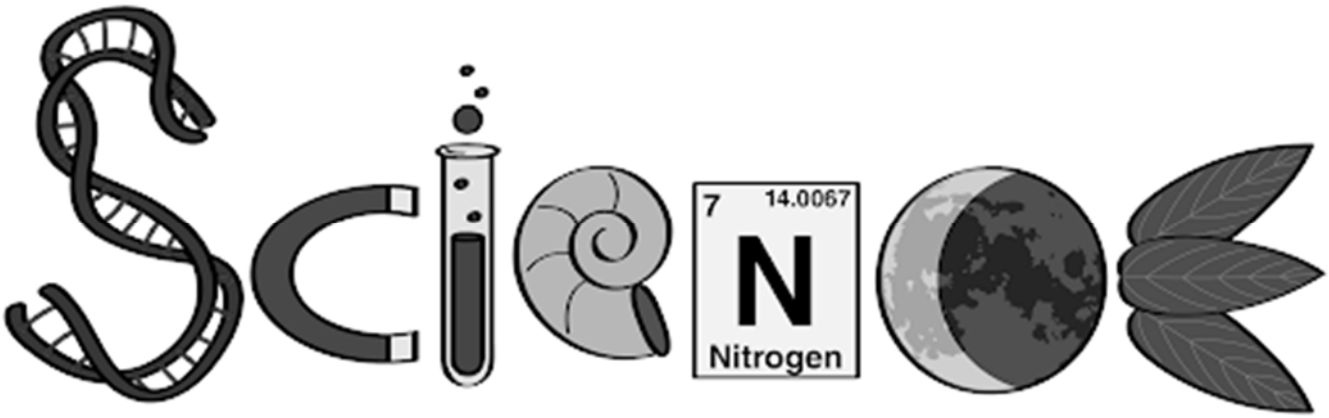
Year 9 Science

Core Knowledge Questions

Year 9 Internal exams



9B1 Cells and Body Systems Core Knowledge

9B2 Respiration

9B3 Genetics

9C1 Atoms and the Periodic Table Core Questions

9C2 Particle Theory Core Questions

9C3 Chemical Reactions

9P1 Forces

9P2 Motion

9P3 Energy

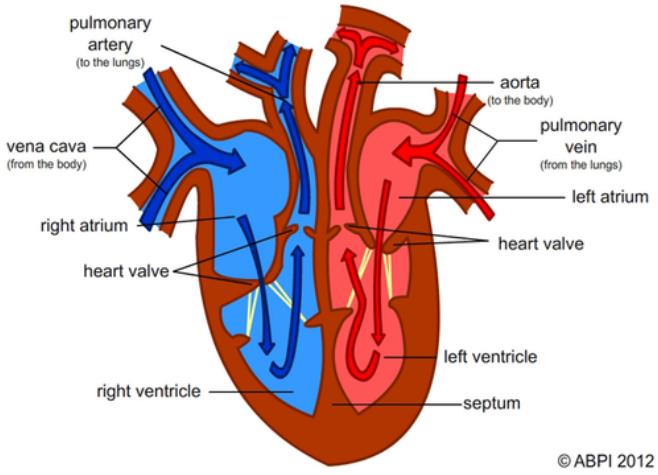
Name	
Class	
Teacher/s	

9B1 Cells and Body Systems Core Knowledge

	Question	Answer

1	What is an enzyme?	A protein made in cells to help a chemical reaction to happen.
2	What is absorption?	When small food molecules pass from the digestive system into the blood **via diffusion**
3	Whereabouts in the digestive system does absorption happen?	The small intestine
4	Give **two** features that allow for efficient diffusion in the small intestine	• **wrinkled surface gives large surface area** • **Villi increase the surface area** • **Many capillaries** supplying blood • The walls of the villi are **one cell thick** • The cells lining the villi have **microvilli**
5	What do we call diseases that cannot be passed from person to person e.g. are caused by genes or lifestyle?	Non-communicable
6	What are some of the consequences of not getting a balanced diet?	Starvation, obesity and deficiency diseases.
7	Name some examples of lifestyle diseases	Cardiovascular disease, lung cancer, liver disease, type 2 diabetes, obesity
8	Give two ways that we can measure obesity	BMI and waist:hip ratio
9	What is the formula for calculating BMI (body mass index)?	BMI = mass/height^2
10	What is the formula for calculating waist:hip ratio?	Waist:hip ratio = waist measurement/hip measurement
11	Give two ways that we can easily represent really big measurements or really small measurements	Metric prefixes and standard form
12	What do we call diseases that are passed from person to person because they are caused by a pathogen?	communicable
13	What is a microorganism?	A living thing too small to see without a microscope
14	What are the three types of microorganism?	Bacteria, viruses and fungi
15	How can we calculate the actual size of a microorganism under the microscope?	Actual size = image size/magnification
16	Give three examples of diseases caused by microorganisms	Tuberculosis (bacteria), chalara ash dieback (fungus), ebola (virus)
17	What do we call a microorganism that causes a disease?	Pathogen
18	What are the human body's physical and chemical barriers to infection?	Mucus, cilia, skin, lysozyme in tears and hydrochloric acid in stomach
19	Which body system responds to infection and fights disease?	The immune system
20	Name the white blood cells that produce antibodies and recognise pathogens.	Lymphocytes
21	How can we safely become immune to a disease without becoming infected by the pathogen that causes it?	By immunisation with a vaccine

9B2: Respiration

	Question	Answer
1	Define respiration	a chemical reaction that happens in all living cells, including plant cells and animal cells. It is the way that energy is released from glucose so that all the other chemical processes needed for life can happen
2	State the word equation for respiration	glucose + oxygen → Carbon dioxide + water + energy
3	What is the organelle in which respiration occurs?	Mitochondria
4	What is the difference between ventilation and respiration?	Ventilation is the movement of gases into and out of the lungs. Respiration is the way we release energy in cells
5	What is diffusion?	**Diffusion** is the movement of a substance from an area of high concentration to an area of low concentration. **Diffusion** happens in liquids and gases because their particles move randomly from place to place
6	Why does oxygen diffuse across the lining of the alveoli and into the blood?	The concentration of oxygen is lower in the blood supply in the lungs than it is in the alveoli. Because of this the oxygen moves across the membrane into the blood.
7	What is the pathway of blood through the heart?	In from body-> right atrium -> right ventricle -> out to the lungs -> left atrium -> left ventricle -> out to the body
8	Why is the muscle of the heart thicker on the left side?	Blood leaving the left side of the heart has to be pressurised enough to push the blood around the body
9	Label the diagram of the heart	
10	Why does heart rate increase during exercise?	During exercise there is a greater rate of respiration in our cells. The heart has to beat faster to carry more oxygen to the cells.
11	Why do we breathe faster during exercise?	During exercise there is a greater rate of respiration in our cells. We use the oxygen in our blood more quickly and this needs to be replaced so our muscles can carry on working. Breathing faster moves more oxygen into our lungs.
12	What is an oxygen debt?	Anaerobic respiration occurs when there is no oxygen available and so produces an ***oxygen debt***. Increased levels of oxygen are required to break down the lactic acid formed.

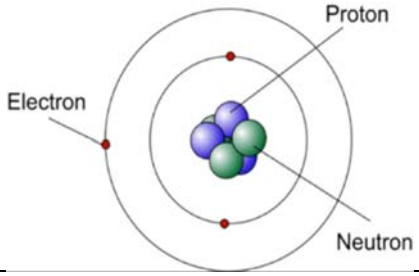
9B3

9B3	Question	Answer

1	How do you calculate the actual length of a magnified image?	Actual length = magnified length ÷ magnification
2	What are DNA strands stored as in the nucleus?	Chromosomes
3	What is a gene?	A section of DNA with the instructions for making a single protein.
4	Name the four scientists that discovered the structure of DNA.	Watson, Crick, Franklin and Wilkins.
5	Describe the structure of DNA.	DNA has 2 strands coiled up to form a double helix; with complimentary base pairs A-T & G-C that are held together by hydrogen bonds.
6	When extracting DNA from fruit, what is the role of the detergent solution?	It breaks down the membranes around the cell and the nucleus.
7	What is asexual reproduction?	Asexual reproduction only involves one parent so there is no joining of sex cells during fertilisation.
8	Define mitosis.	A type of cell division which produces two identical diploid body cells for growth and repair.
9	What are gametes?	Haploid sex cells (e.g. eggs ,sperm, pollen).
10	Define meiosis.	The type of cell division that produces four haploid non-identical sex cells or gametes. There are two rounds of cell division.
11	What is variation?	All individuals in a population differ slightly from one another.
12	Name two reasons for variation within a species.	Genetic variation and Environmental variation.
13	What causes genetic variation?	Sexual reproduction and mutation of DNA.
14	What causes environmental variation?	Characteristics acquired from an organisms environment.
15	Name a feature of humans that shows continuous variation.	Height, Weight, Arm span, hand span, length of foot.
16	Name a feature of humans that shows discontinuous variation.	Eye colour, shoe size, hair colour, gender.
17	What defines data for discontinuous variation?	The data can only take a limited set of values (e.g. colour, sex)
18	What is a phenotype?	What an organism looks like (as a result of its genotype).
19	What are alleles?	Different versions of the same gene (e.g. genes for hair are the same but one version may have

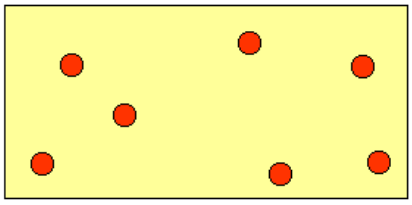
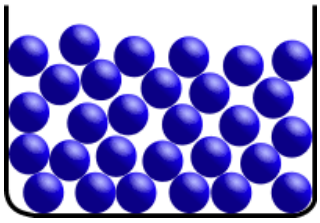
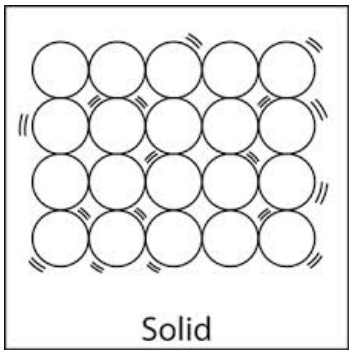
		instructions for red hair and another may have instructions for black hair).
20	What is a genotype?	The pair of alleles inside an organism that determine a characteristic (e.g. BB, Yy).
21	State the sex chromosomes contained within a male and a female body cell.	Male = XY. Female = XX.
22	What is a dominant allele?	A **dominant allele** is and allele that is always expressed, even if the individual only has one copy of it.
23	Define a recessive allele.	A **recessive allele** is only expressed if the individual has two copies of it and does not have the dominant allele of that gene.
24	What are the five key stages in Darwin's theory of evolution by natural selection?	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)
25	When is a species considered to be extinct?	When there are no living organisms of that species left.
26	Why do some living things become extinct?	The organism fails to adapt to rapid changes in its environment.

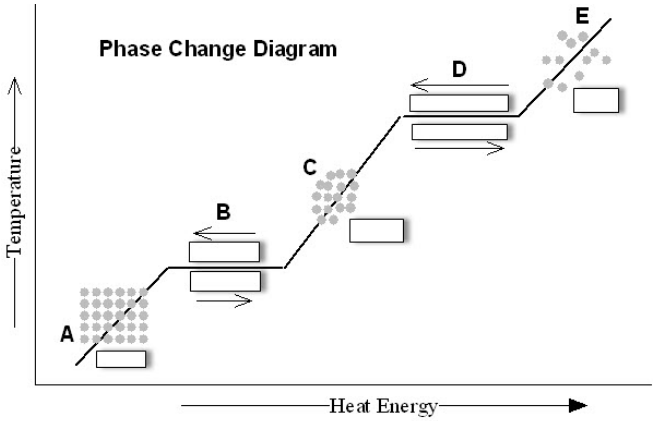
9C1 Atoms and the Periodic Table Core Questions

	Question	Answer
1	What is an atom?	The smallest part of an element, atoms are the building blocks of molecules
2	What is a compound?	A chemical substance that is made from two more different types of atom or elements.
3	What is an element?	An element is a substance that is made up of only one type of atom.
4	What is a molecule?	A molecule is a group of atoms that have been chemically joined together.
5	What is a particle?	A very small part of a substance, it is sometimes used instead of the word molecule.
6	What is the Bohr model of the atom?	
7	What are the sub atomic particles and what are their charges?	Neutron- neutral, proton +1 electron -1
8	Why does an atom have a neutral charge?	Because the number of electrons and protons are equal so the charges balance.
9	Give the formulae for oxygen, carbon dioxide and water	O_2 CO_2 H_2O
10	What is a diatomic molecule?	A molecule that consists of two atoms, often the same.
11	Define the atomic number	The number of protons in an atom
12	Define the mass number	The combined number of protons and neutrons
13	What is the maximum number of electrons in the first energy level?	2
14	What is the maximum number of electrons in the second energy level?	8
15	What is the maximum number of electrons in the third energy level?	8
16	How are group numbers and electrons related?	The group number is the number of electrons in the outer energy level
17	How are period and electrons related?	The period number is the number of energy levels
18	Why are group 1 metals so reactive?	They only have one electron on their outermost shell, which makes them very unstable and very reactive with other substances

19	What happens to the reactivity of group 1 metals as you go down the group?	The reactivity increases as you go down group 1
20	Describe how an ion is formed	An atom will lose or gain an electron to become more stable
21	State the number of ions formed for groups 1, 2, 3 ,5, 6 and 76 on the periodic table	Group 1 +1 Group 2 +2 Group 3 +3 Group 5 -3 Group 6 -2 Group 7 -1

9C2 Particle Theory Core Questions

	Question	Answer
1	What is kinetic energy?	The energy of movement.
2	How are the particles arranged in a gas?	They are very far apart, moving very fast, they have lots of energy and are arranged randomly. 
3	How are the particles arranged in a liquid?	They are close together and touching, they can move past one another and are arranged in an irregular fashion. 
4	How are the particles arranged in a solid?	They are close together and touching, they cannot move past one another and are arranged in a regular orderly fashion. 

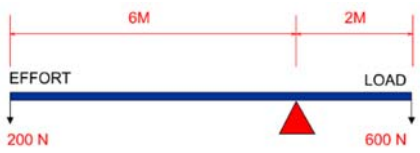
5	What are the three states of matter	Solids, liquids and gases
6	Use a simple kinetic theory model to explain solids in terms of movement and arrangement of particles	• Particles vibrate • Forces of attraction between particles are strong • Which is why particles do not flow • Solids keep their shape • Solids cannot be compressed
7	Use a simple kinetic theory model to explain liquids in terms of movement and arrangement of particles	• Particles flow • Particles have moderate forces of attraction • Liquids take shape of container • Liquids flow • Liquids cannot be compressed
8	Use a simple kinetic theory model to explain gases in terms of movement and arrangement of particles	• Particles move fast • Particles are far apart • Gases expand to fill container • Gases can be compressed
9	Label A-E 	A – Solid B – Melting/Freezing C – Liquid D – Evaporating/Condensing E – Gas
10	What happens to the number of particles during a state change?	They stay the same (mass is always conserved)
11	How is energy stored in substances when they get hotter?	As temperature of the substances increases They store the thermal energy by transferring it into kinetic energy in the particles The particles vibrate more
12	What does a subsstances melting point represent?	The temperature it will change from a solid to a liquid
13	What does a substances boiling point represent?	The temperature it will change from a liquid to a gas

9C3

Question	Answer
What is an ion?	An atom with a net electric charge.
What is an acid?	A substance that produces hydrogen ions when dissolved in water.
What is an alkali?	A substance that produces hydroxide ions when dissolved in water.
What does Solvent mean?	A substance that can dissolve a solute to form a solution.
What does soluble mean?	Can dissolve in a solvent to form a solution
What is a solution?	A mixture of one or more solutes dissolved in a solvent.
What is the rate of a reaction?	How quickly reactants are used up or products are made
What is the equation for calculating the mean rate of reaction?	Mean rate = change in quantity of product or reactant / Time taken
What is the unit for rate of reaction in a reaction involving a change in mass?	g/s
What is the unit for rate of reaction in a reaction involving a change in volume?	cm^3/s
What is the activation energy?	The minimum amount of energy colliding particles have to have before a reaction will take place
What effect does increasing concentration have on the rate of reaction?	Increases
Why does increasing concentration have this effect?	More reactant particles in the same volume lead to more frequent collisions
What effect does increasing pressure have on the rate of reaction?	Increases
Why does increasing pressure have this effect?	Less space between the particles means more frequent collisions
What effect does increasing surface area have on the rate of reaction?	Increases
Why does increasing surface area have this effect?	More reactant particles are exposed and able to collide, leading to more frequent collisions

What effect does increasing temperature have on the rate of reaction?	Increases
Why does increasing temperature have this effect?	Particles move faster, leading to more frequent collisions. Particles have the same activation energy, so more collisions result in a reaction.
What is a catalyst?	A substance that increases the rate of reaction but is not used up in the reaction
How do catalysts increase the rate of reaction?	They lower the activation energy of the reaction, so more collisions result in a reaction.

9P1 Forces

	Question	Answer
1	State the units of force.	Newtons
2	If a system of motion is in equilibrium what can be said of the forces.	They are balanced
3	What effects does an unbalanced for have on motion of an object?	It will accelerate
4	What is the name given to a turning force?	A moment
5	How are moments calculated?	Force x Perpendicular distance
6	What is a pivot?	The point around which something turns
7	What instrument can be used to measure force?	Newton meter
8	What is the unit for moments?	Nm
9	How can the motion of an object be describes if the forces acting upon it are balanced?	It will either be at rest or moving at a constant speed.
10	Calculate the net moment in this example? 	0 Nm

9P2 Motion

	Core question	**Answer**
1	How do you use a distance-time graph to find the speed of an object?	In a distance-time graph, the gradient of the line is equal to the speed of the object.
2	How do you find the gradient of a line?	Select two points on the line and calculate the change in distance and change in time between two points. Use the formula Gradient= rise/run (speed = distance/time)
3	How do you compare the speed of two objects using a distance-time graph?	The greater the gradient (and the steeper the line) the faster the object is moving. The object with a shallower gradient is moving more slowly.
4	What does a curved line on a distance-time graph mean?	It means that the object's speed is changing. This is called acceleration or deceleration.
5	What is a free body diagram?	A diagram that shows the forces acting on an object
8	What happens if the resultant force on an object is zero?	• a stationary object stays stationary • a moving object continues to move at the same velocity (at the same speed and in the same direction)
9	What is Newton's first law of motion?	An object remains in the same state of motion unless a resultant force acts on it.

9P3 Energy

Core Question	Answer
State the unit of energy	Joules
Name 9 forms of energy	Kinetic, Heat, Light, Gravitational Potential, Chemical, Sound, Electrical, Elastic Potential, Nuclear
How can heat energy be transferred?	Through conduction, convection and radiation.
What is meant by a system?	An object or group of object that have a common function/purpose.
State Hooke's law	Extension of an elastic material is directly proportional to the load applied.
What is meant by elastic deformation?	A material/object will return to its original shape after experiencing a force that causes its shape to change.
What is meant by plastic deformation?	A material/object will not return to its original shape after experiencing a force that causes its shape to change.
What is conduction?	The transfer of energy between particles through collisions.
What is convection?	The transfer of energy through the movement of substance due to differences in density.
What is radiation?	The transfer of energy in the form of electromagnetic waves.
Define Emission	
Define Absorption	
Which surfaces are the best absorbers/emitters of infrared radiation?	Dark and matt
Which surfaces are the worst absorbers/emitters of infrared radiation?	Light and shiny