



Science Core Knowledge

Year 9

This booklet contains the core knowledge that we believe is the foundation of understanding for each of the topics taught in year 9.

Pupils are required to learn a selection of these questions each week for homework. Their teacher will then carry out regular quizzes to check pupil progress.

The first 10 questions in end of topic tests will always come directly from this booklet so that pupils who have applied themselves to revision will always be rewarded by predictable questions.

We suggest that pupils work with each other or with adults at home to memorise a few at a time in much the same way you may have prepared for spelling tests in the past.

To help prepare for the end of topic tests we have created a website that contains digital copies of these questions, the presentations that teachers use in their lessons, links to other websites, details of test dates and other things you may find useful.

bit.ly/aylshamscience

(You will need to type this in to the address bar exactly as is because the site is hidden from Google.)

We also sell CGP KS3 revision guides from room 10 at lunch or break time at a significantly reduced price.



We've uploaded sets of these core questions onto Quizlet too, so you can use the smartphone app or find the website on a computer. All you have to do is search for AHS_science under users and lookup the topic number and name and quiz yourself.

9.1 Genetics

	Question	Answer
1	Name three structures that you might find inside a plant cell but <i>not</i> inside an animal cell.	Cell wall, vacuole, chloroplast.
2	What is contained in the nucleus of a cell?	DNA
3	What is the function of the mitochondria in cells?	Releases energy. Where aerobic <u>respiration</u> occurs.
4	How do you calculate the actual length of a magnified image?	Actual length = magnified length ÷ magnification
5	In what way are sperm and eggs cells similar to each other but different to body cells?	Haploid nucleus. They contain half as many chromosomes as body cells.
6	Height, Weight, Arm span, hand span and length of foot are all what types of variation?	Continuous variation
7	Eye colour, shoe size, hair colour and gender are all what types of variation?	Discontinuous variation
8	What defines data for discontinuous variation?	The data can only take a limited set of values (e.g. colour, sex)
9	What causes genetic variation?	Sexual reproduction and mutation of DNA
10	What causes environmental variation?	Characteristics acquired from an organisms environment
11	What are DNA strands stored as in the nucleus?	Chromosomes
12	What are gametes?	Haploid <u>sex cells</u> (e.g. eggs ,sperm, pollen)
13	What is a gene?	A section of DNA with the <u>instructions</u> for making a <u>single protein</u> .
14	State an advantage of sexual reproduction	Genetic variation for greater adaptability
15	What is cloning?	Asexual reproduction that produces genetically identical cells
16	State the sex chromosomes contained within a male and a female body cell.	Male = xy. Female = xx.
17	What are alleles?	<u>Different versions of the same gene</u> (e.g. genes for hair are the same but one version may have instructions for red hair and another may have instructions for black hair)
18	What is a genotype?	The pair of alleles inside an organism that determine a characteristic (e.g. BB, Yy)
19	What is a phenotype?	What an organism looks like (as a result of its genotype)
20	When extracting DNA from fruit, what is the role of the detergent solution?	It breaks down the membranes around the cell and the nucleus.
21	What are the five key stages in Darwin's theory of evolution by natural selection?	<ol style="list-style-type: none"> 1. Genetic variation 2. Change causes competition 3. Natural selection (survival of the 'fittest') 4. Inheritance (successful genes are passed on) 5. Evolution (over many years)
22	When is a species considered to be extinct?	When there are no living organisms of that species left.

9.2 Health

	Question	Answer
1	State <i>at least</i> three functions of the skeleton?	Protection Support Movement Bone marrow produces blood cells
2	What are antagonistic muscles?	Muscles that work in pairs against each other. (When one muscle contracts the other relaxes e.g. bicep and tricep in your arm).
3	What type of joint is the elbow?	"Hinge" joints also e.g. knee
4	What type of joint is the shoulder?	A "ball and socket" joint also e.g. hip
5	Name <i>at least</i> 6 nutrients required for a balanced diet	Carbohydrates Fats and oils (lipids) Proteins Vitamins Minerals Water Fibre (not technically a nutrient)
6	What is a deficiency disease?	A disease caused by not having enough of a particular nutrient.
7	Name the four components of the blood	Red blood cells White blood cells Plasma Platelets
8	What is the function of red blood cells?	To transport oxygen
9	What is transported in plasma in the blood?	Transports dissolved substances around the body including glucose, hormones, water, urea, carbon dioxide
10	How are capillaries adapted to their function?	Very thin walls (only one cell thick) which allows for rapid diffusion of substances into and out of the blood.
11	Which side of the heart pumps oxygenated blood around the body?	The left side
12	What body measurements and calculations can be taken to measure overall health?	$BMI = \frac{Weight (kg)}{Height^2 (m)}$ Hip:waist ratio
13	What is cardiovascular disease?	Any disease affecting the heart or blood vessels, usually a build-up of fatty deposits inside the arteries.
14	What is respiration?	The process which the cells in your body use to release energy from food.
15	Write the word equation for aerobic respiration	glucose + oxygen → carbon dioxide + water (+ energy)
16	Write the word equation for anaerobic respiration	glucose → lactic acid
17	Which gas is a waste product of respiration?	Carbon Dioxide
18	How could you test a gas to see if it is carbon dioxide?	Collect the gas and bubble it through limewater. If the <u>limewater goes cloudy</u> the gas is carbon dioxide
19	Define diffusion	Substances moving from high to low concentration (down a concentration gradient).

20	How are gases exchanged in the lungs?	Oxygen diffuses from the alveoli into the blood. Carbon dioxide diffuses from the blood into the alveoli.
21	State at least 3 ways the alveoli are adapted for gas exchange	Large surface area to volume ratio Thin alveolus cell wall Thin capillary cell wall Lots of capillaries
22	What effects does exercise have on the heart rate and breathing rate? Why?	They <u>both increase</u> to <u>deliver oxygen for respiration</u> to the cells more quickly.
23	What is a drug?	Any chemical substance that affects the central nervous system.
24	What is this the definition of? "A physical or psychological dependence on a substance that means you need to keep taking it or suffer unpleasant withdrawal symptoms."	addiction?
25	Give 3 lifestyle factors and the non-communicable diseases they may cause.	Exercise and diet – obesity and malnutrition Alcohol – liver disease / cirrhosis Smoking – cardiovascular disease

9.3 Reactivity

	Word	Definition
1	What pH range do acids have?	1-6
2	What pH range do alkalis have?	8-14
3	What happens when we add an acid to an alkali?	They neutralise each other
4	What element do all acids contain?	Hydrogen
5	When an acid and an alkali react what are the products?	A salt and water
6	What type of salt does nitric acid produce?	Nitrates
7	What type of salt does sulfuric acid produce?	Sulfates
8	What type of salt does hydrochloric acid produce?	Chlorides
9	What is produced when we react a metal with oxygen?	A metal oxide
10	What is the gas in air required to produce a metal oxide	Oxygen
11	What is oxidation	Gaining oxygen
12	What is reduction	Losing oxygen
13	What is produced when a metal oxide reacts with an acid?	A salt and water
14	What is produced when a metal reacts with an acid?	A salt and hydrogen
15	What is the test for hydrogen	Lighting the gas produces a squeaky pop
16	Iron rusting is an example of...	Iron rusting
17	Give three ways to prevent oxidation	Use a less reactive metal Paint the metal Cover in oil Use a sacrificial anode
18	What is displacement?	Where the more reactive metal replaces a less reactive metal
19	What is the reactivity series?	A list of metals with the most reactive at the top and the least reactive at the bottom
20	What is an ore?	A rock with enough metal in to make it worth extracting
21	What is used to extract (reduce) iron from its ore?	Carbon (coke)
22	Why can't carbon be used to extract magnesium?	It is not reactive enough
23	What could be used to extract magnesium?	Electricity
24	What is the formula for calcium carbonate?	CaCO ₃

9.4 Fuels

1	What happens to the particles in a substance in a chemical reaction?	During a chemical reaction the atoms in the molecules rearrange to form new molecules, with new properties.
2	What happens to the particles in a substance in a physical reaction?	During a physical reaction no new chemicals are made but the way a chemical looks changes.
3	What is an endothermic reaction?	An endothermic reaction is a reaction that absorbs heat as it progresses. The <u>surroundings get colder.</u>
4	What is an exothermic reaction?	An exothermic reaction is a reaction that gives off heat as it progresses. The <u>surroundings get hotter.</u>
5	What is thermal decomposition?	Thermal decomposition occurs when a chemical decomposes (breaks down) when it is heat.
6	What is oxidation?	When a chemical combines with oxygen.
7	What is combustion?	When a fuel reacts with oxygen.
8	What is corrosion?	When a metal reacts with oxygen.
9	What is neutralisation?	When an acid and an alkali react to form a neutral solution.
10	What is crude oil?	Crude oil is an mixture of hydrocarbons.
11	What is a hydrocarbon?	A hydrocarbon is a chemical that is only made of carbon and hydrogen atoms.
12	What is an alkane?	<u>Alkanes</u> are hydrocarbons with only <u>single bonds.</u>
13	What is an alkene?	<u>Alkenes</u> are hydrocarbons where some carbons have <u>double bonds.</u>
14	What are conditions for the formation of crude oil?	The remains of microscopic organisms are buried and subjected to <u>heat and pressure over millions of years.</u>
15	How is crude oil processed to make it useful?	Crude oil is fractionally distilled.
16	What is cracking?	Cracking is the process that breaks large hydrocarbons into smaller more useful molecules
17	What are the products of fractional distillation used for?	The products of fractional distillation are used as fuels and as raw materials for other reactions.
18	What is a fuel?	A fuel is a substance that releases energy when it reacts with oxygen.
19	What is a polymer?	A polymer is a long chain molecule that is made by joining many monomers together.
20	How are polymers made?	Polymers are made by joining monomers together into long chains.

21	Describe polythene's structure	It is a polymer. It is a large molecule containing chains of carbon atoms surrounded by hydrogen.
22	What is the difference between a pure substance and a mixture?	A pure substance is made of just one thing whereas a mixture is made of more than one substance which are not chemically joined.
23	Is the breaking of bonds exothermic or endothermic?	Endothermic.
24	Is the making of bonds exothermic or endothermic?	Exothermic.
25	Why is a reaction exothermic?	In an exothermic reaction less heat energy is needed to break bonds than is given out when new bonds are made.
26	Why is a reaction endothermic?	In an endothermic reaction less energy is released in forming bonds in the products than is required in breaking bonds in the reactants.
27	What is meant by the term activation energy?	The energy needed for a reaction to start. This is equal to the energy needed to break all the reactants' bonds.
28	What does the reaction profile for an exothermic reaction look like?	<p>Energy</p> <p>reactants</p> <p>products</p> <p>Reaction path</p>
29	What does the reaction profile for an endothermic reaction look like?	<p>Energy</p> <p>reactants</p> <p>products</p> <p>Reaction path</p>

30	What is a hydrocarbon?	A hydrocarbon is a compound that contains hydrogen and carbon ONLY.
31	What is crude oil?	Crude oil is a complex mixture of hydrocarbons. Some of these hydrocarbons contain molecules in which carbon atoms are in chains and some where they are in rings. Crude oil is an important source of useful substances and a finite resource.
32	With respect to crude oil, what is a "fraction"?	A fraction is a simpler, more useful mixture of hydrocarbons with a similar boiling point, e.g. petrol or bitumen.
33	What is the name of the process used to separate crude oil into its fractions?	Fractional distillation.

9.5 Electricity

Number	Question	Answer
1	What is voltage?	A measure of the energy provided per electron in a circuit (the same as potential difference)
2	What is potential difference	A measure of the energy provided per electron in a circuit (the same as voltage)
3	Explain what electric current is	The rate of flow of charge/electrons
4	What is the unit of potential difference, and what device measures this in a circuit?	Volts, V; a voltmeter
5	State the unit of current and how it is measure in a circuit	Amps, A; using an ammeter
6	Describe direct current	Electrons flow in one continuous direction
7	How is an ammeter placed in a circuit?	In series
8	How is a voltmeter placed in a circuit?	<u>Parallel</u> across a component
9	Describe what happens to the current as it flows around a series circuit	The current <u>stays the same</u> as it flows around a series circuit
10	What happens to the potential difference in a series circuit when you add more components?	The potential difference <u>decreases</u> as you add more components to a series circuit
11	Describe what happens to current in a parallel circuit	The current splits and recombines at junctions but the total current stays the same.
12	What happens to the potential difference in a parallel circuit at each branch?	<u>The potential difference in each branch is the same</u> as the potential difference provided by the battery or cell
13	What happens to the current if you increase the potential difference (voltage) of a power pack/battery	The current increases
14	If you increase the resistance in a circuit, what happens to the current?	It decreases.
15	What is the unit for resistance?	Ohms (Ω)
16	Explain what causes electrical resistance in a wire	<u>Electrons collide</u> with <u>metal ions</u> inside the wire
17	Recall the equation for calculating potential difference using resistance	Potential difference = current x resistance
18	Explain what happens to resistance as the wire becomes hotter	As the wire becomes <u>hotter</u> , the metal ions <u>vibrate more</u> . This causes an <u>increase of collisions with the flowing electrons</u> , and decreases the rate of electron flow. This is a decrease in current.
19	State three factors which can affect resistance	Length of wire, thickness of wire, type of metal, temperature of wire.

20	What unit do we measure power in?	Watts (W)
21	How can you calculate power using the energy transferred in an object and the time it is used for?	Power = Energy transferred/time taken $P = E / t$
22	How can you calculate power using current and voltage?	Power = Current x voltage $P = I \times V$
23	Describe how to induce a current in a wire	By moving a wire in a magnetic field, or by moving a magnet in and out of a coil of wire
25	Describe alternating current	Electrons vibrate back and forth many times a second
26	What does a transformer do?	Changes the potential difference of an AC electricity supply
27	Describe the energy transfer in an <i>efficient</i> machine	There is <u>little waste energy</u> (the output energy is a similar magnitude to the input energy)
28	Name at least 5 renewable power sources.	<ol style="list-style-type: none"> 1. Solar power 2. Wind turbines 3. Hydro-electricity 4. Tidal power 5. Bio-fuel/biomass 6. Geothermal power
29	State 2 non-renewable energy sources.	<ol style="list-style-type: none"> 1. Fossil fuels (oil, natural gas and coal) 2. Nuclear power

9.6 Energy and Energy Transfer

Number	Question	Answer
1	What are forces, like weight, measured in?	Newtons (N).
2	What is the standard unit for mass?	kilograms (kg)
3	How would the mass of an object be different on the Moon compared to on Earth?	<u>It wouldn't be.</u> The mass of an object is the same wherever it is in the universe
4	What variables affect how strong the force of gravity is between two objects?	<u>Distance</u> (between the objects) and <u>mass</u> (of the objects)
5	How is weight calculated?	Weight (N) = Mass (kg) x g (N/kg)
6	What is the standard unit for distance?	Metres (m)
7	Recall the equation for work done	Work done (J) = Force (N) x Distance moved in direction of resultant force (m)
8	What is the unit for work done?	Joules
9	Recall the equation for calculating linear elastic distortion	Force (N) = spring constant (N/m) x extension (m)
10	What is the point called where a stretched material permanently deforms?	The elastic limit.
11	What is the extra left-over force called in an unbalanced situation?	Resultant force
12	How do you calculate the resultant force?	<ul style="list-style-type: none"> • Forces acting in the same direction are added together • Forces acting in the opposite direction are subtracted
13	(Resultant) Forces acting on an object can change the object's...?	<ul style="list-style-type: none"> • speed • direction • shape
14	Describe the movement of the particles in a solid.	The particles are only <u>vibrating</u> but <u>not moving past each other</u>)
15	How can you calculate pressure?	Pressure = Force/Area
16	What are the standard units for pressure?	Pascal (Pa) 1Pa = 1N/m ²
17	Describe the movement of the particles in a liquid.	<u>can move past</u> each other in close contact
18	What happens to pressure as you go deeper down into a liquid?	It increases.
19	Describe a situation where pressure in liquids is useful.	Hydraulic systems (e.g. brakes in a car)
20	In a sealed container filled with gas what happens to the pressure when the temperature is increased? Why?	Pressure <u>increases</u> . There are <u>more collisions per second</u> of the gas <u>with the walls</u> of the container and <u>collisions have more force</u> .
21	What happens if the pressure inside a sealed containers is suddenly larger than the pressure outside?	The container could <u>explode</u>
22	What happens if the pressure inside a sealed container is suddenly smaller than the pressure outside?	The container could <u>implode</u>
23	If a seesaw is balanced what must be true about the moments involved?	The clockwise and anticlockwise moments must be equal.
24	How do you calculate the moment or turning force?	Moment = Force x distance from pivot.
25	What unit is used for moments?	Nm or Ncm