who carried out the mass murders in the east belonged to the Einsatzgruppen. These were mobile killing units, which consisted of SS men.
- Four Einsatzgruppen (A, B, C and D), each consisting of 500–1000 men, followed the German fighting troops as they advanced into Russian-held territory.
- As they reached different villages and towns, the Einsatzgruppen rounded up Jews and communists. Men, women and children were taken to secluded areas, often in woodland.
- There, the victims were forced to dig a large pit. They were then lined up at the edge of the pit and shot.
- Approximately 90 per cent of those murdered in the autumn and winter of 1941 were Jews, around 1 million people.

The Final Solution: Murder (1941-5)

Phase Two: Use of Poison Gas

- In the autumn of 1941, Operation Reinhard, the extermination of all the Jews in the General Government, was agreed. New extermination or death camps were created, the sole purpose of which was to murder. By 1942, Belzec (March), Sobibor (May) and Treblinka (July) were all operational, murdering Jews in newly constructed gas chambers.

What was the impact of Second World War on the German People?

War Economy, Shortages, Women, Bombing, Evacuation and Total War

War Economy

- In December 1939, Hitler announced that Germany would become a war economy.
- All industries would focus on supporting the war effort and there would be ambitious targets for every aspect of war production.
- In 1939, 23 per cent of the goods produced in German factories were related to the military; by 1941 this had risen to 47 per cent.
- By 1941, 55 per cent of the German workforce was employed in war-related work.

Albert Speer

- By the end of 1941 Germany was not producing many tanks, guns and aircraft.
- Things changed in February 1942 with the appointment of Albert Speer as Minister of Armaments and War Production.
- He decided to focus factories on producing a single product; employ more women in factories and use concentration camp prisoners as workers. This had a massive impact on production.
- In 1940 Germany produced 1,600 tanks. In 1944 they produced 19,000.
- In 1940 Germany produced 10,200 aircraft. In 1944 they produced 39,600.

Shortages

- The war economy led to serious shortages of food and other products throughout the war years.
- Rationing had been introduced from the outset.

Women

- The Nazi leadership was divided over the role of women in the war effort.
- Speer wanted them to work in the factories to boost production, but Hitler and others still believed they should remain at home to continue their role as wives and mothers.
- In 1939, 760,000 women worked in war industries and this had risen to 1.5 million by 1941.
- However, the total number of German women aged 15 to 65 was nearly 30 million. With men away at war it seemed that most women preferred to stay at home.



Bombing

- On 28 August 1940, British planes made a first devastating attack on Berlin.
- Hamburg, Berlin and Dresden were repeatedly bombed by the British and Americans.
- During the autumn of 1940, people in many cities were faced with air raids three or four nights each week.
- The German government introduced a massive programme to build air raid shelters and to improve air defences in the cities.
- Night after night, people sought protection in the air raid shelters, but they were not always safe.

Evacuation

- In September 1940, the Nazis became increasingly concerned about the safety of German children in the cities.
- They therefore introduced a programme of evacuation known as KLV.
- This system of voluntary evacuation to the countryside was first applied to the cities of Hamburg and Berlin, which were considered to be most at risk from attack.
- All children below the age of fourteen could live in the countryside.

The move towards 'Total War'

- At the beginning of 1943 Germany had suffered two defeats, one against the Russians at Stalingrad and another against the British in North Africa.
- Faced with these losses, the Nazis needed a new plan. The war could only be won if the German people made huge sacrifices. 'Total war' was now required.
- On 18 February 1943 Joseph Goebbels made a speech to a huge crowd of Nazi supporters. He explained the need for 'total war' - that every part of German society needed to be involved in the war effort.

Impact of the 'Total War' speech

- The Nazis finally tried to mobilise women into the war effort.
- A total of 3 million eligible women between the ages of 17 and 45 were called to work. Only 1 million actually took up the call.
- Anything that did not contribute to the war effort was eliminated - Professional sport stopped.
- The shortages became even worse. In August 1943, Germany stopped producing clothes.
- There was an increase in propaganda encouraging people to embrace the idea of total war. Goebbels' speech was shown in cinemas around the country and posters.

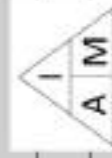


1 – Cell Structure and Specialised Cells

| | |
|------------------|--|
| Eukaryotic Cell | Complex cell with a nucleus. |
| Prokaryotic Cell | Small simple cell with <u>no</u> nucleus. |
| Prokaryotic DNA | Stored as single DNA loop or small rings (plasmids). |
| Ribosomes | Where proteins are synthesised. |
| Cell Wall | Made of cellulose -> strengthens plant and algal cells. |
| Sperm cells | Fertilise egg cells. Carry male DNA. Tail for swimming. Many mitochondria. Enzymes in head. Half a set of DNA. |
| Nerve cells | Carry electrical signals. Long and branched at the ends. |
| Muscle cells | Specialised for contraction. Cells are long and contain many mitochondria. |
| Root hair cells | Absorb water and minerals from the soil. Root hair projections provide a large surface area. No chloroplasts. |
| Xylem Cells | Form tubes that transport water and minerals around plant -> dead cells -> no end walls. |
| Phloem Cells | Form tubes that transport dissolved food around plants -> living cells -> small pores in end walls. |

2 - Microscopy

| | |
|--------------------------|--|
| Magnification | Higher magnification = larger image. |
| Resolution | Higher resolution = clearer image. |
| Equation | Magnification = Image size / Actual size |
| Units | From mm to μm x 1000. From μm to mm \div 1000. |
| Preparing an Onion Slide | Peel thin layer with tweezers -> place on slide -> add iodine stain -> lower cover slip gently to avoid bubbles. |
| Using a Light Microscope | Place on stage -> use lowest power objective lens -> adjust with coarse focus then fine focus -> repeat with higher magnification if needed. |
| Electron Microscope | Higher magnification and resolution than a light microscope. |



3 – Cell Cycle and Stem Cells

| | |
|--------------------------|---|
| Chromosomes | Molecules of DNA, 23 pairs found in nucleus, carry genes. |
| Cell Cycle | Three stages -> growth & DNA replication, mitosis and cell division. |
| Growth & DNA Replication | Cell grows -> number of subcellular structures increases -> DNA replicates -> forms X shaped chromosomes. |
| Mitosis | Cell division. Chromosomes line up in centre -> pulled apart by fibres -> two nuclei formed -> cytoplasm and cell membrane divides. Creates two identical daughter cells. |
| Differentiation | Process by which cells become specialised. |
| Stem Cells | Undifferentiated cells -> can become different types of cell. |
| Embryonic Stem Cells | Grown in lab -> made to specialise -> used to replace faulty cells -> treats disease e.g. diabetes and spinal damage. |
| Adult Stem Cells | Cells transferred from bone marrow -> replaces faulty blood cells in patient. |
| Plant Stem Cells | Found in meristems (issues in the tips of roots and shoots) -> used to produce clones of rare species and crops with desired features (e.g. disease resistance). |

4 – Cell Transport

| | |
|--|--|
| Diffusion | Net movement of particles -> from a higher to lower concentration -> down a concentration gradient. |
| Osmosis | Net movement of water molecules -> across a partially permeable membrane -> from a higher to lower water concentration -> down a concentration gradient. |
| Active Transport | Movement of particles -> from a lower to higher concentration -> against a concentration gradient -> requires energy. |
| Factors that Increase Rate of Cell Transport | Steeper concentration gradient, larger surface area, shorter diffusion pathway. |

GCSE Science

Biology B1 – Cell Biology

| 1 – States of Matter | |
|-------------------------------------|---|
| Particle Model | Atoms or molecules represented by small, solid, spherical particles. Particles identical in each state – only arrangement and energy change. |
| Solids | Particles are regularly arranged, close together and vibrating in fixed positions. Strong forces. |
| Liquids | Particles are randomly arranged, close together and moving around each other. Weak forces. |
| Gases | Particles are randomly arranged, far apart and moving randomly in all directions at a range of speeds. No forces. |
| 2 – Gas Pressure | |
| How do gases exert pressure? | Particles collide with the walls of the container and exert a force. Pressure is the force per unit area. |
| Temperature of a gas | Related to the average kinetic energy of the particles. |
| Temperature and pressure | Temperature of gas increases -> particles have more K.E. -> move faster -> more frequent collisions with walls -> and larger force exerted -> pressure increases. |
| High pressure | May cause container to break, burst or explode. |
| 3 – Changes of State | |
| 3 key facts | 1. Physical changes. 2. Mass is always conserved. 3. Easily reversible. |
| Melting | Solid to liquid. Energy supplied. Forces weaken. Occurs at melting point when heating. |
| Boiling | Liquid to gas. Energy supplied. Forces break. Occurs at boiling point when heating. |
| Condensing | Gas to liquid. Energy given out. Forces reform. Occurs at boiling point when cooling. |
| Freezing | Liquid to solid. Energy given out. Forces strengthen. Occurs at melting point when cooling. |

| 4 – Density | |
|--|---|
| Definition | Mass per unit volume. Measured in kg/m^3 . |
| Equation | $\text{density} = \text{mass} / \text{volume}$ |
| Density of regular solid (e.g. cuboid) | 1. Measure length, width and height with a ruler. 2. Calculate volume: $\text{length} \times \text{width} \times \text{height}$. 3. Measure mass with a mass balance. 4. Use density equation. |
| Density of irregular solid (e.g. a stone) | 1. Fill eureka can with water and insert object. 2. Collect displaced water in a measuring cylinder to measure volume. 3. Measure mass with a mass balance. 4. Use density equation. |
| Density of liquid | 1. Measure volume with a measuring cylinder. 2. Measure mass with a mass balance. 3. Use density equation. |
| 5 – Internal Energy and Energy Transfers | |
| Internal energy | Total kinetic energy and potential energy of all the particles in a system. |
| Change in internal energy | Causes either a change in temperature or a change in state. |
| Heating & cooling curves | Diagonal line Temperature is increasing or decreasing. Horizontal line A change of state is occurring (temperature remains constant). |
| Specific heat capacity | Amount of energy required to increase the temperature of 1 kg of a substance by 1 °C. Measured in $\text{J/kg } ^\circ\text{C}$. |
| Specific latent heat | Equation Energy change = mass x SHC x temp change Definition Amount of energy required to change the state of 1 kg of a substance without changing its temperature. Measured in J/kg . Equation Energy change = mass x specific latent heat |

GCSE Science

Physics P3 – Particle Model of Matter

How did the lives of German people change, 1933-1939?

Workers, Women, Youth and Jews

Workers

- On the surface, the Nazis greatly improved life for workers. During the election of 1932, when there were nearly 6 million unemployed
- By 1939, unemployment had officially been reduced to 35,000 out of a total of 25 million men.

Nazi Policies towards Workers

- The Nazis set up the **Deutsche Arbeitsfront (DAF)**, literally meaning German Labour Front.
- One aspect of the DAF was the **Strength Through Joy Programme (KdF)**. This improved workers' leisure time. This included subsidised holidays, cheap theatre tickets, touring orchestras and gym evenings.

Nazi Policies towards Workers

- The **Beauty Through Labour** aimed to improve work places.
- Through this branch, new toilets, changing rooms and showers were built at factories across Germany.

Nazi Policies towards Workers

- The **Reich Labour Service** was set up to tackle unemployment by providing cheap labour for big state projects like new motorways. From 1935, all men aged between 18 and 25 had to serve for six months.
- In 1938, the DAF created the **Volkswagen** scheme, which meant that workers could pay 5 marks per week and eventually earn a car.
- Many paid in to the scheme but no one ever received a car as the Second World War stopped production

Nazi views on how women should live

- Women should not smoke, should appear natural and not wear makeup.
- Women should dress in traditional German clothes
- Women should not be thin but 'physically robust'. Strong women were best for bearing children

Nazi policies towards women

- Loans to encourage women to marry and have children.
- The couple could receive goods of up to 1000 Reichsmarks in value if the woman gave up her job.
- The loan was reduced by a quarter for every child the couple went on to have.



Impact of Nazi policies towards women

- Marrriages did increase from 516,000 in 1932 to 772,000 in 1939.
- Births rose in the early 1930s but by 1939 the rate had declined again.
- The average number of children per couple in 1932 had been 3.6 and by 1939 it had dropped to 3.3.
- The number of women in employment increased between 1933 and 1939.

Nazi policies on education

- After the Nazis took power in 1933 unreliable teachers had to resign whilst Jewish teachers were banned.
- A National Socialist Teachers League was established, 97 per cent of teachers had joined it by 1936.

Nazi control of the school curriculum

- Old textbooks were thrown out and a Nazi curriculum was imposed. History was taught with a focus on how Germany was betrayed by Communists and Jews in World War 1.
- PE took up an extensive part of the curriculum while Biology focussed on race study.

Youth Organisations

- The Hitler Youth led by **Baldur von Schirach** and became compulsory to join in 1936. No other youth organisations were allowed.
- Meetings for both boys and girls focused on indoctrination and physical activities. Commonly they sang political songs, read Nazi books and paraded through towns. Boys' activities were often more focused on preparation for the military.
- Girls' groups concentrated on domestic duties and even military nursing. For both boys and girls there was the possibility of going on holiday camps. This was particularly attractive to the working classes.

Nazi Policies Against Jews

- March 1933:** Jewish lawyers are banned from conducting legal affairs in Berlin.
- September 1935:** Marriages between Germans and German Jews are punishable by imprisonment. Jews are no longer 'citizens'; they are just 'subjects' with no rights.
- October 1938:** Jewish passports have to be stamped with a 'J' and passports belonging to Jews whose emigration is undesirable are to be confiscated.
- November 1938:** All Jewish children are expelled from non-Jewish state schools.
- Jews are no longer allowed to buy newspapers and magazines.
- Jews are banned from cinemas, theatres, operas and concerts.

Kristallnacht (Night of Broken Glass) – 9-10 November 1938

- 267 synagogues were destroyed and 7500 Jewish businesses had their windows smashed.
- At least 91 Jews were murdered while up to 30,000 Jewish men were arrested.

How much opposition was there to Nazi Rule?

Opposition: 1933-1945

Opposition from the Social Democrats

- After the Nazi takeover in 1933, the leaders of the **Social Democratic Party** fled the country.
- They produced anti-Nazi leaflets and posters, but were hunted down by the Gestapo, who **arrested 1200** of them in the Rhine-Ruhr region alone.

Opposition from the Communists

- The Communists were more active than the Social Democrats. They aimed to provide visible resistance with meetings, propaganda and newsletters.
- One of these newsletters, **The Red Flag**, produced **10,000 copies at least once a month**.
- However, this visibility meant Communists were easily identified and soon **arrested** by the Gestapo.

Opposition from the Church

- With about **22 million Catholics**, **40 million Protestants**, religious groups were by far the largest non-Nazi organisations in Germany.
- Hitler saw the Church as a potential threat and so he made an agreement called the **'Concordat'** with the leader of the Pope.
- The Pope promised that German Catholics would stay out of politics if, in return, the Nazis would leave them alone.

Resistance from Individuals (Miemöller and Cardinal Galen)

- Martin Niemöller was a Protestant pastor (priest - see right above) refused to join the Reich Church and instead founded an alternative, the non-Nazi **Confessional Church**.
- By 1934, **6,000 pastors had joined**. The Confessional Church preached against violence and Nazi racial policy.
- 800** pastors were arrested and sent to concentration camps.
- Niemöller was sent to **Sachsenhausen** then Dachau but survived.
- In 1934 the Catholic Bishop of **Münster**, **Cardinal Galen** began sermons criticising the Nazi regime over its racial policy.
- The Gestapo were sent to question Galen, but he was **too high profile** to remove from power, so he continued to provide resistance.



Ernst Thälmann (pictured above) Leader of the German Communist Party. He was arrested in 1933.



Swing Kids

- These young people came together to listen to jazz, dance and talk openly. The Swing Kids wanted to develop their own individual personalities.
- Himmeler saw the group as so dangerous he personally wrote to Heydrich asking the Gestapo to deal with them. Many were arrested and some were sent to concentration camps.

Eidelweiss Pirates

- Members of this group wore an **Eidelweiss flower** on their clothing.
- Some listened to **foreign radio** and spread news. They produced flyers and **printed slogans** on walls. Some actively picked fights with the Nazis, with reported beatings of the **Hitler Youth members**.

Public Criticism: The White Rose Group

- The White Rose was a group at Munich University centred around **Hans and Sophie Scholl**.
- The students decided to produce a series of **anti-Nazi leaflets**.
- Between **6000 and 9000 leaflets** were distributed to **nine large cities** around Germany
- On **18 February 1943** the Scholls distributed their leaflets outside lecture theatres at Munich University.
- They were then identified, **arrested and executed**.

Wartime Opposition

- As the war progressed, German army officers such as **Colonel Stauffenberg** became disillusioned with the Nazi leadership and particularly disagreed with the policy towards **Jews**.
- He (Stauffenberg) joined a resistance group led by Ludwig Beck and **Herrning von Tresckow**, and took charge of planning and leading an assassination attempt. The plan was to kill Hitler and initiate **Operation Valkyrie**, an emergency order which would allow the plotters to use the reserve army to remove the SS and the Gestapo.
- On 20 July 1944 Stauffenberg planted a bomb at the **Wolf's Lair** (Hitler's headquarters in **Rastenburg**, East Prussia). The bomb exploded yet Hitler survived.
- Back in Berlin, the plotters were tried in a hastily arranged court martial and **executed** by firing squad.



3.1 – States of Matter

| Particle Theory | Models particles as small, solid, inelastic spheres. |
|-----------------|---|
| Solid | Particles Regular arrangement, touching each other, strong forces, vibrating in fixed positions. |
| | Properties Fixed shaped and volume. Cannot flow or be compressed. |
| Liquid | Particles Random arrangement, touching each other, weak forces, moving around each other. |
| | Properties No fixed shape but fixed volume. Can flow but cannot be compressed. |
| Gas | Particles Random arrangement, not touching each other, no forces, moving randomly in straight lines at a range of speeds. |
| | Properties No fixed shape or volume. Can flow and can be compressed. |

3.2 – Changes of State

| | |
|---------------------------|--|
| Melting (S → L) | Particles gain energy and move faster → forces weaken → particles break free from positions. |
| Boiling (L → G) | Particles have enough energy to break the forces between them. |
| Condensing (G → L) | Particles no longer have enough energy to overcome forces. Forces re-form. |
| Freezing (L → S) | Particles lose energy and move slower → forces strengthen → particles held in positions. |
| Melting Point | Temperature at which a solid melts or a liquid freezes. |
| Boiling Point | Temperature at which a liquid boils or a gas condenses. |
| Energy Required | Stronger forces → more energy required → higher melting and boiling points. |

3.3 – Formation of Ions

| | |
|---------------------------|--|
| Ions | Charged particles. |
| Cations | Positive ions formed when electrons are lost. |
| Anions | Negative ions formed when electrons are gained. |
| Group 1 metals | Lose 1 electron → form ions with 1+ charge. |
| Group 2 metals | Lose 2 electrons → form ions with 2+ charge. |
| Group 6 non-metals | Gain 2 electrons → form ions with 2- charge. |
| Group 7 non-metals | Gain 1 electron → form ions with 1- charge. |

3.4 – Ionic Bonding

| | |
|-------------------------------------|---|
| Electron Transfer | Electrons transferred from metal to non-metal atoms. Both gain full outer shells. |
| Ionic Bond | Electrostatic attraction between a positive metal ion and a negative non-metal ion. |
| Structure of Compound | Lattice of oppositely charged ions held together by strong electrostatic forces in all directions. |
| Melting & Boiling Points | High → many strong electrostatic forces → require a lot of energy to break. |
| Electrical Conductivity | Solid = does not conduct → ions not free to move Molten or aqueous = does conduct → ions free to move. |

3.5 – Explaining Reactivity Trends in Group 1 and 7

| | |
|----------------------------|--|
| Group 1 Trend | More reactive as you go down the group. |
| Group 1 Explanation | Down the group: number of shells increases → outer shell electron further from nucleus → less attraction → electron lost more easily. |
| Group 7 Trend | Less reactive as you go down the group. |
| Group 7 Explanation | Down the group: number of shells increases → outer shell electrons further from nucleus → less attraction → electron gained less easily. |

Y9 Science

Chemistry 2a – States of Matter & Ionic Bonding

| 1 - Pathogens (micro-organisms that cause communicable diseases) | |
|--|---|
| Communicable disease | Infectious disease caused by pathogens -> easily spread. |
| Bacteria | Small prokaryotic cells -> produce toxins that cause cell damage. |
| Virus | Not cells -> reproduce inside body cells -> causes cells to burst. |
| Fungi | Some single celled -> others made of hyphae -> produce spores. |
| Protist | Single celled eukaryotes -> often transferred by vectors. |
| Spread | By contaminated food and water, air and direct contact. |
| Reducing spread | Being hygienic, destroying vectors, isolation, and vaccination. |
| 2 - Communicable Diseases | |
| Measles | Viral -> spread by coughs/sneezes -> causes rash and fever -> can lead to pneumonia or encephalitis -> vaccination available. |
| HIV | Viral -> spread by sexual contact / sharing needles -> flu-like symptoms -> control with antiretroviral drugs -> attacks immune system -> can lead to AIDS. |
| Tobacco mosaic virus | Viral -> mosaic pattern on leaves (discolouration) -> affects photosynthesis -> affects growth -> spread by contact. |
| Rose black spot | Fungal -> purple or black spots on leaves -> leaves turn yellow and drop off -> affect photosynthesis and growth -> spread in water / wind -> use fungicides -> strip and destroy leaves. |
| Malaria | Caused by protist -> spread by mosquitoes (vectors) when feeding -> causes fever -> can be fatal -> stop mosquitoes breeding -> use insecticides and nets. |
| Salmonella | Bacterial -> contaminated food causes food poisoning -> toxins cause fever, vomiting, diarrhoea -> poultry given vaccination. |
| Gonorrhoea | Bacterial -> sexually transmitted -> pain when urinating and yellow/green discharge -> treat with antibiotics (but some strains resistant) -> prevent by using condoms. |
| 3 - Natural Barriers | |
| Skin | Physical barrier -> secretes antimicrobial substances. |
| Nose | Hair and mucus to trap pathogens. |
| Airways | Mucus traps pathogens -> hairs on cilia cells sweep mucus. |
| Stomach | Produces hydrochloric acid -> kills pathogens in food/drink. |

| 4 - Immune System Response to Pathogens | |
|---|--|
| Phagocytosis | White blood cells engulf and digest pathogens. |
| Antibodies | White blood cells produce specific shape antibodies -> lock onto antigens on surface of pathogen. |
| Antitoxins | Counteract toxins produced by bacteria. |
| 5 - Vaccinations and Drugs | |
| Vaccinations | Small amounts of dead or inactive pathogens are injected. |
| Vaccination response | White blood cells produce specific shape antibodies -> lock onto antigens on surface of pathogen. |
| Future infection response | White blood cells have memory of the antigens -> rapidly produce specific shape antibodies before person gets ill. |
| Painkillers | Relieve pain and reduce symptoms but don't kill pathogens. |
| Antibiotics | Kill bacteria (specific antibiotics needed for specific bacteria) -> cannot kill viruses (they reproduce inside body cells). |
| Antibiotic resistance | Bacteria mutate and become resistant to antibiotic -> cannot be killed -> risk of super bugs e.g. MRSA. |
| 6 - Developing Drugs | |
| Drugs from plants | Painkiller aspirin from willow. Heart drug digitalis from foxgloves. |
| Drugs from micro-organisms | Antibiotic penicillin discovered by Alexander Fleming from the <i>Penicillium</i> mould. |
| Drug testing | Drugs tested for efficacy (does it work), toxicity (is it harmful), and optimum dose (most effective but few side effects). |
| Predclinical trials | 1. Test drugs on human cells and tissues in the lab. 2. Test drugs on live animals. |
| Clinical trials | 1. Test on healthy volunteers (low dose gradually increased) 2. Test on patients with the disease (use double-blind trial). |
| Placebo | Inactive substance made to resemble a drug. E.g. a sugar pill. |
| Double-blind trial | Split patients into 2 groups. Neither patient nor doctor knows who has the real drug and who has the placebo. Reduces bias. |

GCSE Science

Biology B3 – Infection & Response

Why was it so hard to oppose Nazi rule?

Terror and Propaganda



Heinrich Himmler and the SS

- The SS was made up of men of pure German blood and had the ideal Aryan features.
- In 1934 the SS truly rose to power after removing the leadership of the SA. Hitler now looked to the obedience and ruthlessness of the SS to carry out purges and remove political enemies.
- The SS was made an independent organisation led by Heinrich Himmler - see right.

Reinhard Heydrich and the SD

- The SD (Secret Service) was the main official intelligence gathering agency.
- The role of the SD was to identify enemies of the Nazi leadership.
- The SD focused on any opposition to the party itself. It spied on all aspects of education, the arts, government and administration, as well as churches and the Jewish community.
- From their findings, agents wrote extensive reports on the morale and attitude of the German people.
- These enabled the Nazi leadership to monitor the impact of the changes they made and to tailor propaganda as and when it was necessary.
- The SD did not take action against individuals but passed information on to those who did - the Gestapo.
- The SD was led by Reinhard Heydrich - see right.

The Gestapo

- The Gestapo (Secret Police) spied on the public to remove any opposition.
- At its height, the Gestapo had 15,000 active officers to police a population of 66 million. This works out as only one officer per 4,400 people. Yet even with such low numbers, the Gestapo was deeply feared.
- It had the power to arrest and imprison any person suspected of opposing the Nazi state.
- They could tap telephones and open mail, but mostly they relied on informers who might pass on remarks they had overheard or just general suspicions.



Joseph Goebbels

- Joseph Goebbels was the Minister for Propaganda and Public Enlightenment - see right.
- His ministry controlled radio messages, all newspapers, films and organised posters and displays of propaganda through rallies - see below.
- These messages persuaded many Germans to support the Nazis.

Newspapers

- The Nazis took control over existing papers and closed any opposition papers down.
- By 1939 they owned two-thirds of all German newspapers and magazines.
- Any articles that did not show the Nazis in a positive way would be censored (banned).

Radio

- The Ministry for Propaganda controlled the output of every radio station so that they always included Nazi messages, Hitler's speeches.
- The Nazis produced cheap radio sets, the People's Receivers. These were sold at a week's wage for the average manual worker and could be paid for in instalments.
- In 1933, 1.5 million of these sets were produced, and by 1939, 70 per cent of Germans had a radio in their home.



Posters

- The Nazis were mastered at the visual message, using bold colours and eye catching phrases which made messages clear and obvious. Thousands were put up all over Germany.

Rallies

- Giant rallies were held to emphasise and celebrate the strength of the Nazi movement. They involved speeches, choruses, marches, torch-lit parades and even mock battles.
- The annual party rally at Nuremberg was the largest of these and the 1934 event lasted a whole week.
- For the 1934 Nuremberg Rally, 30,000 swastika flags were placed around the field, each with its own spotlight.



Nazi Ideology and Demands

| | |
|---|---|
| Scrap the Treaty of Versailles | The Treaty of Versailles was a treaty that Germany had to sign at the end of World War 1. The Nazis wanted to scrap the treaty by building up the army and taking back land lost. |
| Bread and Work (Brot und Arbeit) | Bread and work was promised to the millions of unemployed in 1933. |
| Hatred towards Jews (Antisemitism) | The Nazis believed that Jews were controlled governments, particularly in Britain and the USA. This enemy had to be destroyed if the Aryan race was to survive. |
| Aryan Supremacy | The Nazis believed that the Aryan race was superior (better) to any other. Eastern Europeans and Jews were untermenschen (sub-human) and a threat to the Germanic race. |
| Living Space (Lebensraum) | The Nazis believed that Germany should invade Poland and Russia in order to gain more living space for Germans. |
| Winterhilfswerk | Winter Relief of the German People A Nazi charity to help the poor, providing them with food, warmth and clothing. |

29-30 June 1934 – Night of the Long Knives

- By 1934, Hitler had become concerned by the increasing power of the SA which had over 3 million members and wanted to take control of the army. **Ernst Röhm**, the leader of the SA, was a personal rival of Hitler's.
- During the Night of the Long Knives, SA leaders were dragged from their beds and shot. Röhm too was arrested and shot.

2 August – Death of Hindenburg and Army Oath

- When Hindenburg died, Hitler combined the offices of President and Chancellor. He was now the undisputed head of government and took the title **Führer (Supreme Leader)**.
- The army now took an **oath of personal loyalty** to Hitler as he was now Supreme Commander of the armed forces. All German soldiers swore to obey Hitler and to risk their life for him at any time.
- Hitler now had almost **absolute power** meaning the any important decision in Germany could not happen without his permission.

Consolidation of Power

27 February 1933– Reichstag Fire

- The Reichstag (German Parliament) was destroyed by a fire created by a Dutch Communist **Marinus van der Lubbe**.
- The Nazis claimed that this was the start of a Communist plot to take over Germany. The next day Hitler persuaded Hindenburg to grant him **emergency powers** – people could be arrested without trial.
- 4,000 people were arrested, mainly Communists and Socialists.

5 March 1933– New Elections

- The Nazis used the police and the SA (brownshirts) to march through the streets and **intimidate** other parties, breaking up meetings of the Socialists.
- The Nazis used the radio to broadcast their anti-Communist message.
- This helped the Nazis achieve their best ever election result, with **44 per cent** of the vote, but it was not the 2/3rds majority Hitler needed.

24 March 1933– The Enabling Act

- Hitler wanted an Enabling Act.
- This would give Hitler the power to pass laws without going through the Reichstag or the President. In order to achieve it, he needed to get **two-thirds (66%)** of the Reichstag to support it.
- The Communists were banned from voting.
- The Centre Party was persuaded to vote in favour of the law and only the Social Democrats voted against it.
- The Enabling Act was passed by **444 votes to 94**. Germany was now a dictatorship because all important decisions would now only be made by Hitler and his closest advisors.

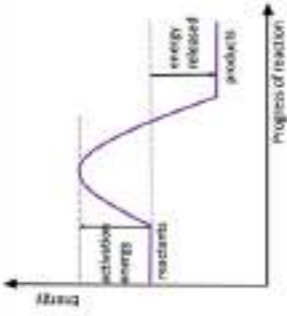
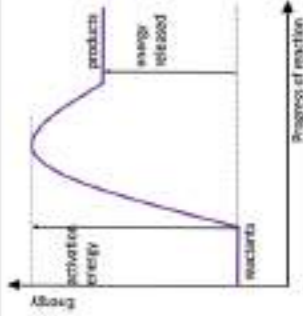
May-July 1933 – the Enabling Act in Action

- The Civil Service Act.** Political opponents or anyone who was non-Aryan were fired from government positions. This meant that Jews could no longer be teachers, judges or university lecturers.
- 1 April 1933:** Boycott of Jewish shops and businesses. SA guards were posted outside shops to prevent people from entering.
- Trade Unions taken over:** Trade Unions are an organisation set up to protect workers rights. On 2 May 1933 Trade union offices were taken over and union leaders were arrested.
- All political parties banned (July):** A law was introduced that banned people from forming new political parties. There was now only one party in Germany.
- Controlling local government:** In January 1934 the power of the **Länder** (Local Governments) was removed completely. The states (counties) were now split into 42 **Gaug**, each run by a **Gaulster** (Governor) chosen by the Nazi Party.

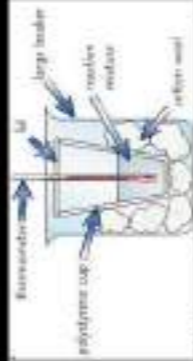
**1 – Endothermic and Exothermic Reactions**

| | |
|-------------------------------|---|
| Conservation of Energy | Energy is conserved in chemical reactions. The amount of energy in the universe at the end of a chemical reaction is the same as before it takes place. |
| Exothermic reaction | A reaction which transfers energy to the surroundings. It causes increase in temperature of surroundings. |
| Examples | Combustion, neutralisation, oxidation and respiration. Everyday uses include hand warmers and self-heating cans. |
| Endothermic reactions | A reaction where energy is taken in from the surroundings. It causes a decrease in temperature of the surroundings. |
| Examples | Thermal decomposition and photosynthesis. Everyday uses include sports injury packs. |

2 – Reaction profiles

| | |
|------------------------------|---|
| Exothermic reactions |  <ul style="list-style-type: none"> Energy level decreases because energy is given out to surroundings. Products are at a lower energy than the reactants. The difference in height represents the overall energy change. Initial rise represents the activation energy. |
| Endothermic reactions |  <ul style="list-style-type: none"> Energy level increases because energy is taken in from the surroundings. Products are at a higher energy than the reactants. The difference in height represents the overall energy change. Initial rise represents the activation energy. |
| Activation energy | The minimum amount of energy that particles must have to react. |

3 – Temperature changes




| | |
|------------------|---|
| Equipment |  <ul style="list-style-type: none"> Polystyrene cup and cotton wool for insulation to prevent energy loss. Lid to reduce energy loss by evaporation. |
| Variables | This equipment could be used to investigate effect of concentration, mass or volume of reactants on temperature change. |

4 – Bond energies (HT)

| | |
|--|--|
| Bond breaking | Bond breaking is endothermic as energy must be supplied to break bonds. |
| Bond forming | Bond forming is exothermic as energy is released when new bonds are formed. |
| Bond energy example calculation | <p>Using the bond energies given, calculate the energy change for the reaction between H₂ and Cl₂ forming HCl:</p> $\text{H-H} + \text{Cl-Cl} \rightarrow \text{H-Cl} \quad \text{H-H: } +436 \text{ kJ/mol} \quad \text{Cl-Cl: } +242 \text{ kJ/mol}$ $\text{H-Cl} \quad \text{H-Cl} \quad \text{H-Cl} \quad \text{H-Cl} \quad \text{H-Cl} \quad \text{H-Cl} \quad \text{H-Cl} \quad \text{H-Cl} \quad \text{H-Cl} \quad \text{H-Cl}$ <ol style="list-style-type: none"> Find the energy required to break the original bonds: (1 x H-H) + (1 x Cl-Cl) = 436 + 242 = 678 kJ/mol Find the energy released by forming the new bonds: 2 x H-Cl = 2 x 431 kJ/mol = 862 kJ/mol Find the overall energy change for the reaction: Overall energy change = breaking bonds – forming bonds 678 kJ/mol – 862 = -184 kJ/mol |

GCSE Science

Chemistry C5 – Energy Changes

| 1 - Photosynthesis | |
|--|---|
| Photosynthesis | An endothermic reaction in which plants taken in energy to make glucose for plants. It occurs in chloroplasts in palisade cells in leaves. |
| Word equation | carbon dioxide + water $\xrightarrow{\text{light}}$ glucose + oxygen |
| Symbol equation | $6 \text{CO}_2 + 6 \text{H}_2\text{O} \xrightarrow{\text{light}} \text{C}_6\text{H}_{12}\text{O}_6 + 6 \text{O}_2$ |
| Chlorophyll | Green pigment in chloroplasts. Absorbs energy from sunlight required for photosynthesis. |
| Uses of glucose | For respiration to release energy. Stored as insoluble starch for using later. Making other substances e.g. cellulose (for cell walls), lipids and proteins (with nitrate ions). |
| 2 - Limiting Factors for Rate of Photosynthesis | |
| Limiting factors | A factor that limits the rate of photosynthesis. If the factor increases, rate increases. |
| Light intensity | As light intensity increases \rightarrow rate increases (as it is the LF). Graph flattens \rightarrow rate is constant \rightarrow other factor is now the LF.  |
| CO ₂ conc. | As CO ₂ conc. increases \rightarrow rate increases (as it is the LF). Graph flattens \rightarrow rate is constant \rightarrow other factor is now the LF.  |
| Temperature | As temp increases \rightarrow rate increases (as it is the LF). Optimum temperature \rightarrow maximum rate. Beyond optimum \rightarrow rate decreases \rightarrow enzymes denatured. May be limiting factor due to infectious disease (tobacco mosaic virus) or lack of minerals (magnesium).  |
| Chlorophyll | May be limiting factor due to infectious disease (tobacco mosaic virus) or lack of minerals (magnesium). |
| 3 - Investigating Rate of Photosynthesis with Pondweed | |
| Independent variable | Light intensity \rightarrow change by moving lamp. Light intensity $\propto 1/\text{distance}^2$ (inverse square law). |
| Dependent variable | Rate of photosynthesis. Count bubbles of oxygen. Or measure volume of oxygen with gas syringe. |
| Control variables | Same piece of pondweed, constant temperature, same power light source, same CO ₂ concentration, same length of time. |

| 4 - Respiration | |
|---------------------------------------|---|
| Respiration | Exothermic reaction \rightarrow releases energy from glucose. Aerobic \rightarrow uses oxygen. Anaerobic \rightarrow does not use oxygen. |
| Uses of energy | Muscle contraction, keeping body temperature constant, building up larger molecules from smaller ones. |
| Aerobic respiration | glucose + oxygen \rightarrow carbon dioxide + water $\text{C}_6\text{H}_{12}\text{O}_6 + 6 \text{O}_2 \rightarrow 6 \text{CO}_2 + 6 \text{H}_2\text{O}$ Occurs in mitochondria. |
| Anaerobic respiration in muscle cells | glucose \rightarrow lactic acid Occurs when oxygen cannot be supplied fast enough \rightarrow exercise. Incomplete oxidation of glucose \rightarrow less energy released. |
| Anaerobic respiration in yeast cells | glucose \rightarrow ethanol + carbon dioxide Known as fermentation. Ethanol \rightarrow making alcohol. Carbon dioxide \rightarrow making bread rise. |
| 5 - Exercise | |
| Muscle cells | When exercising \rightarrow more energy required for contraction \rightarrow cells respire faster. |
| Heart Rate | Increases during exercise to pump blood faster. Oxygen and glucose delivered to muscle cells faster. Carbon dioxide removed from muscle cells faster. |
| Breathing | Breathing rate and volume of breaths increases \rightarrow oxygen inhaled faster \rightarrow carbon dioxide exhaled faster. |
| Anaerobic Respiration | Occurs if insufficient oxygen is supplied \rightarrow lactic acid causes muscle pain and fatigue. |
| Oxygen debt | Amount of oxygen needed to react with and remove the lactic acid built up during anaerobic respiration. |

GCSE Science
Biology B4 – Bioenergetics

¿Qué haces para ayudar a otros? (What do you do to help others?)

Para ayudar a otras personas (In order to help other people)

visito a los ancianos en una residencia (I visit the elderly in a care home)

voy de compras para mis vecinos (I go shopping for my neighbours)

ayudo a mi hermana con sus deberes (I help my sister with her homework)

trabajo en el jardín de mi abuelo (I help in my granddad's garden)

voy de paseo con el perro de mi abuela (I take my Nan's dog for a walk)

Se debería ayudar a otros porque (You should help others because)

si haces cosas buenas por los demás te sentirás mejor contigo mismo (if you do good deeds for other people you will feel better about yourself)

es bueno ser generoso y amable (It is good to be generous and kind)

¿Qué has hecho recientemente para la caridad? (What have you done recently for charity?)

| | | | |
|-------------------------------|--|--|---|
| Para la caridad (For charity) | trabajé como voluntario/a (I worked as a volunteer) | en una clínica (in a clinic) en un instituto (in a school) | me importa (It matters to me) puedo hacer una diferencia (I can make a difference) quiero ayudar a los demás (I want to help others) me gustaría mejorar la vida de los demás (I would like to make other people's lives better) |
| | me ofrecí como voluntario/a (I became a volunteer) | en una residencia de ancianos (in an old people's home) en zonas de conflicto (in conflict zones) | |
| | recaudé fondos (I fundraised) | | porque |
| | organicé una venta benéfica (I organised a charity sale) | | dado que |
| | asistí a una venta de pasteles (I attended a cake sale) | | ya que |
| | participé en una carrera (I took part in a race) | | |

| 1 - Energy Stores | |
|--------------------------------|---|
| Kinetic | Stored in moving objects. |
| Gravitational potential | Increases if an object is lifted up / moves up. |
| Elastic potential | Increases if we stretch or squash an object. |
| Thermal (or internal) | Increases if we increase the temperature of an object. |
| Chemical | Released by a chemical reaction. E.g. fuels. |
| Nuclear | Released by a nuclear reaction. E.g. the Sun. |
| Electrostatic | Increases if we bring like charges together or unlike charges apart. |
| Magnetic | Increases if we bring like poles together or unlike poles apart. |
| 2 - Energy Calculations | |
| Power | $P = E/t$ or $P = W/t$ $P = \text{power (W)}$, $E = \text{energy transferred (J)}$, $W = \text{work done (J)}$, $t = \text{time (s)}$ |
| Gravitational Potential Energy | $E_p = m \times g \times h$ $E_p = \text{gravitational potential energy (J)}$, $m = \text{mass (kg)}$, $g = \text{gravitational field strength (N/kg)}$, $h = \text{height (m)}$ |
| Kinetic Energy | $E_k = \frac{1}{2} \times m \times v^2$ $E_k = \text{kinetic energy (J)}$, $m = \text{mass (kg)}$, $v = \text{velocity (m/s)}$ |
| Elastic Potential Energy | $E_e = \frac{1}{2} \times k \times e^2$ $E_e = \text{elastic potential energy (J)}$, $k = \text{spring constant (N/m)}$, $e = \text{extension (m)}$ |
| Thermal Energy | $\Delta E = m \times c \times \Delta T$ $\Delta E = \text{thermal energy (J)}$, $m = \text{mass (kg)}$, $c = \text{specific heat capacity (J/kg } ^\circ\text{C)}$, $\Delta T = \text{change in temperature (} ^\circ\text{C)}$ efficiency = $\frac{\text{useful output energy transfer}}{\text{total input energy transfer}}$ |
| Efficiency | efficiency = $\frac{\text{useful power output}}{\text{total power input}}$ |

3 - Energy Transfers

| | |
|------------------------------------|--|
| A system | An object or group of objects. |
| 4 transfer pathways | Mechanically, electrically, by heating, by radiation. |
| Law of conservation | Energy can be transferred usefully, stored or dissipated, but can never be created or destroyed. |
| Power | Rate of energy transfer or rate of doing work. Measured in watts (W). |
| Reducing unwanted transfers | Lubricate moving parts (e.g. with oil) or use thermal insulation to prevent heat loss. |
| Thermal conductivity | Higher thermal conductivity -> higher rate of energy transfer by conduction across the material. |
| Reducing heat loss from a building | Have thicker walls made from a material with a lower thermal conductivity. |

4 - Energy Resources

| | |
|----------------------------|---|
| Uses | Transport, electricity generation and heating. |
| Renewable resources | Ones that can be replenished as quickly they are used. |
| Examples | Bio-fuel, wind, hydroelectricity, geothermal, the tides, the Sun and water waves. |
| Non-renewable resources | Ones that will run out one day. |
| Examples | Fossil fuels (coal, oil and gas) and nuclear fuels (uranium and plutonium). |
| Trends in use of resources | Still depend on fossil fuels -> harmful for the environment. Trying to move to renewable fuels -> better for the environment but can be unreliable and expensive. |

GCSE Science

Physics P1 - Energy

| 1 – Acids and Bases | |
|---|--|
| Acid | A substance that dissolves in water and forms H⁺ ions . Solutions have a pH lower than 7 . |
| Alkali | A substance that dissolves in water and forms OH⁻ ions . Solutions have a pH higher than 7 . |
| Base | A substance that can neutralise an acid . If the base is soluble , it is also known as an alkali . |
| Neutralisation | acid + base → salt + water H⁺ + OH⁻ → H₂O |
| Strong acids (HT) | Completely ionise in water to release H⁺ ions . E.g. sulphuric, hydrochloric and nitric acids. |
| Weak acids (HT) | Partially ionise in water to release H⁺ ions . E.g. ethanoic, citric and carbonic acids. |
| pH in terms of H⁺ (HT) | pH is a measure of H⁺ ion concentration in solution . Stronger acid = higher H⁺ ion concentration = lower pH . As the pH decreases by one unit , the H⁺ ion concentration of the solution increases by a factor of 10 . |
| 2 – Reactions of Acids with 3 Types of Bases | |
| Metal oxide | acid + metal oxide → salt + water |
| Metal hydroxide | acid + metal hydroxide → salt + water |
| Metal carbonate | acid + metal carbonate → salt + water + carbon dioxide |
| Naming salts | 1 st word from metal , 2 nd word from acid : nitric → nitrate, hydrochloric → chloride, sulphuric → sulphate. |
| 3 – Making Soluble Salts (e.g. copper sulphate) using Insoluble Bases | |
| Reaction | Gently warm sulphuric acid . Add insoluble copper oxide until no more reacts . Filter out the excess copper oxide to leave copper sulphate solution . |
| Crystallisation | Gently heat solution using a water bath to increase concentration. When crystals start to form, leave to |

cool. Filter out crystals. Leave crystals in a warm place to dry.

| 4 – Metal Reactions | |
|---|--|
| Reactivity series | Metals react by losing electrons and forming positive ions . More reactive metals lose electrons more easily . |
| Metal and acids | metal + acid → salt + hydrogen (MASH) Only metals more reactive than hydrogen react. |
| Metal and water | metal + water → metal hydroxide + hydrogen Potassium, sodium, lithium and calcium react quickly with cold water . |
| Oxidation | Substance gains oxygen (or substance loses electrons - OIL). |
| Reduction | Substance loses oxygen (or substance gains electrons - RIG). |
| Extraction from ores | Less reactive than carbon → extract by reduction with carbon . More reactive than carbon → extract using electrolysis . |
| Displacement reaction | A more reactive metal displaces a less reactive metal from its compound. |
| 5 – Electrolysis | |
| Electrolysis | Passing an electrical current through an electrolyte (a molten or dissolved ionic compound) to split it up . |
| Positive ions (cations) | Move towards cathode (negative electrode) → gain electrons → they are reduced . |
| Negative ions (anions) | Move towards anode (positive electrode) → lose electrons → they are oxidised . |
| Molten ionic solids | At the cathode → positive metal ions reduced . At the anode → negative non-metal ions oxidised . |
| Aqueous solutions (H⁺ and OH⁻ present) | At the cathode → hydrogen gas or pure metal produced (whichever is least reactive). At the anode → halogen molecules (Cl₂, Br₂, I₂) produced if halide ions present . If not, oxygen gas is formed. |

| Reactivity Series |
|-------------------|
| Potassium |
| Sodium |
| Lithium |
| Calcium |
| Magnesium |
| Carbon |
| Zinc |
| Iron |
| Hydrogen |
| Copper |

GCSE Science
Chemistry C4 – Chemical Changes

| ¿Qué se debería hacer para cuidar el planeta? | |
|---|--|
| Para...(in order to) | limpiar las calles (<i>clean the streets</i>) proteger el medio ambiente (protect the environment) reducir la contaminación (reduce pollution) luchar contra el calentamiento global (fight global warming) llevar una vida más verde (lead a greener life) salvar el planeta (save the planet) reducir tu huella de carbono (reduce your carbon footprint) |
| Se debería (you should) | ducharse (<i>shower</i>) plantar más árboles (<i>plant more trees</i>) usar productos ecológicos (<i>use green products</i>) ahorrar energía en casa (save energy at home) usar el transporte público (use public transport) reciclar todo lo posible (recycle as much as possible) usar energías renovables (use renewable energy) apagar la luz (switch off the light) desenchufar los aparatos eléctricos (unplug electrical items) |

| ¿Cuáles son los problemas sociales principales? (What are the main social issues?) | | | |
|--|---|--|---|
| Me preocupa (n) (I am worried about) | el paro/desempleo (unemployment) | Es necesario que/ es esencial que (It is necessary/essential that) | apoyemos proyectos de ayuda (we support aid projects) |
| | el hambre (hunger) | | creemos más trabajos (we create more jobs) |
| | la pobreza (poverty) | | recaudemos dinero (we raise money) |
| | la drogadicción (drug addiction) | No es justo que haya (Its not fair that there is) | tanta desigualdad (so much inequality) |
| | la obesidad (obesity) | | tanta gente sin trabajo (so many unemployed) |
| | la crisis económica (economic crisis) | | tanta gente sin techo (so many homeless) |
| | los sin hogar/ los sin techo (homeless) | | tantos drogadictos (so many drug addicts) |

¿Cuáles son los problemas medioambientales más serios hoy en día?

| | |
|--|---|
| Me preocupa (n) <i>(I am worried about)</i> | la deforestación (deforestation) los problemas del medio ambiente (environmental problems) los animales en peligro de extinción (animals in danger of extinction) los desastres naturales (natural disasters) el aumento de las sequías (the increase in droughts) |
| El problema más grave es | la contaminación (pollution) la destrucción de la capa de ozono (the destruction of the ozone layer) el cambio climático (climate change) el calentamiento global (global warming) las inundaciones (floods) la destrucción de la selva tropical (the destruction of the rainforest) la falta de recursos naturales (the lack of natural resources) |
| Es necesario que/ es esencial que <i>(It is necessary/essential that)</i> | cuidemos el planeta (we look after the planet) hagamos proyectos de conservación (we do conservation projects) compremos/usemos productos verdes (we buy/use green products) ahorremos agua/energía (we save water/electricity) consumamos menos (we consume less) |


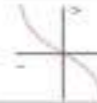




¿Qué haces para proteger el medio ambiente? (What do you do to protect the environment?)

| | | | |
|--|---|------------------------|---|
| Para proteger el medio ambiente (In order to protect the environment) | ahorro la electricidad (I save electricity) reciclo papel, botellas y vidrio (I recycle paper, bottles and glass) llevo bolsas reusables al supermercado (I take reusable bags to the supermarket) voy en bicicleta o a pie (I ride my bike or walk) apago las luces (I turn off the lights) compro productos locales (I buy local products) llevo un jersey (I wear a jumper) Uso transporte público (I use public transport) | en vez de (instead of) | malgastar la energía (wasting energy) ir en coche (going by car) comprar productos extranjeros (buying foreign products) dejar las luces encendidas (leaving the lights on) usar bolsas de plástico (using plastic bags) utilizar la calefacción (using the heating) tirar basura en el suelo (throwing rubbish on the floor) |
|--|---|------------------------|---|

| | |
|--|--|
| 4.3 – Endocrine System | Chemical messengers that travel in the blood. |
| Hormones | |
| Glands | Organs that secrete hormones. |
| Pituitary gland | Makes many hormones -> control many other glands. |
| Pancreas | Makes insulin and glucagon -> controls blood sugar. |
| Thyroid | Makes thyroxine -> controls basal metabolic rate. |
| Adrenal gland | Makes adrenaline -> controls 'fight and flight' response. |
| Ovaries (female) | Makes oestrogen -> puberty, menstrual cycle. |
| Testes (male) | Makes testosterone -> puberty, sperm production. |
| 4.4 – Control of Blood Glucose | |
| Glucose too high | Insulin converts glucose -> glycogen. Stored in muscle and liver cells. |
| Glucose too low | Glucagon converts glycogen -> glucose. Released into blood. |
| Type 1 diabetes | Pancreas does not produce insulin. |
| Type 2 diabetes | Pancreas produces insulin but cells do not respond. |
| 4.5 – Menstrual Cycle and Contraception | |
| Menstrual cycle | 28 day cycle. Day 1 -> uterus lining sheds (menstruation). Day 14 -> release of egg (ovulation). |
| Oestrogen (ovaries) | Uterus lining thickens. Inhibits FSH, stimulates LH. |
| Progesterone (ovaries) | Maintains uterus lining. Remains high during pregnancy. |
| FSH (pituitary gland) | Causes an egg to mature in the ovaries. |
| LH (pituitary gland) | Stimulates release of an egg from ovaries (ovulation). |
| Hormonal contraception | Oral contraceptives, contraceptive implant, injections and skin patch. |
| Non-hormonal contraception | Barrier methods (condoms, diaphragm), spermicidal agents, IUDs, abstaining from sex, surgical sterilisation. |

| | |
|---|---|
| 4.1 – Homeostasis | Maintenance of a constant internal environment in response to changes in internal and external environments. |
| Homeostasis | |
| Stimulus | A change in the environment, e.g. temperature change, blood glucose. |
| Receptor | Detects a stimulus, e.g. temperature receptors in the skin. |
| Co-ordination centre | Processes information and coordinates a response, e.g. brain, spinal cord. |
| Effector | A muscle or gland that carries out the response. |
| Negative feedback | When a change occurs, negative feedback automatically causes a corrective mechanism to reverse the change. |
| 4.2 – Nervous System | |
| Nervous system | Made up of the central nervous system or CNS (brain and spinal cord) and neurones -> responds to our surroundings quickly. |
| Neurones / nerve cell | Specialised cells of the nervous system -> carry electrical impulses. Long axon and many branches (dendrites). |
| Sensory neurones | Carry impulses from receptors to the CNS. |
| Relay neurones | Found in the CNS. Carry impulses from sensory to motor neurones. |
| Motor neurones | Carry impulses from the CNS to effectors. |
| Synapses | Gap between two neurones. An electrical impulse meets the synapse then chemicals called neurotransmitters diffuse across the gap. |
| Reflexes | Rapid, unconscious responses to a stimulus -> can prevent injury. |
| Reflex arc | Stimulus -> receptor -> sensory neurone -> relay neurone -> motor neurone -> effector -> response |
| Reactions | Reactions are different to reflexes as they are conscious actions (e.g. catching a ball). |
| Required practical: Reaction times | Measured using simple ruler drop test. Different variables such as the effect of caffeine can be investigated. |

| 1 – Key Definitions | |
|--|--|
| Current | Rate of flow of charge. Units = amps (A). Measured with an ammeter connected in series. |
| Potential difference (voltage) | Energy transferred per unit charge. Units = volts (V). Measured with a voltmeter connected in parallel. |
| Resistance | Measure of how difficult it is to pass a current through a component. Units = ohms (Ω). |
| Power | Rate of energy transfer. Units = watts (W). |
| Charge | Transferred by electrons. Units = coulombs (C). |
| 2 – Series Circuits (only one loop) | |
| Current rule | Current is the same in all parts of the circuit. |
| P.D. rule | P.D. of the cell/battery is shared between the components. |
| Resistance rule | Total resistance found by adding up resistance of each component. |
| 3 – Parallel Circuits (more than one loop) | |
| Current rule | Current splits between loops. |
| P.D. rule | Each loop gets the total P.D. from the cell/battery. |
| Resistance rule | Total resistance is lower than the loop with the lowest resistance. |
| 4 – Electricity Equations | |
| $Q = I \times t$ | Charge = current x time |
| $V = I \times R$ | Potential difference = current x resistance |
| $V = E / Q$ | Potential difference = energy transferred / charge |
| $E = P \times t$ | Energy transferred = power x time |
| $P = I \times V$ | Power = current x potential difference |
| $P = I^2 \times R$ | Power = current ² x resistance |

| 5 – I-V Characteristics | |
|-----------------------------|--|
| Ohmic conductor | Current is directly proportional to potential difference, e.g. resistor at constant temperature.  |
| Filament lamp | As current increases, temperature increases -> resistance increases -> harder for current to flow -> non-ohmic.  |
| Filament lamp | Current only flows in one direction -> very high resistance in reverse direction -> non-ohmic.  |
| 6 – Other Circuit Devices | |
| Thermistor | Temperature dependent resistor -> as temperature increases, resistance decreases -> used in thermostats.  |
| LDR | Light dependent resistor -> as light intensity increases, resistance decreases -> used in automatic lights.  |
| 7 – Electricity in the Home | |
| UK mains supply | Alternating P.D., 230 V, frequency = 50 Hz.  |
| Live wire | Brown -> provides alternating P.D. -> at 230 V. |
| Neutral wire | Blue -> completes the circuit -> at 0 V. |
| Earth wire | Green and yellow stripes -> stops appliance becoming live -> only carries current if there is a fault -> at 0 V. |
| 8 – The National Grid | |
| Step-up transformers | Increase the P.D. -> lowers the current -> reduces heating effect -> more efficient transmission. |
| Step-down transformers | Decrease the P.D. -> safe for domestic use. |

GCSE Science

Physics P2 – Electricity

| Que fais-tu comme emploi à temps partiel? | | |
|--|---|---|
| Starter | Verb | Activity |
| <p>comme emploi à temps partiel (as a part-time job)</p> <p>Cet été (this summer)</p> <p>Dans le futur (in the future)</p> <p>Quand j'avais __ans (when I was __years old)</p> | <p>Je travaille (I work)</p> <p>Je travaillais (I used to work)</p> <p>Je vais travailler (I am going to work)</p> <p>Je voudrais travailler (I would like to work)</p> | <p>Comme cuisinier/cuisinière (as a cook)</p> <p>Comme guide dans une colonie de vacances (as a guide in a holiday camp)</p> <p>Dans un café comme serveur/serveuse (in a café as waiter/waitress)</p> <p>Comme boulanger/boulangère (as a baker)</p> <p>En tant qu'animatrice/animateur enfant (as a childrens entertainer)</p> <p>Comme recruteur/recrutrice de donateurs (as a fundraiser)</p> <p>En tant que vendeur/vendeuse (as a salesperson)</p> <p>En tant que pâtissier/pâtissière (as a pastry chef)</p> |

Pourquoi est-ce que tu voudrais faire cet emploi?

| | |
|---|---|
| <p>mécanicien/mécanicienne. – a mechanic. vendeur/vendeuse. – a salesperson. infirmier/infirmière. – a nurse. médecin. – a doctor. avocat/avocate. – a lawyer. secrétaire. – a secretary. agriculteur/agricultrice/fermier/fermière. – a farmer. pilote. – a pilot. agent de police. – a police officer. instituteur/institutrice. – a primary school teacher. professeur. – a teacher. serveur/serveuse. – a waiter/waitress. coiffeur/coiffeuse. – a hairdresser. boulanger/boulangère. – a baker. comptable. – an accountant. ingénieur/ingénieure. – an engineer. électricien/électricienne. – an electrician. musicien/musicienne. – a musician. maçon/maçonne. – a builder. programmeur/programmeuse. – a programmer. acteur/actrice. – an actor/an actress. créateur/créatrice de mode. – fashion designer. créateur/créatrice de jeux-vidéo. – video game designer. patron/patronne. – a boss. directeur/directrice d'entreprise. – a company director. facteur/factrice. – postman/postwoman. chef de cuisine. – a chef.</p> | <p>Le travail est bien payé (the work is well paid) La santé est importante pour moi (health is important to me) J'aime réparer les voitures (I like repairing cars) L'informatique m'intéresse (ICT interests me) Je trouve le crime fascinant (I find crime fascinating) Les horaires ne sont pas longs (the hours are not long) Je peux travailler à domicile (I can work at home) Je peux m'occuper de ma famille (I can take care of my family) Je trouve cet emploi fascinant (I find this job fascinating) J'aime construire des maisons (I like building houses)</p> |
| <p>J'aimerais devenir <i>(I would like to become)</i></p> <p>Je voudrais être <i>(I would like to be)</i></p> | <p>car (because)</p> <p>parce que (because)</p> |

4

| | |
|----------------------------------|--|
| 1 – Relative Formula Mass | <p>Larger numbers on periodic table above element symbol. e.g. A, of C = 12, A, of O = 16</p> <p>Sum of the relative atomic masses of all the atoms in a molecular formula. e.g. M_r of $CO_2 = (1 \times C) + (2 \times O)$ $= (1 \times 12) + (2 \times 16) = 44$</p> <p>$A_r$ x number of atoms of element x 100 M_r of the compound</p> <p>e.g. Find the % mass of oxygen in carbon dioxide, CO_2. $\frac{1 \times 2}{44} \times 100 = 11.1$</p> |
| 2 – The Mole (HT only) | <p>Avogadro constant 6.02×10^{23} particles</p> <p>One mole An amount of a substance that contains the Avogadro constant number of particles. e.g. 1 mole of carbon contains 6.02×10^{23} carbon atoms.</p> <p>Mass of one mole The mass in grams is equal to the relative atomic/formula mass of the substance. e.g. A, of carbon = 12. One mole of carbon = 12 g.</p> <p>Calculating number of moles $\text{number of moles} = \frac{\text{mass (in grams)}}{M_r} = \frac{n}{M_r}$</p> |
| 3 – Conservation of Mass | <p>Law of conservation of mass Mass is always conserved in a chemical reaction. Mass of reactants = mass of products. No atoms are created or destroyed.</p> <p>Balanced equations Balance equations using coefficients (big numbers). e.g. $2 Li + F_2 \rightarrow 2 LiF$ (2 Li atoms and 2 F atoms on each side)</p> <p>Mass may seem to change... If mass increases \rightarrow one of the reactants may be a gas, e.g. a metal reacts with oxygen in the air. If mass decreases \rightarrow one of the products may be a gas, e.g. bubbles of hydrogen gas are released.</p> |

4 – Reacting Masses (HT only)

| | | | | | | | | | | | | | | | | | | | | | | | | | |
|----------------------------------|--|-------------------|---------------------|---------|---------------------|------|-------|-------|--------|-------|----|----|----|---------------------|------------------|------------------|-----|-------|---|---|---|--|-----|------|-----|
| Coefficients in equations | <p>They tell you how many moles of each substance are reacting / being produced. e.g. $2 Mg + O_2 \rightarrow 2 MgO$. In this reaction, 2 moles of Mg react with 1 mole of O_2 and produce 2 moles of MgO.</p> | | | | | | | | | | | | | | | | | | | | | | | | |
| Limiting reactant | <p>The reactant that gets completely used up. Mass of limiting reactant will limit mass of products.</p> | | | | | | | | | | | | | | | | | | | | | | | | |
| Reactant in excess | <p>This reactant will be left over when the reaction stops. 6.9 g of Na is reacted with 7.6 g of F_2. Which reactant is limiting? Calculate the mass of NaF formed.</p> | | | | | | | | | | | | | | | | | | | | | | | | |
| Example | <table border="1"> <tr> <td>Balanced Equation</td> <td>$2 Na$</td> <td>$+ F_2$</td> <td>$\rightarrow 2 NaF$</td> </tr> <tr> <td>Mass</td> <td>6.9 g</td> <td>7.6 g</td> <td>12.6 g</td> </tr> <tr> <td>M_r</td> <td>23</td> <td>38</td> <td>42</td> </tr> <tr> <td>Moles = mass/M_r</td> <td>$6.9 / 23 = 0.3$</td> <td>$7.6 / 38 = 0.2$</td> <td>0.3</td> </tr> <tr> <td>Ratio</td> <td>2</td> <td>1</td> <td>2</td> </tr> <tr> <td></td> <td>0.3</td> <td>0.15</td> <td>0.3</td> </tr> </table> <p>Na is limiting (0.15 moles of F_2 will be left over)</p> | Balanced Equation | $2 Na$ | $+ F_2$ | $\rightarrow 2 NaF$ | Mass | 6.9 g | 7.6 g | 12.6 g | M_r | 23 | 38 | 42 | Moles = mass/ M_r | $6.9 / 23 = 0.3$ | $7.6 / 38 = 0.2$ | 0.3 | Ratio | 2 | 1 | 2 | | 0.3 | 0.15 | 0.3 |
| Balanced Equation | $2 Na$ | $+ F_2$ | $\rightarrow 2 NaF$ | | | | | | | | | | | | | | | | | | | | | | |
| Mass | 6.9 g | 7.6 g | 12.6 g | | | | | | | | | | | | | | | | | | | | | | |
| M_r | 23 | 38 | 42 | | | | | | | | | | | | | | | | | | | | | | |
| Moles = mass/ M_r | $6.9 / 23 = 0.3$ | $7.6 / 38 = 0.2$ | 0.3 | | | | | | | | | | | | | | | | | | | | | | |
| Ratio | 2 | 1 | 2 | | | | | | | | | | | | | | | | | | | | | | |
| | 0.3 | 0.15 | 0.3 | | | | | | | | | | | | | | | | | | | | | | |

5 – Concentration of Solutions

| | |
|----------------------------------|--|
| Solute | The substance dissolved in a solution. |
| Solvent | The liquid part of a solution, e.g. water. |
| Concentration | Amount of solute dissolved in a certain volume of a solution. More solute in a given volume = higher concentration. |
| Calculating concentration | $\text{concentration (in g/dm}^3) = \frac{\text{mass of solute (in g)}}{\text{volume of solvent (in dm}^3)}$ $c = \frac{m}{V}$ |
| Volume conversion | $1 \text{ dm}^3 = 1000 \text{ cm}^3$. To go from cm^3 to dm^3 , divide by 1000. |

GCSE Science

Chemistry C3 – Quantitative Chemistry

| 1 – Evolution of the atmosphere | |
|---|--|
| Phase 1 - Volcanoes | The early atmosphere came from intense volcanic activity. Large amounts of carbon dioxide. Small amounts of nitrogen, water vapour, methane and ammonia. Little to no oxygen. |
| Phase 2 – Absorption of CO₂ | Water vapour condensed and formed oceans. Carbon dioxide dissolved into oceans to form carbonate precipitates. Green plants/algae absorbed carbon dioxide for photosynthesis. Marine animals evolved, their shells and skeletons contained carbonates from the oceans. |
| Phase 3 – Production of O₂ | Algae and plants evolved. They carried out photosynthesis: water + carbon dioxide → glucose + oxygen The oxygen gradually built up, allowing animals to evolve. |
| Earth's modern atmosphere | Approximately 80% nitrogen and 20% oxygen. Less than 1% other gases (carbon dioxide, noble gases, water vapour). |
| 2 – Greenhouse effect/Climate change | |
| Greenhouse gases | Carbon dioxide, methane and water. |
| The greenhouse effect | 1. Short wavelength radiation enters atmosphere. 2. Short wavelength radiation is absorbed by materials. 3. The Earth re-emits the radiation as longer wavelength infrared radiation (IR). 4. Some of the IR goes into space. 5. The longer wavelength radiation is trapped by greenhouse gases which stop it escaping. 6. The lower atmosphere warms up (temperature increases). |
| Human activity | -Deforestation – increases CO ₂ (less trees take it in) -Burning fossil fuels – releases CO ₂ -Agriculture – increases methane (cattle's digestive systems) -Creating waste – increases methane and CO ₂ (decomposition) -Glaciers/ice-caps melting – increased flooding, loss of habitats -Sea levels rising – increased flooding, coastal erosion -Rainfall/storms – amount and distribution of rain may change, frequency and severity of storms may increase. -Changing habitats – change in temperature or amount of water may affect wild species. |
| Effects of global warming | |

| 3 – Carbon footprint | |
|-----------------------------------|--|
| Carbon footprint | A measure of the amounts of greenhouse gases released by a product, service or event. -Use renewable or nuclear energy instead of fossil fuels -Reduce waste -Tax for companies with high greenhouse gas emissions -Carbon capture technology. |
| Reducing carbon footprints | -More work required on technology -Governments concerned about economic impact of changes -Difficult to make international agreements |
| 4 – Air pollution | |
| Complete combustion | When fuel burns with enough oxygen. Produces carbon dioxide and water. E.g.: methane + oxygen → carbon dioxide + water CH ₄ + 2O ₂ → CO ₂ + 2H ₂ O |
| Incomplete combustion | When fuel burns without enough oxygen. Produces carbon monoxide or carbon particulates (soot). E.g. ethane + oxygen → carbon monoxide + water OR ethane + oxygen → carbon + water |
| Carbon monoxide | A toxic gas. No colour and no smell so not easily detected. |
| Carbon particulates | Cause respiratory problems and global dimming. |
| Sulphur dioxide | Formed when sulphur impurities are present in fossil fuels. Dissolves in rain water to make acid rain (sulphuric acid) |
| Oxides of nitrogen | High temperatures and pressures inside car engines causes nitrogen and oxygen in air to react. Different compounds are made but given the general formula NO _x . Dissolves in rain water to cause acid rain (nitric acid). |
| Effects of acid rain | -Kills plants – damages leaves (can't do photosynthesis) -Damages buildings and statues, and makes metals corrode -Causes respiratory problems |

Y10 Science Cycle 3 – Sheet 2

Chemistry C9 – Chemistry of the Atmosphere

Qu'est-ce que vous voulez comme métier?

| | | | |
|--|--|---|--|
| Je travaille I work | dans un garage. – in a garage. dans un magasin. – in a shop. dans un hôpital. – in a hospital. dans un bureau. – in an office. dans une ferme. – on a farm. à bord d'un avion. – on board a plane. dans un commissariat de police. – in a police station. dans un collège. – in a secondary school. dans un restaurant. – in a restaurant. dans un salon de coiffure. – in a hair salon. dans une boulangerie. – in a bakery. dans une école primaire. – in a primary school. | Je suis – I am Il est – He is Elle est – She is | mécanicien/mécanicienne. – a mechanic. vendeur/vendeuse. – a salesperson. infirmier/infirmière. – a nurse. médecin. – a doctor. avocat/avocate. – a lawyer. secrétaire. – a secretary. agriculteur/agricultrice/fermier/fermière. – a farmer. pilote. – a pilot. agent de police. – a police officer. instituteur/institutrice. – a primary school teacher. professeur. – a teacher. serveur/serveuse. – a waiter/waitress. coiffeur/coiffeuse. – a hairdresser. boulangier/boulangère. – a baker. comptable. – an accountant. |
| Je veux être – I want to be Je veux devenir – I want to become Il veut être – He wants to be Elle veut être – She wants to be | ingénieur/ingénieure. – an engineer. électricien/électricienne. – an electrician. musicien/musicienne. – a musician. maçon/maçonne. – a builder. programmeur/programmeuse. – a programmer. acteur/actrice. – an actor/an actress. créateur/créatrice de mode. – fashion designer. créateur/créatrice de jeux-vidéo. – video game designer. | Ma passion, c'est – My passion is Sa passion, c'est – His passion is Sa passion, c'est – Her passion is | la cuisine. – cooking. la mode. – fashion. le sport. – sport. le théâtre. – drama. les ordinateurs. – computers. les voitures. – cars. |
| Je veux travailler comme – I want to work as Il veut travailler comme – He wants to work as Elle veut travailler comme – She wants to work as | patron/patronne. – a boss. directeur/directrice d'entreprise. – a company director. facteur/factrice. – postman/postwoman. chef de cuisine. – a chef. | | |

Qu'est-ce qu'on peut faire après les études?

| Starter | Verb | Activity |
|---|-------------------|--|
| Après le collège (after school) Après mes examens (after my exams) Après les études (after studies) | On peut (one can) | faire une année sabbatique (to take a gap year) faire une formation (to do training) aller à l'université (to go to university) obtenir un diplôme (get a degree) travailler à temps partiel (to work part-time) faire un apprentissage (to do an apprenticeship) travailler à temps complet (to work full-time) voyager autour du monde (travel the world) ignorer les parents (ignore parents) trouver du travail (find work) |

Qu'est-ce que tu vas peut faire après le collège?

| Starter | Activity | Reason |
|---|--|--|
| Après le collège (after school) Je vais (I am going) Je voudrais (I would like) | faire une année sabbatique (to take a gap year) faire une formation (to do training) aller à l'université (to go to university) obtenir un diplôme (get a degree) travailler à temps partiel (to work part-time) faire un apprentissage (to do an apprenticeship) travailler à temps complet (to work full-time) voyager autour du monde (travel the world) ignorer les parents (ignore parents) trouver du travail (find work) | Les salaires sont augmentés si on a un diplôme (salaries are higher if you have a degree) C'est mieux pour la santé mentale (its better for mental health) L'éducation vous donnera plus de choix dans le futur (Education will give you more choice in the future) On peut se faire de nouveaux amis (you can make new friends) Les diplômes sont très chers (degrees are very expensive) On peut gagner beaucoup d'argent sans un diplôme (you can earn lots of money without a degree) |

| | | |
|--------------------------------------|---|---|
| 2.5 – Motion | Speed equation Distance-time graphs Acceleration Acceleration equations Velocity-time graphs Terminal velocity | speed = distance / time -> $v = d / t$ Gradient = speed Horizontal line = stationary Rate of change of velocity -> units = m/s^2 $a = \frac{\Delta v}{t}$ $v^2 - u^2 = 2 \times a \times d$ Gradient = acceleration Horizontal line = constant velocity Area under graph = distance travelled Maximum constant velocity -> forwards force and backwards friction/drag force are balanced. |
| 2.6 – Newton's Laws of Motion | 1st Law 2nd Law 3rd Law | Balanced forces -> object stationary or constant velocity. Unbalanced forces -> object accelerates in direction of resultant force. Force = mass x acceleration -> $F = m \times a$ Two interacting objects exert equal and opposite forces on each other. |
| 2.7 – Stopping Distances | Equation Thinking distance Braking distance | Stopping distance = thinking distance + braking distance Distance moved during reaction time. Increased by vehicle speed and slower reaction times (e.g. alcohol). Distance moved whilst brakes applied. Increased by vehicle speed, poor road surface, wet/icy weather, worn brakes/tyres |
| 2.8 – Momentum | Equation Conservation | Momentum = mass x velocity -> $p = m \times v$ -> units = $kg \ m/s$ For an event (e.g. a collision) in a closed system: momentum before = momentum after. |

| | | |
|--|--|---|
| 2.1 – Scalars and Vector Quantities | Scalars Scalar examples Vectors Vector examples | Quantities that only have magnitude. Distance, speed, energy, time, mass, temperature. Quantities that have both direction and magnitude. Displacement, velocity, force, acceleration, momentum. |
| 2.2 – Forces | Contact forces Non-contact forces Resultant force Work done by forces | Objects have to be touching, e.g. friction, tension, air resistance, normal contact force. Objects do not need to be touching, e.g. electrostatic force, magnetic force, gravitational force. A single force that gives the same effect as multiple forces acting together on an object. When a force moves an object -> energy transferred -> work is done -> work = force x distance -> $W = F \times d$ |
| 2.3 – Mass and Weight | Mass Weight Relationship Equation Centre of mass | Measure of the amount of matter -> units = kilograms -> measure with a mass balance. Force due to gravity -> units = Newtons -> measure with a Newton meter. Weight is directly proportional to mass. Weight = mass x gravitational field strength -> $W = m \times g$ Point through which an object's weight appears to act. |
| 2.4 – Forces and Elasticity | Deformation Elastic deformation Inelastic deformation Hooke's law Equation | Stretch, compress or bend -> requires more than 1 force. Object returns to original shape/size when forces removed. All energy transferred to elastic potential store. Object does not return to original shape/size when forces removed. Extension of spring is directly proportional to force applied -> up to the limit of proportionality. Force = spring constant x extension -> $F = k \times e$ |