

How to use this resource:

Please use this booklet to regularly quiz your child on the content covered in their science lessons.. Some of the questions might not necessarily be concerned with course content but look at essential skills needed for success in the examination context.

Once your child has completed a quiz, please complete the table on the front cover, all quizzes should be completed as many times as you can and each completion recorded.

Reward points will be allocated for each complete booklet. Cover logs must not be signed by students, home or school staff signature is needed.

Any questions or queries, please contact your child's science teacher.

Even if science is not in your comfort zone, don't let this put you off you can still help your child to be successful by regularly quizzing them. Remember, this is retrieval practice, we don't expect students to get 100% first time, but after practice scores will improve.

Units Covered in Years 9, 10 & 11:

Please note that some of these units have already been delivered, it is essential that these are also covered to assist students with retrieval of information already delivered (all formal examinations are sat at the end of year 11, this includes the content delivered from year 9 onwards, so it is essential this information is still practiced). Some units may not have been delivered yet, again it is still important to practice these so learners are at an advantage when this unit is delivered.

Biology

Cell Biology
Photosynthesis & Respiration
Organisation (moving & changing)
Health Matters (infection & response)
Coordination & Control
Reproduction & Inheritance
Ecology

Chemistry

Atomic Structure & Periodic Table
Bonding
Chemical Quantities
Chemical Changes
Hydrocarbons
Energy Changes
Atmosphere
Sustainable Development
Rate & Extent of Chemical Change
Chemical Analysis

Physics

Energy
Electricity
Particle Model
Magnets
Forces & Pressure
Atomic Structure
Waves

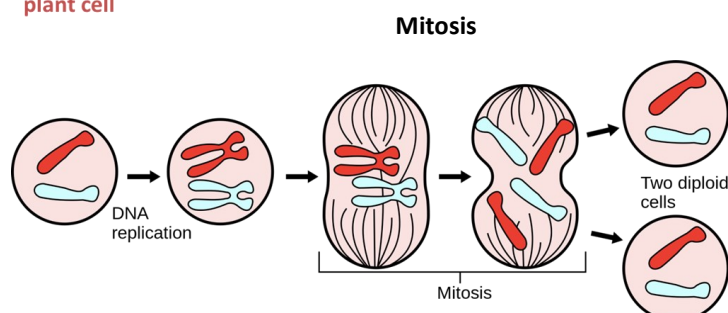
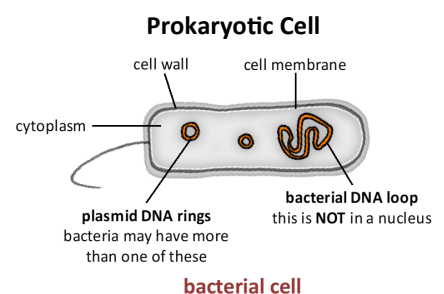
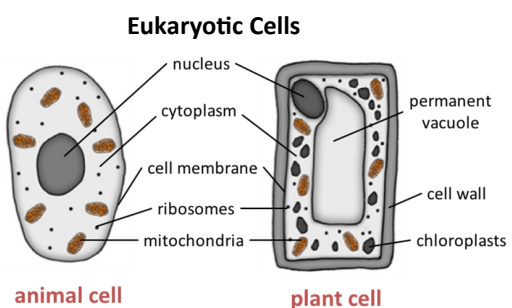
Other:

Command Words—essential to understand what question is requiring students to do (explain, describe, evaluate etc.)

Biology Quizzes

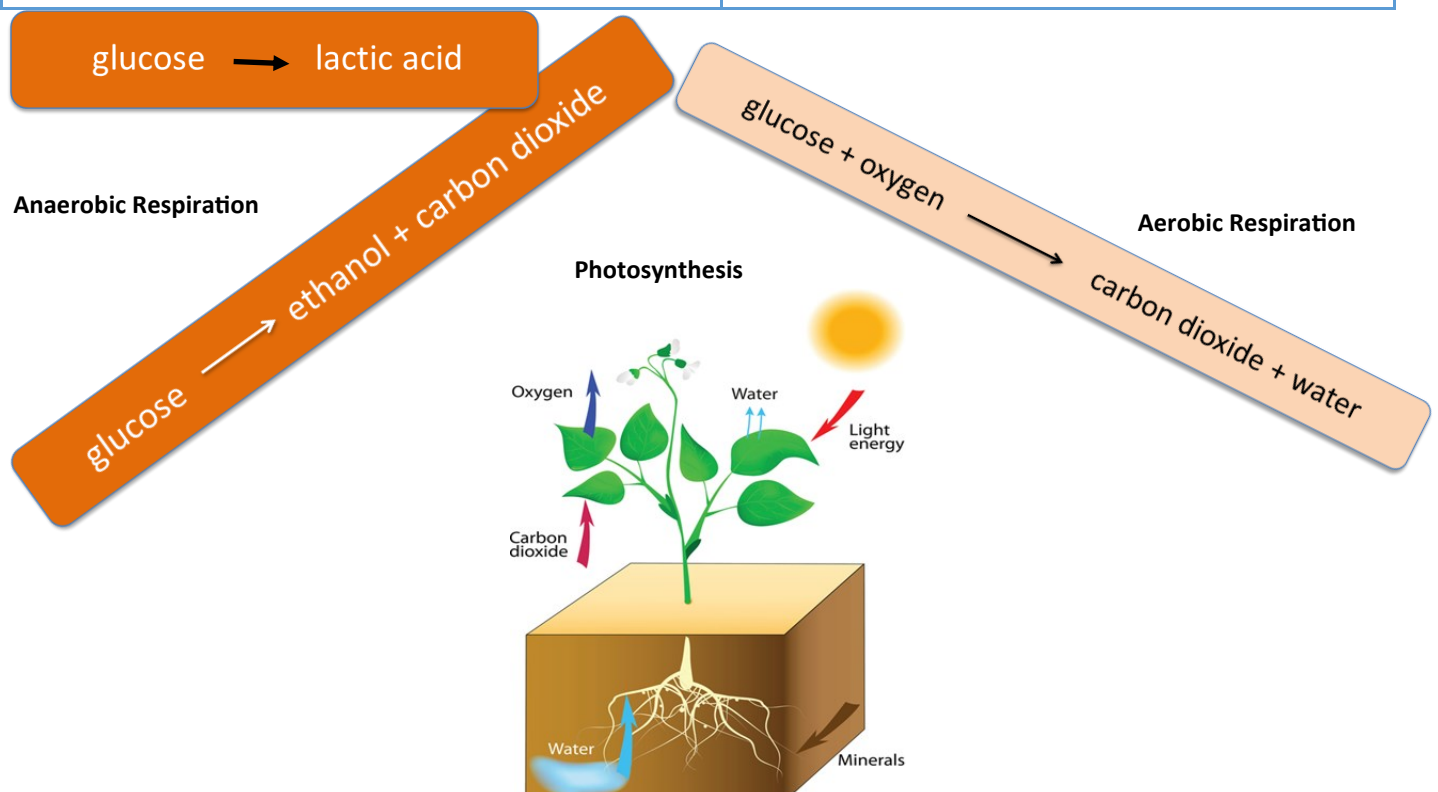
Cell Biology:

Questions:	Answers:
1. Organise the following from smallest to largest: Heart, mitochondria, cardiac tissue, cell, human, atom	Atom, mitochondria, cell, cardiac tissue, heart, human
2. What part of a cell is where respiration happens?	Mitochondria
3. Name 2 organelles you would find in a plant cell but NOT in an animal cell?	Chloroplast, Permanent Vacuole, Cell Wall (any 2)
4. What is meant by a partially permeable membrane?	It is a membrane that has small holes in it so only tiny particles can pass through it.
5. Which cells in plants are specialised for absorbing water and minerals from the soil?	Root hair cells
6. Is a plant cell a prokaryotic or eukaryotic cell?	A eukaryotic cell (a eukaryotic cell is a complex cell e.g., a plant or an animal cell, whereas a prokaryotic cell is a simple cell e.g., a bacterium)
7. What is the purpose of the fine adjustment knob on a light microscope?	It is used to focus the lens until a clear image of what's on the slide appears.
8. How does the ability to differentiate differ between plant and animal cells?	The ability to differentiate is lost at an early stage in most animal cells (after they have specialised), but lots of plant cells don't ever lose this ability.
9. How many daughter cells are produced in mitosis?	Two
10. How many daughter cells are produced in meiosis?	Four
11. Are the daughter cells identical to the parent cells in mitosis?	Yes
12. Are the daughter cells genetically identical to the parent?	No

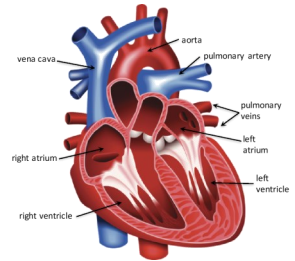


Photosynthesis & Respiration:

Questions:	Answers:
1. True or false? Photosynthesis is an exothermic reaction?	False, its an endothermic reaction
2. Which molecule has the chemical symbol $C_6H_{12}O_6$?	Glucose
3. What is the word equation for photosynthesis?	Carbon dioxide + water \rightarrow glucose + oxygen (using the energy from light)
4. What is the name of the pigment found in the chloroplasts of green plants?	Chlorophyll
5. What role does chlorophyll play in photosynthesis?	It absorbs energy from light, which is used to convert carbon dioxide and water into glucose and oxygen.
6. What do plants convert glucose into for storage?	Starch
7. Why do plants convert glucose into starch for storage?	Because it is not soluble, a cell filled with lots of glucose would draw in a lot of water (by osmosis) and swell up.
8. Apart from storage, what else do plants use glucose for?	Respiration, to make cellulose and to make amino acids.
9. Which 3 environmental variables can affect the rate of photosynthesis?	Temperature, light intensity and CO_2 concentration
10. Why is the rate of photosynthesis often limited during the winter?	Lower temperatures, fewer hours of daylight, both will limit the rate of photosynthesis
11. What is the word equation for aerobic respiration?	Oxygen + Glucose \rightarrow Water + Carbon Dioxide (energy released)
12. What are the products of anaerobic respiration in plant and	Ethanol and Carbon Dioxide

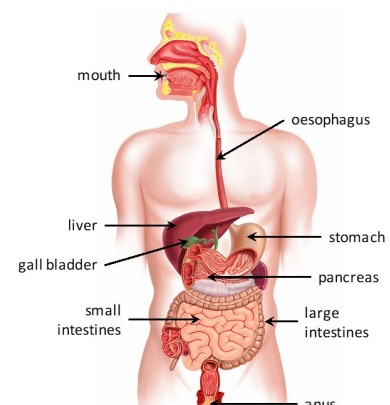


Organisation:



Questions:	Answers:
1. What is a group of organs working together to perform a par-	An organ system
2. True or false? A tissue is a group of cells of only one type, which work together to perform a function?	False, a tissue doesn't have to be made of one type of cell, it can include more than one type of cell.
3. What is an organ?	An organ is a group of different tissues that work together to perform a particular function.
4. What is an enzyme?	A biological catalyst that speeds up reactions without being used up (it is a protein)
5. How do enzymes affect the rate of a reaction?	They lower the activation energy and increase the rate of a chemical reaction.
6. What is an active site of an enzyme?	The active site is the part of the enzyme that the substrate fits into.
7. Give 2 variables that affect the rate of an enzyme controlled reaction	Temperature and pH
8. What is the lock and key model of enzyme activity?	It's a simplified model of enzyme action—a reaction will only be catalysed if the shape of the substrate exactly
9. In which organs are proteases produced?	The stomach, pancreas and small intestine
10. What reagent is used to test for starch and how would we know if starch was present?	Iodine—turns from brick-red to blue-black in the presence of starch
11. What type of food molecule can be identified in a sample using the Benedict's test?	Sugars
12. What reagent would be used to test whether fats/ lipids are	Ethanol—turns milky in the presence of fats/lipids

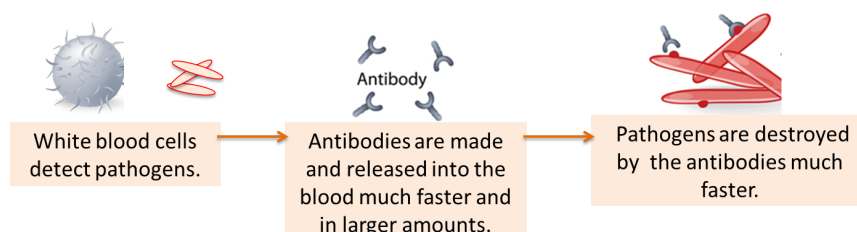
Digestive Enzyme	Where released?	Breakdown what?
Amylase	Salivary glands and pancreas	Carbohydrates into simple sugars
Protease	Stomach and pancreas	Proteins into amino acids
Lipase	Pancreas	Fats and oils (lipids) into fatty acids and glycerol



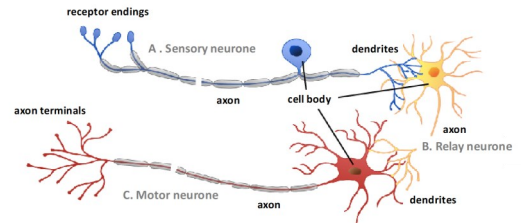
Infection & Response



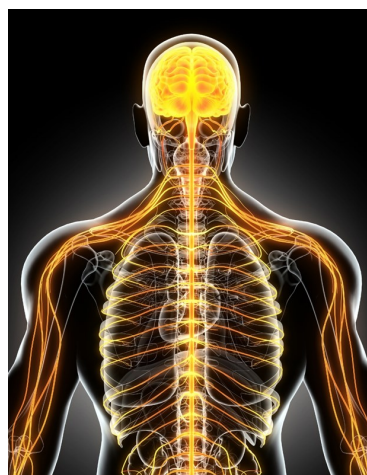
Questions:	Answers:
1. What are pathogens?	Pathogens are microorganisms that cause communicable
2. Bacteria, viruses and fungi are examples of types of patho-	Protist
3. Cholera is a disease that is spread by water. How could a person pick up the pathogen that causes cholera?	By drinking, bathing or swimming in contaminated water
4. What type of organism causes rose black spot in plants? How is it spread?	Caused by a fungus, spread by water or wind
5. State 2 symptoms of measles. How are measles spread?	A red skin rash and fever. It is spread by inhaling droplets from an infected person's sneezes and coughs.
6. State one way that the spread of malaria could be controlled	By preventing mosquitos from breeding or by using mos-
7. How does phagocytosis help defend the body against pathogens?	White blood cells use phagocytosis to engulf and digest pathogens.
8. What type of cells produce antitoxins? What do antitoxins do?	White blood cells, antitoxins counteract toxins produced by invading bacterial pathogens.
9. Explain how a vaccination protects a person from future infections.	The person is injected with a small amount of dead or inactive pathogen. The immune system produces antibodies specific to the antigens on the pathogen. In the future, if the person is infected by the live version of the same pathogen, then their white blood cells can rapidly produce the antibodies needed to fight it off.
10. How does the stomach help to defend the body against pathogens?	The stomach produces hydrochloric acid, this kills pathogens that reach the stomach.
11. True or false? Antibiotics can be used to fight viruses?	False, antibiotics only work on bacterial infections.
12. What does it mean when patients are given a placebo?	They have been given a substance that looks like a real



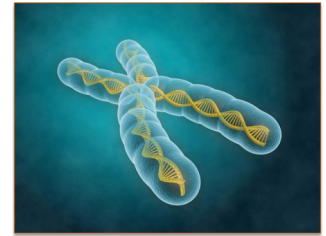
Coordination & Control



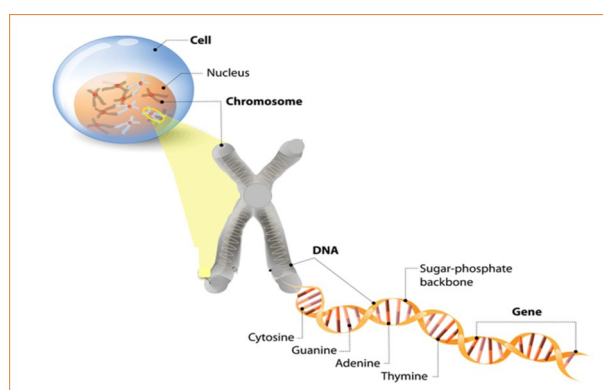
Questions:	Answers:
1. What is homeostasis?	The regulation of conditions inside the body, to maintain a stable internal environment in response to changes in both internal and external conditions.
2. Homeostasis controls the water content of the blood, give 2 other conditions that are controlled by homeostasis.	Blood glucose, body temperature
3. The body has control systems that regulate internal conditions. What components do all control systems include?	Receptors, a coordination centre and effectors.
4. What is negative feedback (Higher Tier)	Negative feedback helps to maintain a stable internal environment. It acts against a change in a condition, to return it back to its normal levels
5. True or false? Muscles and glands are examples of receptors	False they are effectors.
6. In humans, what does the central nervous system consist of?	The brain and spinal cord
7. Which type of neurone carries impulses from the CNS to effectors?	Motor Neurone
8. Why is the nervous system so important to humans?	Allows us to react to our surroundings and coordinate behaviour
9. True or false? Reaction time is the time it takes to detect a stimulus.	False, reaction time is the time it takes to respond to a stimulus.
10. How are nerve signals transferred across a synapse?	Chemicals diffuse across the synapse and set off a new electrical impulse in the next neurone.
11. How are hormones transported around the body?	In the blood
12. Which gland monitors and controls blood glucose concentration?	Pancreas



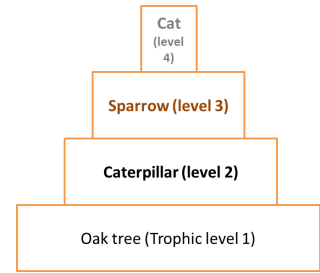
Reproduction & Inheritance



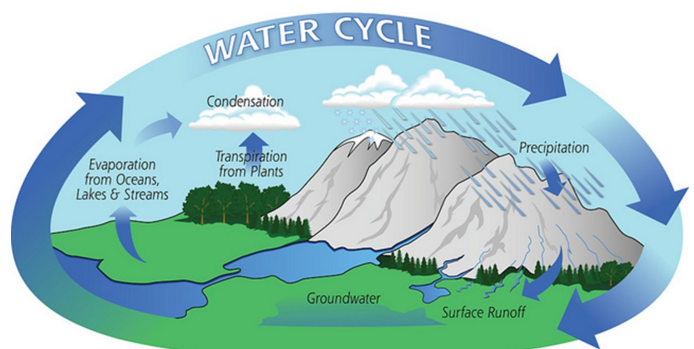
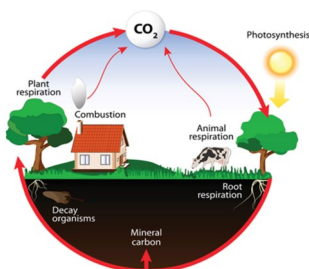
Questions:	Answers:
1. True or false? DNA is contained in long structures called chromosomes?	True
2. What is bigger—a gene or a genome?	A genome is bigger than a gene, the genome is the entire set of genetic material in an organism. This includes every single gene that the organism has.
3. What is the importance of genes in the production of proteins?	Each gene codes for a specific sequence of amino acids which are put together to form a specific protein.
4. What type of reproduction do humans do to produce offspring?	Sexual reproduction (the genetic information in humans comes from a mother and father)
5. What are gametes?	Sperm and egg cells in humans, egg and pollen in plants
6. How many pairs of chromosomes are there in a normal human body cell?	23 pairs
7. Is polydactyly caused by a dominant or recessive gene?	It is caused by a dominant allele
8. What is an allele	Different versions of the same gene (e.g. we have several different genes that code for eye colour, these are different alleles for that gene)
9. What do we mean by the terms phenotype and genotype?	Genotype = the combination of genes inherited Phenotype = the physical representation
10. When a mutation occurs, what is the most common outcome for the phenotype?	Most mutations have no effect on the phenotype, very rarely a mutation might result in a new phenotype.
11. What is extinction?	When there are no remaining individuals of a species still alive.
12. What is meant by natural selection?	Organisms with the most suitable characteristics for the environment are more likely to survive and reproduce, so they are more likely to pass on their genes for their characteristics to the next generation.



Ecology



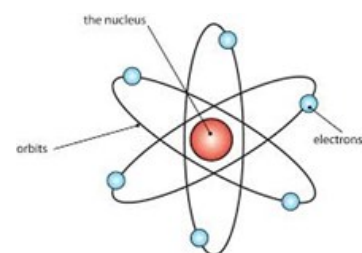
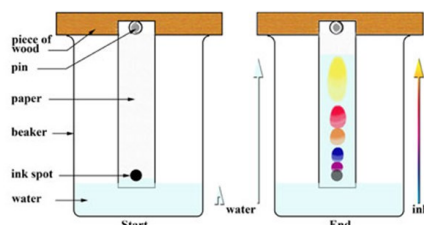
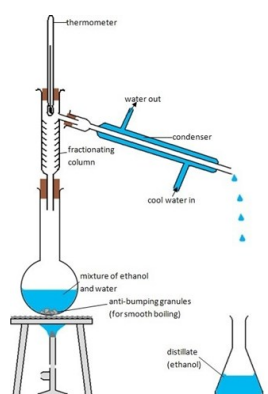
Questions:	Answers:
1. What is the definition of an ecosystem?	The interaction of a community of living organisms with the non-living parts of their environment
2. What do plants compete with other plants for?	Light, space, water and mineral ions from the soil
3. What do animals compete with each other for?	Food, mates, territory
4. List 2 ways that a plant may depend on another species for its survival	Pollination and seed dispersal
5. What is interdependence>?	How species within an ecosystem depend on each other, if one species is removed it can affect the whole community.
6. What is meant by a stable community?	One where all of the species and environmental factors are in balance so that population sizes remain fairly constant.
7. What are biotic and abiotic factors?	Biotic = Living factor (other plants and animals, anything that is alive) Abiotic = A non-living factor (temperature, pH etc..)
8. There are 3 types of adaptation that an organism may show to aid its survival, what are the 3 types?	Behavioural, structural, functional
9. What is an extremophile?	An organism that lives in an extreme environment
10. Give an example of an extremophile	Bacteria living in deep sea vents
11. What is biomass?	The amount of living material in an organism
12. What does a food chain show?	Feeding relationships within a community



Chemistry Quizzes

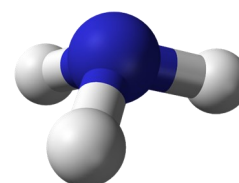
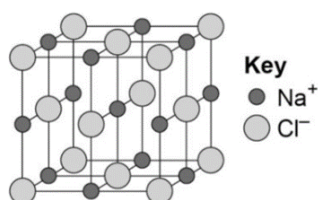
Atomic Structure & Periodic Table:

Questions:	Answers:
1. What is the relative charge of a neutron? What is its relative atomic mass?	Relative charge = 0, neutrons are neutral! The relative mass of a neutron is 1
2. Explain what is meant by the term isotope?	Isotopes are different forms of the same element, they have the same number of protons but different number of neutrons.
3. True or false? Most of the mass of an atom is located in the nucleus?	True, electrons have virtually no mass.
4. Why do atoms have no charge?	Atoms have the same number of protons as electrons. Because the charges on protons (+1) and electrons (-1) are opposite and equally sized, they cancel each other out.
5. What is a compound?	A substance formed from two or more different elements in fixed proportions, held together by chemical bonds.
6. What type of process is needed to separate a compound into its elements?	You need a chemical reaction to separate compounds into elements, it is not always easy and involves energy.
7. What is a mixture?	Two or more elements and/or compounds that are combined but not chemically bonded together.
8. In chromatography, what is the solvent front?	The point at which the solvent in paper chromatography reaches as it moves up the paper.
9. Why might crystallisation be used rather than evaporation to separate a salt from a mixture?	Crystallisation is used if the salt will decompose when heated, or if you want to make big crystals of the salt.
10. When can filtration be used to separate a mixture?	Filtration can be used when you have a mixture of an insoluble solid and a liquid.
11. How were the elements arranged in the first periodic table?	Relative atomic mass / atomic weight
12. What happens to the reactivity of groups 1 and 7 as you move down the group?	Group 1 get more reactive, group 7 get less reactive.



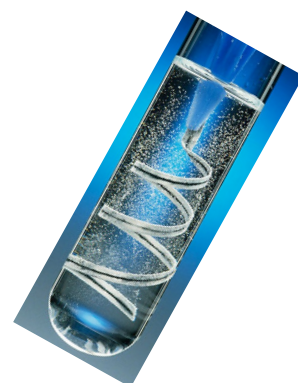
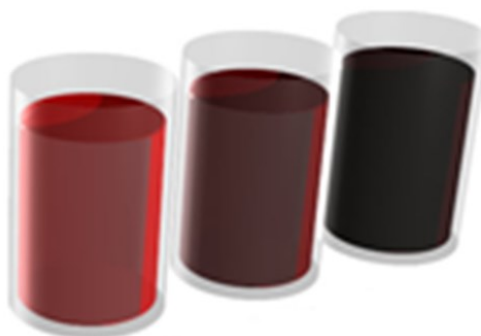
Bonding

Questions:	Answers:
1. True or false? A positive ion is formed when an atom gains an electron?	False, electrons are negatively charged so atoms that gain electrons form negative ions.
2. If an atom loses two electrons to form an ion, what charge will the ion have?	The ion will have a +2 charge, as electrons are negatively charged.
3. Describe how an ionic bond forms between a metal and a non-metal atom.	The metal atom loses electrons to form a positively charged ion. The non-metal gains these electrons to form a negatively charged ion. These oppositely charged ions are strongly attracted to each other by electrostatic forces, forming an ionic bond.
4. Do ionic compounds have high or low melting points?	High melting points, this is because of the strong electrostatic forces of attraction between the ions.
5. Explain why ionic compounds conduct electricity when molten but not when solid.	For a substance to conduct electricity it must contain charged particles that are free to move and carry the current. The ions in a solid ionic compound are held in place in the rigid lattice structure, so can't move around. When an ionic compound melts, the ionic bonds break and the ions become free to move and can carry an electrical current.
6. How many electrons does each atom donate to form a single covalent bond?	The atoms in a single covalent bond donate one electron each.
7. True or false? Non-metal atoms can form covalent bonds with each other?	True—covalent bonds only form between non-metal atoms.
8. Explain why carbon forms covalent bonds with 4 hydrogen atoms in CH ₄ ?	A non-metal will generally try to form enough covalent bonds to fill its outer shell. Carbon has 4 electrons in its outer shell, so needs to form 4 single covalent bonds in order to get 8 electrons in its outer shell.
9. Why don't simple molecular substances conduct electricity?	Simple molecular substances aren't charged, so there aren't any free electrons or ions to carry the current.
10. How are the atoms in a polymer joined together?	By covalent bonds
11. True or false? Buckminsterfullerene molecule is shaped like a ball?	True—Buckminsterfullerene is a hollow sphere made of carbon atoms arranged in rings.
12. Why do most metals have high melting points?	Because they are held together by strong metallic bonds, which require a lot of energy to break, it is these bonds that are broken when metals melt, so most metals have high melting points.



Chemical Quantities

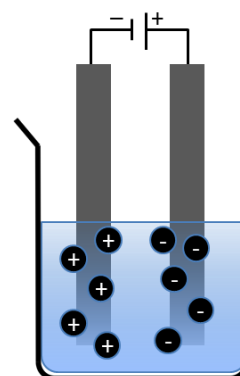
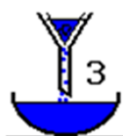
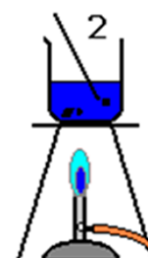
Questions:	Answers:
1. True or false? The <i>Mr</i> of a compound is always greater than the <i>Ar</i> of any of the elements in that compound?	True—you find the <i>Mr</i> by adding the <i>Ar</i> of each element, so it must be greater.
2. The <i>Ar</i> of oxygen is 16 and the <i>Ar</i> of nitrogen is 14. Find the <i>Mr</i> of nitric oxide (NO)	16+14=30 There is only 1 atom of element in the formula, so just add the A values together.
3. How do you calculate the percentage mass of an element in a compound?	Multiply the <i>Ar</i> of the element by the number of atoms of that element in the formula of the compound, then divide the <i>Mr</i> and multiply by 100.
4. What is the definition of a mole? (Higher Tier)	One mole is 6.02×10^{23} (the Avogadro constant) particles of a substance
5. What is meant by the term 'conservation of mass'?	Conservation of mass means the total mass of the products in a reaction will always be equal to the mass of the reactants. This is because no atoms are ever destroyed or created during a reaction.
6. How does a balanced symbol equation for a reaction show that mass is conserved in a reaction?	In a balanced equation, the sum of the reactants will equal the sum of the products, there will be the same number of each type of atoms on both sides of the equation.
7. How do you find the concentration of a solution in g/dm ³ ?	Divide the mass of solute in grams by the volume of the solution in dm³.
8. A large bottle of cola contains 130g of sugar. The bottle holds 2dm ³ of the drink. What is the concentration of the drink in g/dm ³ ?	Concentration = mass ÷ volume = $130 \div 2 = 65\text{g/dm}^3$
9. What's the definition of a limiting reactant? (Higher Tier)	The reactant that gets completely used up in a given reaction.
10. What does it mean if a reactant is said to be in excess? (Higher Tier)	A reactant is in excess if there is more than enough of it present to allow the limiting reactant to be fully used up.
11. A scientist places a lump of metal in an open container on a mass balance, then forgets to put it away before locking up the lab and going on holiday for 2 weeks. When he returns the mass balance has gone up (it has gained weight) Why?	The metal must have reacted with one or more of the gases in the air.
12. Find the concentration in dm ³ , of the solution formed when 15g of potassium nitrate is dissolved in 250cm ³ of water.	First convert the volume to dm³ $250 \div 1000 = 0.25\text{dm}^3$.



Chemical Changes

Questions:	Answers:
1. What is an ore?	A metal compound in a rock
2. What is produced when metals react with oxygen?	Metal oxide
3. What is oxidation and reduction in terms of oxygen?	Oxidation is the gain of oxygen, reduction the loss of oxygen
4. What type of ions do metals produce?	Positive
5. What is electrolysis?	When an electric current is passed through a molten or aqueous ionic solution and it is broken down into simpler substances
6. What are the names of the electrodes that attract the positive and negative ions during electrolysis?	Positive = cathode Negative = anode
7. Why is gold found as an element in the Earth rather than as a metal ore?	It is an unreactive metal
8. How are metals that are less reactive than carbon extracted from their ores?	Reduction with carbon
9. What is produced when acids react with metals?	Salt + water
10. What salts are formed by the following acids: hydrochloric acid, sulphuric acid, nitric acid?	Hydrochloric acid = chloride, sulphuric acid = sulphate, nitric acid = nitrate
11. What ions do aqueous acids contain?	H ⁺
12. What ions do aqueous alkalis contain?	OH ⁻

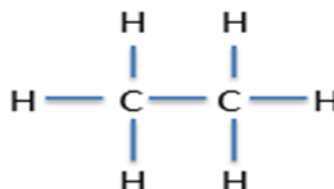
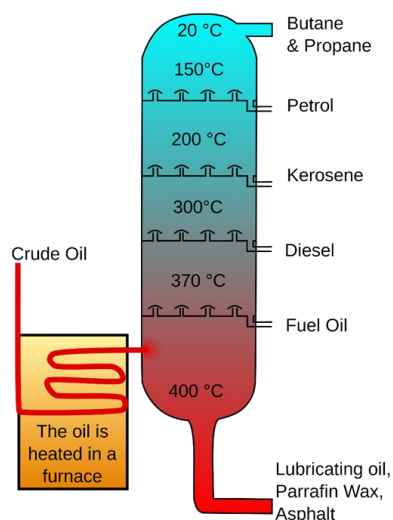
pH	Examples of solutions
0	Battery acid, strong hydrofluoric acid
1	Hydrochloric acid secreted by stomach lining
2	Lemon juice, gastric acid, vinegar
3	Grapefruit juice, orange juice, soda
4	Tomato juice, acid rain
5	Soft drinking water, black coffee
6	Urine, saliva
7	"Pure" water
8	Sea water
9	Baking soda
10	Great Salt Lake, milk of magnesia
11	Ammonia solution
12	Soapy water
13	Bleach, oven cleaner
14	Liquid drain cleaner



Hydrocarbons

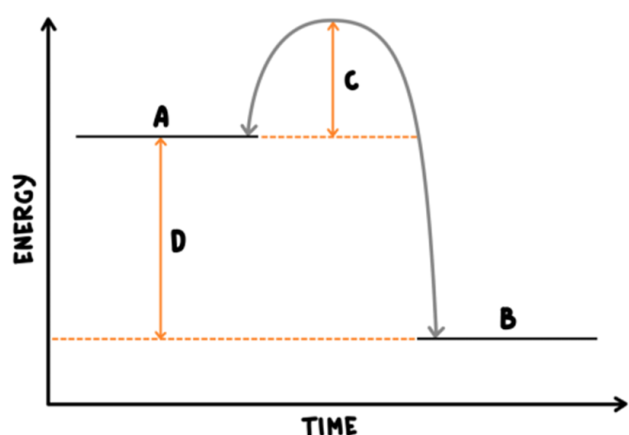


Questions:	Answers:
1. Crude oil is a finite resource, what does finite mean?	A resource that is being used up faster than it is being formed
2. How was crude oil formed?	The remains of ancient biomass consisting of many plankton that was buried in mud, time, heat and pressure and lack of oxygen were the optimal conditions for crude oil to be formed.
3. What is crude oil?	A mixture of a very large number of compounds, most of which are hydrocarbons.
4. What is the definition of a hydrocarbon?	A compound containing hydrogen and carbon only
5. What is the general formula of the alkanes?	C_nH_{2n+2}
6. Name the first four of the alkanes	Methane, ethane, propane, butane
7. What do we call the many hydrocarbons in crude oil?	Fractions
8. How can the hydrocarbons in crude oil be separated out?	Fractional distillation
9. Give three examples of useful materials produced by the petrochemical industry	Solvents, lubricants, polymers, detergents
10. How would you describe the boiling point, the viscosity and the flammability of a very large alkane molecule?	High boiling point, high viscosity, low flammability
11. Define the term 'cracking'	Breaking hydrocarbons down to produce smaller, more useful molecules
12. What is the test for alkenes?	Bromine water will turn from orange to colourless

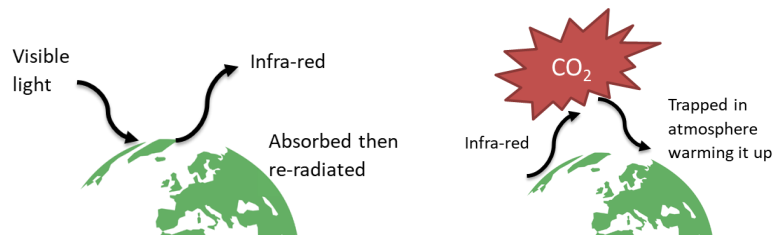


Energy Changes

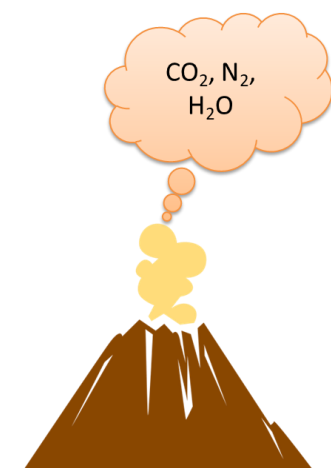
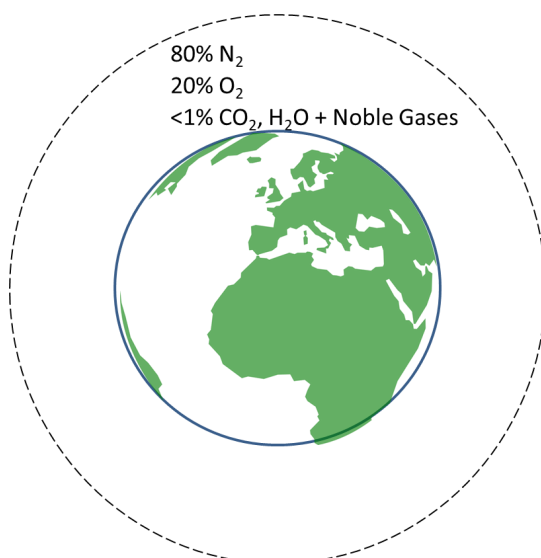
Questions:	Answers:
1. How would you know if an exothermic reaction had occurred?	The reaction would give out heat / get warmer / temperature increase
2. how would you know if an endothermic reaction had occurred?	The reaction would take in heat / get colder / temperature decrease
3. What is meant by the term activation energy?	The minimum amount of energy that particles must have to react
4. What 2 things are needed for a chemical reaction to occur?	Reacting particles must collide with each other and with sufficient energy
5. Which process is exothermic, bond breaking or bond making?	Bond making
6. How would you calculate the overall energy change of a reaction?	It is the difference between the sum of the energy needed to break bonds in the reactants and the sum of the energy released when bonds in the products are formed.
7. What is an exothermic reaction?	Heat energy given out / energy lost to the surroundings
8. What is an endothermic reaction?	Heat energy is taken in / energy taken from the surroundings
9. Give 3 examples of common exothermic reactions	Combustion, oxidation, neutralisation
10. Identify an everyday use of an exothermic reaction	Self-heating cans, hand warmers (or any other relevant example)
11. Identify an everyday use of an endothermic reaction	Thermal decomposition, sports injury packs
12. What does a reaction profile show?	The changes in relative energies of the reactants and products



Atmosphere



Questions:	Answers:
1. Name 4 gases in the Earth's atmosphere	Nitrogen, oxygen, other gases such as carbon dioxide, water vapour and natural gas.
2. Give the proportions of the gases in the Earth's atmosphere	Nitrogen 80%, oxygen 20%, small proportions of other gases
3. Why is evidence for the Earth's early atmosphere limited?	The timescale of 4.6 billion years
4. What gases are believed to have been released from volcanoes during the first billion years of the Earth's existence?	Nitrogen, carbon dioxide, water vapour, small amounts of ammonia and methane
5. How did the oceans form?	Water vapour in the atmosphere condensed
6. Why did the amount of carbon dioxide in the earlier atmosphere decrease?	When oceans formed carbon dioxide dissolved into the water, carbonates precipitated producing sediments, reducing carbon dioxide in the atmosphere
7. What gas in the current day atmosphere was not present in the atmosphere 4.6 billion years ago?	Oxygen
8. What organisms increased the amount of oxygen in the Earth's atmosphere?	Algae and plants
9. What is the word equation for photosynthesis?	Carbon dioxide + water → glucose and oxygen (with the energy from sunlight and chlorophyll)
10. When did oxygen first start appearing in the atmosphere?	2.7 billion years ago
11. Other than photosynthesis, what other factors decreased the level of carbon dioxide in the atmosphere?	Formation of sedimentary rocks and fossil fuels (natural gas, oil, coal)
12. Name 3 greenhouse gases	Water vapour, carbon dioxide, methane



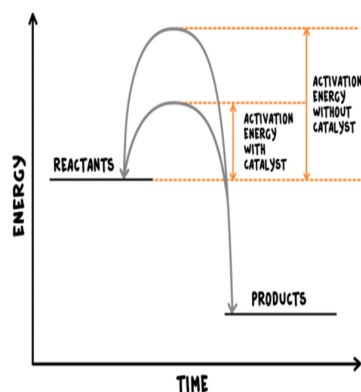
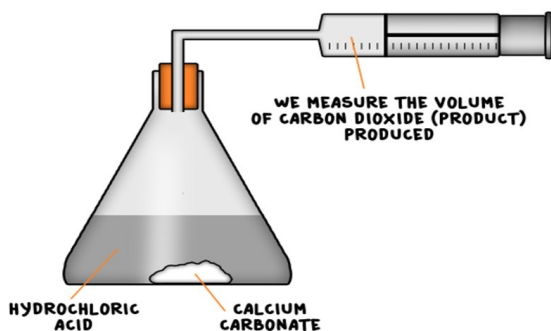
Sustainable Development

Questions:	Answers:
1. Describe 2 ways that humans use the Earth's natural resources	Warmth, shelter, food, transport (any 2)
2. Explain what the term finite means and give an example	Finite—being used up faster than it is being made
3. What is meant by the term sustainable development?	The development that meets the needs of the current generations without compromising the ability of future generations to meet their own needs.
4. Why is potable water not described as pure water by scientists?	It contains dissolved substances
5. What does the method for producing potable water depend upon?	Available supplies (fresh or seawater) and local conditions
6. How is most potable water in the UK produced?	Choosing an appropriate source of freshwater, passing the water through filter bed then sterilising
7. What two methods can be used for the desalination of salty water?	Distillation and reverse osmosis
8. What needs to be removed from sewage and agricultural waste water?	Organic matter and harmful chemicals
9. What are the four stages in the treatment of sewage?	Screening and grit removal, sedimentation to produce sewage sludge and effluent, anaerobic digestion of sewage sludge, aerobic treatment of effluent
10. What types of ores can phytomining and bioleaching be used on?	Low grade ores
11. Why are phytomining and bioleaching used?	Avoids traditional mining methods of digging, moving and disposing of large amounts of rock.
11. Life cycle assessments are carried out to assess the environmental impact of what stages of a product?	Extracting and processing raw materials, manufacturing and packaging, use and operation during its lifetime, disposal at the end of its useful life.



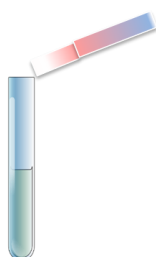
Rate & Extent of Chemical Change

Questions:	Answers:
1. State 2 ways of finding the rate of a reaction	Measuring the quantity of reactant used or product formed.
2. State 2 ways of measuring the quantity of a reactant or product	Mass in grams or volume cm^3
3. What is 'collision theory'?	Explains that particles need to collide with enough energy for them to react together
4. What is meant by activation energy?	The minimum amount of energy that particles must have to react
5. What happens to the gradient of a line if the rate of a reaction is increased.	It will become steeper.
6. Identify 3 factors that affect the rate of a reaction	Concentration, temperature, surface area, pressure, catalyst
7. What is a catalyst?	Catalysts change the rate of chemical reactions, but are not used up during the reaction. They provide a different pathway with a lower activation energy
8. What is meant by a reversible reaction?	The products of the reaction can react to produce the original reactants
9. If a reaction is endothermic in one direction, what is it in the other direction?	Exothermic
10. What is meant by the term 'equilibrium'?	Forward and reverse reactions occur at the same rate
11. What needs to happen for equilibrium to be reached?	Closed system; apparatus prevents the escape of reactants and products
12. What can be said about the amount of energy being transferred in a reversible reaction?	Same amount of energy is transferred in both directions



Chemical Analysis

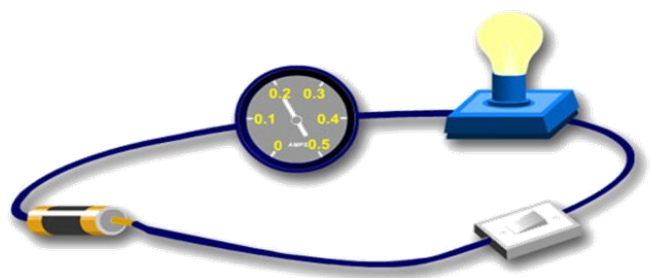
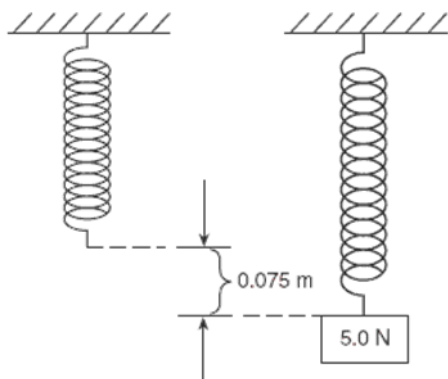
Questions:	Answers:
1. How would you test for oxygen gas?	A glowing splint will relight
2. An unknown gas gives out a squeaky pop when a burning splint is put into it, what is the gas?	Hydrogen
3. Describe how you could test for carbon dioxide gas?	Limewater turns milky / cloudy, or a lit splint is extinguished
4. A student wrote down the following description for testing chlorine: "use litmus paper it turns from red to blue", where has he gone wrong?	Moist litmus paper is bleached, it turns white
5. What is a flame test?	Rod is dipped in water and then into the compound; placed in a flame and the colour produced is observed.
6. What is a precipitate?	An insoluble solid product produced in a liquid.
7. What is a pure substance?	A single element or compound, not mixed with any other substance
8. How can we tell the difference between a pure substance and a mixture?	Pure substances boil and melt at specific temperatures, melting and boiling data could be used.
9. What is a formulation?	A mixture that has been designed as a useful product
10. Give some examples of formulations	Fuels, cleaning products, paints medicines, alloys, fertilisers and foods.
11. What is a chromatograph?	Used to help separate mixtures, can give information to help identify substances.
12. What happens in the stationary and mobile phases?	Stationary phase is the paper; mobile phase is the solvent. Mixture is dissolved in the solvent and moves up the stationary phase.



Physics Quizzes

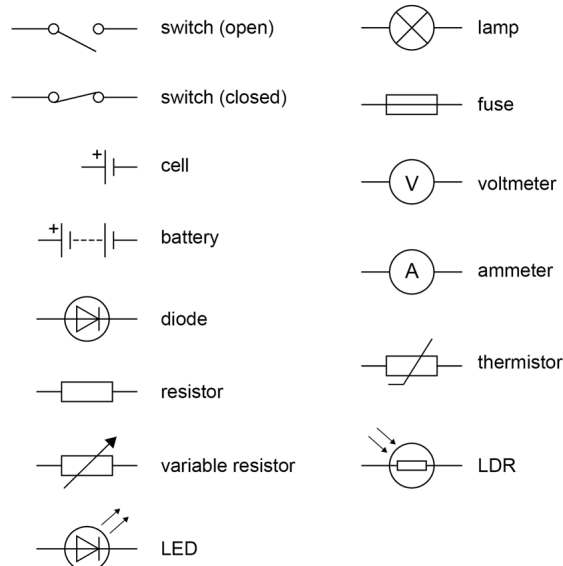
Energy

Questions:	Answers:
1. Name three different energy stores	Gravitational potential, thermal, kinetic, elastic potential, chemical, magnetic, electrostatic, nuclear.
2. Give three ways in which energy can be transferred	Energy can be transferred mechanically (work is done by a force), electrically (work is done by moving charge), or by heating.
3. What is meant by a system?	A system is an object or a group of objects.
4. Which stores is energy transferred between when a car is slowed down by applying the brakes?	Transferred from the kinetic energy store to the thermal energy stores of the car and its surroundings
5. When an object slows down, which store is the energy being transferred away from?	The object's kinetic energy store.
6. a 2kg block and a 5kg block are both lifted to the same height. Which block has more energy in its potential energy store?	The 5kg block has more energy in its gravitational potential energy (GPE) store as it has a higher mass, the amount of energy in its GPE store depends on its mass ($E_p = mgh$)
7. True or false? If a material has a high specific heat capacity, a relatively large amount of energy is required to increase its	True, specific heat capacity is the energy required to raise the temperature of 1kg of a substance by 1°C.
8. Give the equation that gives power in terms of work done	$P=W \div t$ (power = work done \div time)
9. What does it mean if a machine is powerful? .	A powerful machine is a machine that can transfer a lot of power
10. How much work is done by a 150kW powerboat operating at full power for 10s?	1.5Mj. $P=W \div t$, so $W = P \times t$. $P=150kW = 150\,000W$ $W = 150\,000 \times 10 = 1\,500\,000J$ or 1.5Mj
11. Should insulation have a high or a low thermal conductivity?	Low thermal conductivity
12. What is the equation relating efficiency, total power input	Efficiency = useful power out \div total power input



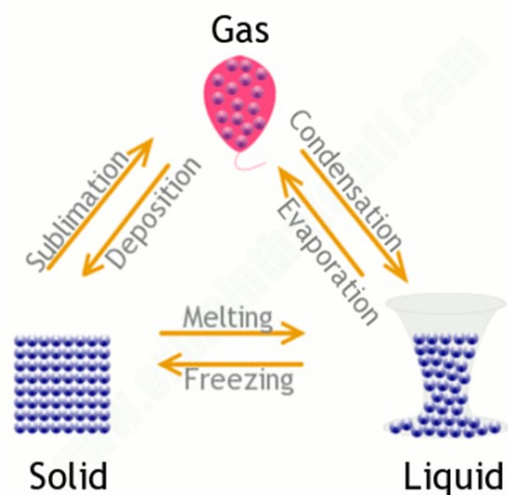
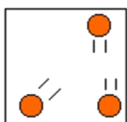
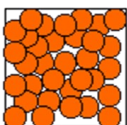
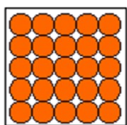
Electricity

Questions:	Answers:
1. True or false? The current in a single closed loop of wire is the same at any point.	True
2. What is the equation that links charge flow, current and time?	Charge flow = current x time ($Q=It$)
3. A current of 12A flows through a circuit in a power washer for 80s, how much charge flows during this time?	960 C ($Q=It$, so $12 \times 80 = 960$ C)
4. True or false? For a given potential difference, the smaller the resistance of a component, the smaller the current through it will be.	False, resistance is anything that slows down the flow of charge. So for a given potential difference, the smaller the resistance of a component, the greater the current through it will be.
5. True or false? A diode has a very high resistance in 1 direction	True, the high resistance in one direction makes it very hard for a current to flow in that direction.
6. What is the relationship between potential difference and current for an ohmic conductor at a constant temperature?	Current is directly proportional to potential difference
7. True or false? Thermistors can be used in thermostats that control the temperature of a room?	True, they are used in lots of devices that need to sense changes in temperatures.
8. What happens to the resistance of a thermistor when its temperature decreases?	The resistance increases.
9. True or false? All components connected in series will have the same size current flowing through them?	True, the current is the same at any point in a series circuit.
10. How do you find the total resistance of a series circuit?	By adding the resistance of every component in the circuit.
11. True or false? The current running through all components connected in parallel is always the same?	False, the current is shared between the branches of a parallel circuit, the potential difference across all components connected in parallel is the same
12. True or false? Work done is when charges flow in a circuit?	True, charges in a circuit do work against resistance)

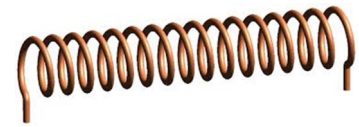


Particle Model

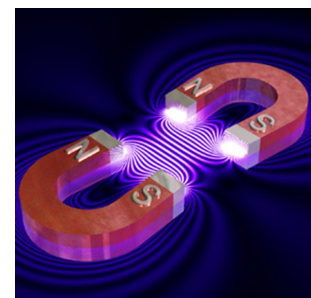
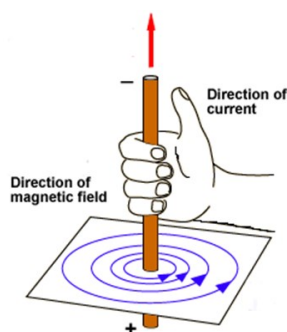
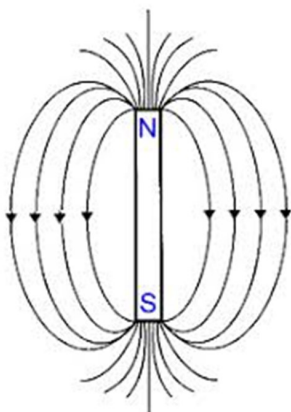
Questions:	Answers:
1. In which state of matter do particles move fastest?	Gas
2. In which state of matter is density generally the highest? How is this explained by the particle model?	Solid, particles are arranged closest together in the solid state.
3. Describe the difference between particle arrangements in solids and liquids	In solids, particles are fixed, have regular arrangements, whereas in liquids particles can move past each other and their arrangements are irregular.
4. What does density tell you about an object?	How compact a substance is, or how much mass there is per unit of volume.
5. What's the equation used for calculating density?	Density = mass ÷ volume
6. A marshmallow has a mass of 7g and a volume of 14cm ³ ,	0.5g/cm ³ Density = mass ÷ volume = 7 ÷ 14 = 0.5g/cm ³
7. What is 10.5m ³ in cm ³ ?	10 500 000cm ³
8. During which 2 changes in state does liquid become a gas?	Boiling and evaporation
9. What is sublimation?	The physical change of state to a gas state without passing through the liquid state.
10. True or false? The internal energy of a system is equal to the total energy that all the particles in the system have in their ki-	False, it's the total energy in the kinetic and potential energy stores of all the particles
11. What is the specific latent heat of vaporisation of a substance?	The energy needed to change 1kg of the substance from a liquid into a vapour/gas without raising the temperature of the substance.
12. What happens to the internal energy of a substance when it is condensing?	The internal energy decreases, this is because the bonds are forming, which releases energy.



Magnets & Electromagnets

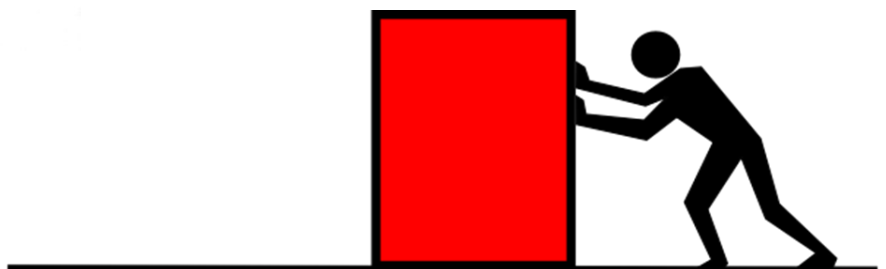


Questions:	Answers:
1. Describe the forces that exist between the like (same) poles of a magnet?	A repulsive, non-contact force exists between the like poles of magnet
2. Name 3 magnetic materials	Iron, steel, nickel, cobalt (any three)
3. What is the difference between a permanent and an induced magnet?	Permanent magnets produce their own magnetic field. Induced magnets only turn into magnets when they are put in a magnetic field.
4. True or false? The force between a permanent and an induced magnet is repulsive (they repel)	False, the attraction is always attractive
5. Magnetic field lines can be drawn to show the magnetic field of a bar magnet. At which points will the lines be closest together? What does this show?	They are closest together at the poles, this shows that the magnetic field is strongest here
6. what can you use to plot the shape and direction of a magnetic field around a current carrying wire?	A plotting compass (with a pencil and paper to draw it on)
7. What can you add to a solenoid to increase its magnetic field strength?	An iron core
8. A current carrying wire has a magnetic field around it. What factors affect the strength of the magnet field at a particular point?	The size of the current through the wire and the distance of the point from the wire.
9. Describe the magnetic field inside a solenoid	Strong and uniform
10. What is an electromagnet?	A solenoid with an iron core
11. Why might a current carrying wire move when placed between magnetic poles ?	The magnetic field around the wire interacts with the magnetic field between the poles, this causes the magnet and the wire to exert a force on each other. This force can cause the wire to move.
12. What do the directions of the thumb and first and second fingers indicate in Fleming's left hand rule?	Thumb = direction of force/motion, first finger = magnetic field direction, second finger = current direction.

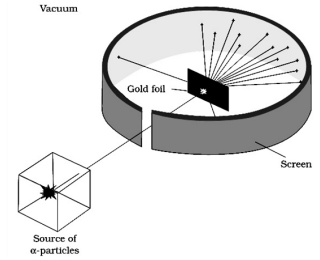


Forces & Pressure

Questions:	Answers:
1. True or false? Scalar quantities only have a magnitude	True, it is vector quantities that have magnitude and direction
2. Name 2 vector forces	Force, velocity, displacement, acceleration, momentum, weight drag
3. When contact forces act between a pair of interacting objects, what must be true about the two objects?	They must be physically touching for contact forces to act
4. What is meant by the weight of an object?	The force acting on an object due to gravity
5. What is the formula for calculating the weight of an object?	Weight = mass x gravitational field strength or $W=mg$
6. What is a newtonmeter used to measure?	Force or weight
7. True or false? The forces that act on an object can be replaced with a single resultant force that has the same effect?	True
8. What equation is used to calculate work done on an object moved by a force?	Work done = force x distance (moved along the line of action of the force)
9. If an object is in equilibrium, what must be true about all of the forces acting on the object?	They must be balanced
10. What is the equation that links extension, force and spring constant?	Force = spring constant x extension or $F = ke$
11. what does it mean if part of a distance-time graph is horizontal?	The object was stationary during that part, as the distance travelled does not change.
12. What is the equation to find the average acceleration of an object?	Average acceleration = change in velocity ÷ time taken



Atomic Structure

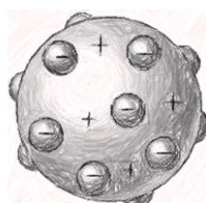


Questions:	Answers:
1. What two types of particle make up an atom's nucleus? For each type, say whether the particles have a positive or negative charge.	Protons and neutrons. Protons have a positive charge and neutrons have no charge.
2. Describe the plum pudding model of an atom	Atoms are spheres of positive charge with tiny negatively charged electrons stuck in them
3. True or false? An alpha particle is the same as a hydrogen nucleus?	False, an alpha particle is the same as a helium nucleus, not a hydrogen nucleus
4. What are gamma rays?	Short wavelength electromagnetic radiation emitted by the nucleus of an atom
5. What is a beta particle?	A fast moving electron, a beta particle is released by the nucleus as a neutron turns into a proton
6. Why do some atomic nuclei undergo radioactive decay?	Unstable atomic nuclei decay to become stable
7. A nucleus emits a gamma ray, what happens to the mass number of the atom? How about its charge?	The mass number and charge remain unchanged.
8. Define half-life in terms of the number of nuclei of an isotope in a sample	The time taken for the number of nuclei of that isotope in a sample to half.
9. True or false? It is possible to predict exactly how long it will take for a certain radioactive nucleus to decay?	False, radioactive decay is a random process, so it is impossible to predict when a certain nucleus will decay or which nucleus will decay next.
10. What is meant by the activity of a radioactive source?	Activity is the rate at which a source of unstable nuclei decays.
11. True or false? Irradiation of an object causes it to become radioactive?	False, an irradiated object is exposed to nuclear radiation but doesn't become radioactive.
12. Explain how keeping a gamma source in a lead lined box when it is not in use helps to reduce the risk of contamination and irradiation by the source	Gamma rays are absorbed by the lead walls of the box, very little gamma radiation will be able to penetrate the box walls and irradiate people/objects outside it. Keeping the source in a box reduces the risk that some of it will accidentally be passed onto an object/person, so the risk of contamination is reduced.

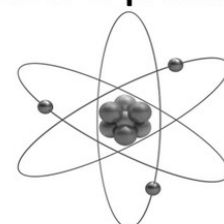
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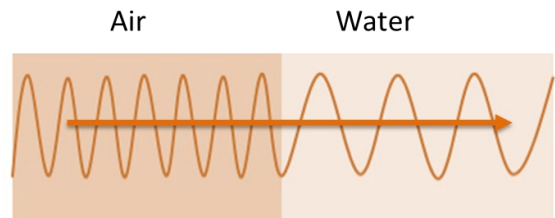
Pre 1911



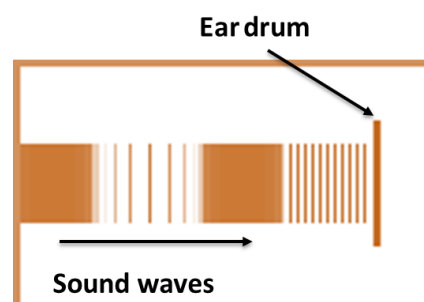
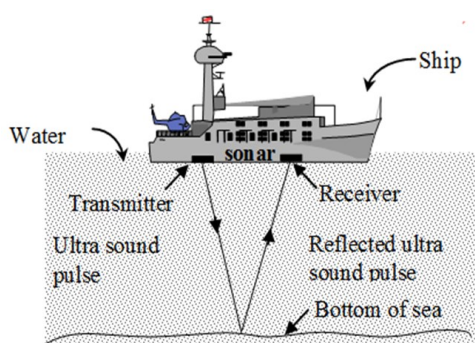
1911 to present



Waves



1. What does a wave transfer?	Energy
2. What is meant by a period of a wave?	The time taken to complete 1 full wave
3. In which type of wave are there compressions and rarefactions?	In longitudinal waves
4. Which of the following types of wave are longitudinal? Electromagnetic waves, water waves or sound waves?	Sound waves
5. How do the oscillations of a longitudinal wave differ from the oscillations of a transverse wave?	The oscillations of a longitudinal wave are parallel to the wave's direction of travel, whereas the oscillations of a transverse wave are at 90° to the wave's direction of travel
6. What is meant by the frequency of a wave? What are the units of frequency?	Frequency is the number of complete waves passing a certain point per second.
7. What happens to a wave's frequency if its period increases?	Its frequency will decrease (this is a result of the relationship 'frequency = 1 ÷ period')
8. Describe how the wavelength and frequency of electromagnetic waves change as the spectrum progresses from radio waves through to gamma waves.	Frequency increases and wavelength decreases.
9. What type of electromagnetic wave lies between visible light and X-rays on the electromagnetic spectrum?	Ultraviolet light
10. What is infrared radiation used for?	Heating, cooking, infrared cameras
11. True or false? Infrared radiation is made up of longitudinal waves?	False, all electromagnetic waves are transverse
12. Name 2 types of electromagnetic waves that are used in medical treatments.	Gamma rays and X Rays



Command Words:

Students should be able to explain what to do when asked to any of the following in an examination, choose 12 to quiz (remember to change the 12 each time)

If asked to	I will need to.....
Balance	Balance a chemical equation
Calculate	Use numbers given in the question to work out the answer
Choose	Select from a range of alternatives/options
Compare	Describe the similarities and/or differences between things, not just write about one.
Define	Specify/explain the meaning of something
Describe	Recall facts, events or processes in an accurate way
Design	Set out / explain how something will be done
Determine	Use given data or information to obtain an answer
Draw	To produce, or add to, a diagram
Estimate	Assign / give an approximate value
Evaluate	Use the information supplied as well as knowledge and understanding to consider evidence for and against when making a judgement
Explain	Make something clear , or state the reasons for something happening
Give	Give a short answer, not an explanation or a description
Identify	Name or otherwise characterise something
Justify	Use evidence from the information supplied to support an answer
Label	Provide appropriate names on a diagram
Measure	Find an item of data for a given quantity
Name	Only need to give a sort answer, not an explanation or description, could be answered with a single word
Plan	Write a method (remembering that methods are easy to follow, numbered or bullet pointed steps, outlining how to carry out a practical investigation)
Plot	Mark on a graph using data given
Predict	Give a plausible outcome
Show	Provide structured evidence to reach a conclusion
Sketch	Draw approximately
Suggest	Apply knowledge and understanding to a new situation
Use	Give an answer based on the information given in the question, if the information given in the question is not used no marks will be awarded
Write	Short answer required, not an explanation or a description.

