

GCSE Science homework - triple

Year 10 terms 3 & 4



The following tasks must be completed by the dates indicated:

Due date	Task
Friday 19 th January 2024	C2 Bonding
Friday 26 th January 2024	B2 The Challenges of Size
Friday 2 nd February 2024	C2 – Giant Covalent Structures
Friday 9 th February 2024	P2 Distance-Time vs Velocity-Time Graphs
Friday 23 rd February 2024	P2 Newton's Laws
Friday 1 st March 2024	P2 Forces in Action
Friday 8 th March 2024	B3 The Nervous System
Friday 15 th March 2024	B3 Hormones
Friday 22 nd March 2024	B3 Menstrual Cycle
Friday 12 th April 2024	Introducing Chemical Reactions

Due date:	Friday 19 th January 2024
Student number:	
Name:	



Y10 Triple T3 W2 – C2 Bonding

Question	Answer
What are the properties of metals?	Metals are malleable, ductile and good conductors of electricity and heat. Metals usually have high boiling points.
What are properties of non-metals?	Non-metals are brittle and poor conductors of heat and electricity.
What does the group and period number of an element tell you?	group number: number of electrons in the outer shell of an atom period number: number of electron shells in each atom
What is the maximum number of electrons that can be held in each electron shell?	Two electrons in the first shell. Eight electrons in the second and third shells.
What is an ion?	An atom which has lost or gained electrons to become charged.
What atoms will bond ionically?	Metals and non-metals.
How does ionic bonding occur?	Electrons are transferred from the metal to the non-metal. The metal forms a positive ion and the non-metal forms a negative ion which attract together due to strong electrostatic forces.
What atoms will bond covalently?	Non-metals
How does covalent bonding occur?	Electrons are shared between the atoms to form a full outer shell of electrons.
What is metallic bonding?	The strong electrostatic attraction between positive metal ions and a sea of delocalised electrons.

Look, Cover, Write, Check

Question	Answer
What does the group and period number of an element tell you?	
What is an ion?	
What atoms will bond ionically?	
What are properties of non-metals?	
How does ionic bonding occur?	
What are the properties of metals?	
How does covalent bonding occur?	
What is the maximum number of electrons that can be held in each electron shell?	
What atoms will bond ionically?	
What is metallic bonding?	

Look, Cover, Write, Check

Question	Answer
	Electrons are shared between the atoms to form a full outer shell of electrons.
What are properties of non-metals?	
What atoms will bond ionically?	
	The strong electrostatic attraction between positive metal ions and a sea of delocalised electrons.
What does the group and period number of an element tell you?	
	Electrons are transferred from the metal to the non-metal. The metal forms a positive ion and the non-metal forms a negative ion which attract together due to strong electrostatic forces.
	Two electrons in the first shell. Eight electrons in the second and third shells.
What atoms will bond covalently?	
	An atom which has lost or gained electrons to become charged.
What are the properties of metals?	

1. Which statement describes **ionic** bonding?

- A Electrons are delocalised.
- B Electrons are shared between atoms.
- C Electrons are transferred from a metal to a non-metal.
- D Electrons are transferred from a non-metal to a metal.

Your answer

☐

[1]

2. Which statement about covalent bonding is **not** correct?

- A Covalent bonds are broken when a compound changes state from a liquid to a gas.
- B Covalent bonds are strong.
- C Covalent bonds can be found in both simple compounds and giant structures.
- D Covalent bonds share electrons between atoms.

Your answer

☐

[1]

3. Which statement about the bonding in magnesium oxide is correct?

- A There are strong covalent bonds between atoms.
- B There are strong covalent bonds between ions.
- C There are strong electrostatic forces between atoms.
- D There are strong electrostatic forces between ions.

Your answer

☐

[1]

Due date:	Friday 26 th January 2024
Student number:	
Name:	



Y10 Triple T3 W3 – B2 The Challenges of Size

Question	Answer
What type of circulatory system do humans have?	Humans have a double circulatory system.
Name the four chambers in the heart	Left atrium, right atrium, left ventricle, right ventricle.
Name the three types of blood vessel	Veins, arteries and capillaries.
Name the four components of blood	Red blood cells, white blood cells, plasma and platelets.
What is the phloem?	The phloem is a transport vessel in plants made of living cells that transports sugars around the plant.
What is translocation?	The movement of sugars around a plant.
What is the xylem?	The xylem is a transport vessel in plants made up of dead cells that transport water and minerals around the plant.
What is transpiration?	The movement of water around a plant from the roots to the leaves.
What factors can affect transpiration?	Light intensity, air movement, humidity and temperature.
What is a potometer used for?	A potometer is used to measure the rate of transpiration.

Look, Cover, Write, Check

Question	Answer
What is translocation?	
What factors can affect transpiration?	
What is the xylem?	
What is a potometer used for?	
What type of circulatory system do humans have?	
Name the four components of blood.	
What is transpiration?	
Name the four chambers in the heart.	
Name the three types of blood vessel	
What is the phloem?	

Look, Cover, Write, Check

Question	Answer
What type of circulatory system do humans have?	
	Left atrium, right atrium, left ventricle, right ventricle.
	Veins, arteries and capillaries.
Name the four components of blood.	
	The phloem is a transport vessel in plants made of living cells that transports sugars around the plant.
What is translocation?	
What is the xylem?	
	The movement of water around a plant from the roots to the leaves.
	Light intensity, air movement, humidity and temperature.
What is a potometer used for?	

1. Sieve plates are structures found in plants. What is their location and function?

- A Found in phloem and allow movement of sucrose
- B Found in phloem and allow movement of water
- C Found in xylem and allow movement of sucrose
- D Found in xylem and allow movement of water

Your answer

[1]

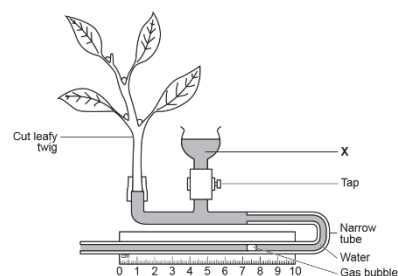
2. The diagram shows a potometer.

What is the purpose of the water in X?

- A To provide water for the leafy twig.
- B To reset the gas bubble to the start of the scale.
- C To remove the gas bubble from the narrow tube.
- D To measure the volume of water lost in transpiration.

Your answer

[1]



Due date:	Friday 2 nd February 2024
Student number:	
Name:	



Y10 Triple T3 W4 – C2 – Giant Covalent Structures

Question	Answer
Define a 'covalent bond'.	A shared pair of electrons between 2 non-metal atoms.
Give an example of a giant covalent structure.	Diamond, graphite and silicon dioxide.
Why do giant covalent structures have a high melting and boiling point?	They have lots of strong covalent bonds, therefore lots of energy is required to break these covalent bonds.
Define 'allotrope'	Different structural forms of the same element in the same physical state.
Name 2 allotropes of carbon.	Diamond and graphite.
State some properties of graphite.	Soft and slippery; good conductor of heat and electricity; high melting and boiling point.
State some uses of graphite	Pencils; lubricant; electrodes in batteries and electrolysis.
Describe the bonding in graphite.	Each carbon atom is covalently bonded to 3 other carbon atoms, forming hexagons.
State some properties of diamond.	Very hard; shiny; does not conduct heat or electricity; high melting and boiling point.
State some uses of diamond	Jewellery; cutting tools.
Describe the bonding in diamond.	Each carbon atom is covalently bonded to 4 other carbon atoms.

Look, Cover, Write, Check

Question	Answer
Define an 'allotrope'	
Name 2 allotropes of carbon.	
Give an example of a giant covalent structure.	
Define a 'covalent bond'.	
Why do giant covalent structures have a high melting and boiling point?	
State some properties of graphite.	
State some properties of diamond.	
Describe the bonding in graphite.	
Describe the bonding in graphite.	
State some uses of graphite.	
State some uses of diamond	

Look, Cover, Write, Check

Question	Answer
	A shared pair of electrons between 2 non-metal atoms.
Give an example of a giant covalent structure.	
Why do giant covalent structures have a high melting and boiling point?	
	Different structural forms of the same element in the same physical state.
Name 2 allotropes of carbon.	
	Soft and slippery; good conductor of heat and electricity; high melting and boiling point.
State some uses of graphite.	
Describe the bonding in graphite.	
	Very hard; shiny; does not conduct heat or electricity; high melting and boiling point
State some uses of diamond	
Describe the bonding in diamond.	

1. Which particles in a metal allow it to **conduct electricity**?

- A Atoms
- B Electrons
- C Ions
- D Protons

Your answer

[1]

2. Graphite is used in pencils. Why can graphite make marks on paper?

- A All the bonds in graphite are weak.
- B Atoms in graphite are in layers.
- C Forces between layers in graphite are strong.
- D Every atom in graphite is strongly bonded to four others.

Your answer

[1]

3. Look at the information about four different substances, **A**, **B**, **C** and **D**.

Substance	Melting point (°C)	Conducts electricity?
A	-30	no
B	3550	no
C	1660	yes
D	124	no


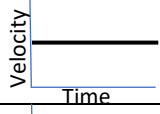
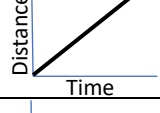
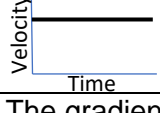
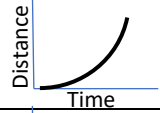
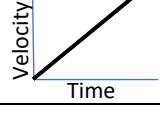
Which substance is **diamond**?

Your answer

[1]

Due date:	Friday 9 th February 2024
Student number:	
Name:	

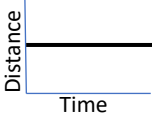

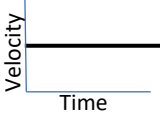
Y10 Triple T3 W5 – P2 Distance-Time vs Velocity-Time Graphs

Question	Answer
Define 'stationary'	Not moving (still).
Define 'acceleration'	Velocity increasing.
Sketch a distance-time graph for an object that is stationary .	
Sketch a velocity-time graph for an object that is stationary .	
Sketch a distance-time graph for an object travelling at a constant speed .	
Sketch a velocity-time graph for an object travelling at a constant speed .	
How is speed calculated from a distance-time graph?	The gradient (steepness) of the line.
Sketch a distance-time graph for an object that is accelerating .	
Sketch a velocity-time graph for an object that is accelerating .	

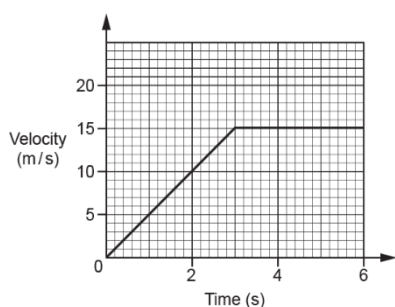
Look, Cover, Write, Check

Question	Answer
Define 'stationary'	
Sketch a velocity-time graph for an object that is stationary .	
Sketch a distance-time graph for an object that is stationary .	
Define 'acceleration'	
How is speed calculated from a distance-time graph?	
Sketch a velocity-time graph for an object that is accelerating .	
Sketch a distance-time graph for an object that is accelerating .	
Sketch a velocity-time graph for an object travelling at a constant speed .	
Sketch a distance-time graph for an object travelling at a constant speed .	

Look, Cover, Write, Check

Question	Answer
	Not moving (still).
Sketch a velocity-time graph for an object that is stationary .	
	
	Increase in velocity.
How is speed calculated from a distance-time graph?	
	
Sketch a distance-time graph for an object that is accelerating .	
	
Sketch a distance-time graph for an object travelling at a constant speed .	

1. Look at the graph below.



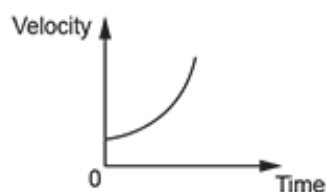
Which of the following is the distance travelled between 0 and 6 seconds?

- A 22.5 m
- B 45.0 m
- C 67.5 m
- D 90.0 m

Your answer

[1]

2. This is a velocity-time graph for an object.



Your answer

[1]

Which statement describes the motion of the object?

- A The object has a constant acceleration.
- B The object is accelerating at a decreasing rate.
- C The object is accelerating at an increasing rate.
- D The object is decelerating.

Due date:	Friday 23 rd February 2024
Student number:	
Name:	

W1 – P2 Newton's Laws

Question	Answer
What is Newton's first law?	An object remains in the same state of motion unless a resultant force acts on it.
What state of motions would an object have if the resultant force is zero?	Stationary or moving at a constant velocity
What is Newton's second law?	Force = mass x acceleration
What is Newton's third law?	When objects interact, they exert equal and opposite forces on each other.
What are contact forces?	Forces exerted between two objects when they are touching.
What are non-contact forces?	The push or pull between objects that are not physically touching when they interact.
What are the force pairs that occur when pushing a pram?	The person pushes the pram forwards, the pram pushes the person backwards.
What are the force pairs that occur between a satellite in orbit and the Earth?	The Earth pulls the satellite, and the satellite pulls the Earth.
What forces are acting on a skydiver?	Weight and air resistance
What is terminal velocity?	The maximum speed of an object, reached when the forces moving the object are balanced by frictional forces.

Look, Cover, Write, Check

Question	Answer
What are contact forces?	
What are non-contact forces?	
What is Newton's second law?	
What are the force pairs that occur when pushing a pram?	
What is Newton's third law?	
What forces are acting on a skydiver?	
What is terminal velocity?	
What is Newton's first law?	
What are the force pairs that occur between a satellite in orbit and the Earth?	
What state of motions would an object have if the resultant force is zero?	

Look, Cover, Write, Check

Question	Answer
	An object remains in the same state of motion unless a resultant force acts on it.
What state of motions would an object have if the resultant force is zero?	
	Force = mass x acceleration
	When objects interact, they exert equal and opposite forces on each other.
What are contact forces?	
What are non-contact forces?	
	The person pushes the pram forwards, the pram pushes the person backwards.
What are the force pairs that occur between a satellite in orbit and the Earth?	
	Weight and air resistance
	The maximum speed of an object, reached when the forces moving the object are balanced by frictional forces.

1. Two skaters are standing, at rest, opposite each other on an ice rink. Skater **A** has a mass of 40 kg and skater **B** has a mass of 50 kg.



Skater **A** pushes against skater **B** with a force of 30 N.

- i. What does Newton's third law tell us about the force that skater **A** experiences from skater **B**?

[2]

- ii. Calculate the acceleration of skater **B** when they are pushed with the force of 30 N.

Use the equation: force = mass x acceleration

Acceleration = m/s² [3]

Due date:	Friday 1 st March 2024
Student number:	

Name: _____

Y10 Triple T4 W2 - P2 Forces in Action

Question	Answer
What is momentum?	The product of mass and velocity
How is momentum calculated?	momentum = mass x velocity
What is work done?	A measure of how much energy is transferred when an object is moved.
How is work done calculated?	work done = force x distance
What is power?	The rate at which energy is transferred or work is done.
What is weight (also known as gravity force)?	The force acting on an object due to the pull of gravity from a massive object like a planet.
How is moment (turning effect force) calculated?	Moment = Force x perpendicular distance from the pivot
What is gravitational field strength on Earth?	10 N/kg
How is gravitational potential energy (GPE) calculated?	GPE = mass x height x gravitational field strength
What is a moment?	The turning effect of a force

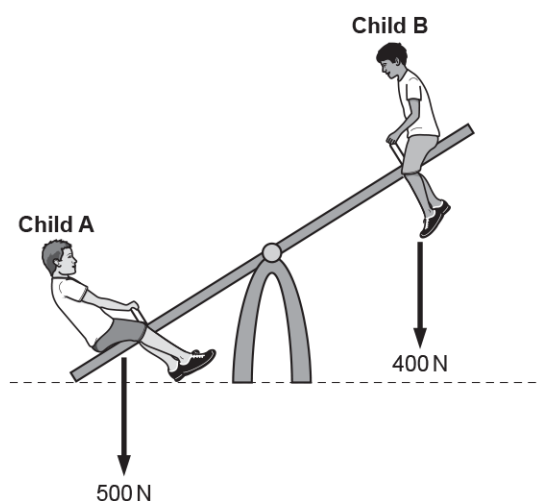
Look, Cover, Write, Check

Question	Answer
What is power?	
What is weight (also known as gravity force)?	
How is gravitational potential energy (GPE) calculated?	
What is a moment?	
How is work done calculated?	
How is moment (turning effect force) calculated?	
What is work done?	
What is gravitational field strength on Earth?	
What is momentum?	
How is momentum calculated?	

Look, Cover, Write, Check

Question	Answer
	The product of mass and velocity
How is momentum calculated?	
What is work done?	
How is work done calculated?	
	The rate at which energy is transferred or work is done.
	The force acting on an object due to the pull of gravity from a massive object like a planet.
How is moment (turning effect force) calculated?	
What is gravitational field strength on Earth?	
	$GPE = \text{mass} \times \text{height} \times \text{gravitational field strength}$
	The turning effect of a force

1. Two children play on a seesaw.



Both children sit **2 m** from the pivot.

Calculate the clockwise and anti-clockwise moments around the pivot when the seesaw is horizontal.

Clockwise moment = Nm

Anti-clockwise moment = Nm
[3]

Calculate where **Child A** should sit to balance the seesaw.

Answer = [3]

Due date:	Friday 8 th March 2024
Student number:	
Name:	



Y10 Triple T4 W3 – B3 The Nervous System

Question	Answer
What do receptor cells detect?	They detect different stimuli.
What are the three main neurons called?	Sensory neurone, relay neurone and motor neurone.
What happens to a stimulus once it has been detected?	It is converted into an electrical impulse which can travel along sensory neurones to the CNS.
What are the receptors and stimuli associated with the skin organ?	Receptor cells detect pressure and temperature. The stimulus is pressure and heat.
What is a reflex action?	A reflex action is an involuntary response that bypasses the brain.
Write the pathway/order of a nervous reaction	Stimulus → Receptor cells → Sensory neurone → Brain → Motor neurone → Effector → Response
Write the pathway/order of a reflex response	Stimulus → Receptor cells → Sensory neurone → Spinal cord → Motor neurone → Effector → Response
Why is a reflex response faster than a voluntary response?	The response bypasses (misses out) the brain, so the body can respond faster.
What is the difference between a receptor and an effector?	A receptor detects the change in stimuli whereas an effector is a muscle or gland that initiates a response

Look, Cover, Write, Check

Question	Answer
What do receptor cells detect?	
What are the three main neurons called?	
What happens to a stimulus once it has been detected?	
What are the receptors and stimuli associated with the skin organ?	
What is a reflex action?	
Write the pathway/order of a nervous reaction	
Write the pathway/order of a reflex response	
Why is a reflex response faster than a voluntary response?	
What is the difference between a receptor and an effector?	

Look, Cover, Write, Check

Question	Answer
What do receptor cells detect?	
What are the three main neurons called?	
What happens to a stimulus once it has been detected?	
What are the receptors and stimuli associated with the skin organ?	
What is a reflex action?	
Write the pathway/order of a nervous reaction	
Write the pathway/order of a reflex response	
Why is a reflex response faster than a voluntary response?	
What is the difference between a receptor and an effector?	

1. * When a fly lands on a horse, the horse's skin shivers.

This response to the fly is a reflex action.

Describe the sequence of events that occurs in the body of the horse to produce this response.

Use ideas about reflex arcs in your answer.

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and extend across the width of the page. There are no margins, text, or other markings on the paper.

Due date:	Friday 15 th March 2024
Student number:	
Name:	



Y10 Triple T4 W4 – B3 Hormones

Question	Answer
What are hormones?	Chemical messengers
How are hormones transported around the body?	Through the bloodstream.
What is homeostasis?	Keeping the internal conditions of the body constant.
What is the menstrual cycle?	A monthly cycle during which a woman's body gets ready for pregnancy.
What are the four menstrual hormones?	FSH, LH, Oestrogen and Progesterone.
Where are the menstrual hormone made?	FSH and LH are made in the pituitary gland. Oestrogen and progesterone are made in the ovaries.
What does FSH do?	FSH causes an egg to mature.
What does oestrogen do?	Oestrogen causes the lining of the uterus to build up.
What does LH do?	When LH levels reach a peak in the middle of the cycle, ovulation is triggered.
What does progesterone do?	Progesterone maintains the uterus lining.

Look, Cover, Write, Check

Question	Answer
How are hormones transported around the body?	
What is homeostasis?	
What does FSH do?	
What are hormones?	
What are the four menstrual hormones?	
What does oestrogen do?	
Where are the menstrual hormone made?	
What does progesterone do?	
What is the menstrual cycle?	
What does LH do?	

Look, Cover, Write, Check

Question	Answer
	Chemical messengers
	Through the bloodstream.
What is homeostasis?	
	A monthly cycle during which a woman's body gets ready for pregnancy.
What are the four menstrual hormones?	
Where are the menstrual hormone made?	
	It travels to the ovaries and causes an egg to mature.
	It causes the lining of the uterus to build up.
What does LH do?	
What does progesterone do?	

1.

- i. An egg develops in a follicle before ovulation. The follicle has a diameter of 25×10^{-3} mm at the start. This follicle grows to 20 mm in diameter just before the egg is released.

Calculate the increase in size of the diameter of the follicle.

Give your answer to **2** decimal places.

Answer =

mm **[3]**

- ii. The failure of a follicle to increase in size can result in less production of oestrogen.

Explain what effect this may have on the uterus.

[1]

- iii. Explain how hormones can be used to treat infertility in women.

[3]

Due date:	Friday 22 nd March 2024
Student number:	
Name:	



Y10 Triple T4 W5 – B3 Menstrual Cycle

Question	Answer
What is the 'menstrual cycle'?	A monthly cycle during which a female's body prepares for pregnancy.
How long does the menstrual cycle last?	28 days.
What occurs during days 1-4?	The uterus lining sheds. This is called menstruation (a period).
What occurs during days 4-14?	The uterus lining thickens.
What occurs on day 14?	An egg is released from the ovaries. This is called ovulation.
What occurs during days 14-28?	The uterus lining remains thick, in case the egg becomes fertilised.
What is the role of FSH?	Causes the egg to mature.
What is the role of oestrogen?	Causes the uterus lining to thicken.
What is the role of LH?	Causes the release of the egg (ovulation).
What is the role of progesterone?	Maintains the thickness of the uterus lining.

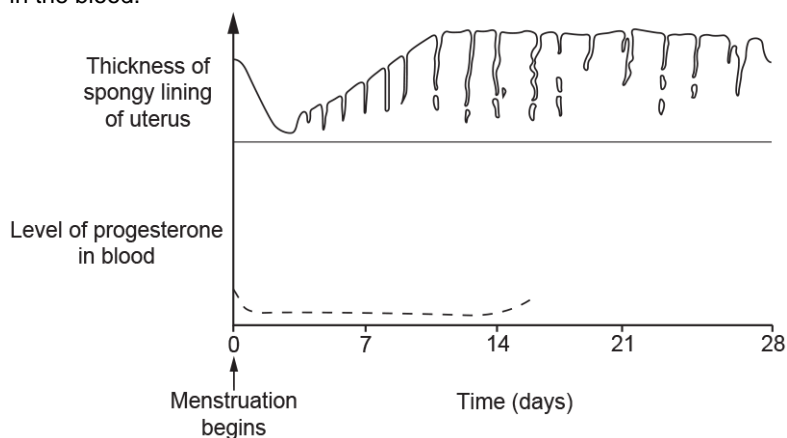
Look, Cover, Write, Check

Question	Answer
What is the 'menstrual cycle'?	
How long does the menstrual cycle last?	
What occurs during days 1-4?	
What occurs during days 4-14?	
What occurs on day 14?	
What occurs during days 14-28?	
What is the role of FSH?	
What is the role of oestrogen?	
What is the role of LH?	
What is the role of progesterone?	

Look, Cover, Write, Check

Question	Answer
What is the role of progesterone?	
How long does the menstrual cycle last?	
	The uterus lining sheds. This is called menstruation (a period).
What occurs during days 4-14?	
What is the role of oestrogen?	
	Causes the egg to mature.
	The uterus lining remains thick, in case the egg becomes fertilised.
What occurs on day 14?	
	Causes the release of the egg (ovulation).
	A monthly cycle during which a female's body prepares for pregnancy.

1. The graph shows how the lining of the uterus changes during the menstrual cycle and also shows the level of progesterone in the blood.



- i. Where in the ovary is progesterone produced?

[1]

- ii. Draw a line to continue the graph to show the levels of progesterone until day 28 (assume that an egg has not been fertilised).

[2]

2. Explain how hormones can be used by women for contraception.

Due date:	Friday, 12th April 2024
Student number:	
Name:	



Y10 Triple T5 W1 C3 - Introducing Chemical Reactions

Question	Answer
What are the rules for writing the formulae of elements?	Each element starts with a capital letter, with any other letters being lower case. E.g. Na or Br
What is a diatomic molecule?	A molecule containing 2 atoms e.g. Cl ₂ .
What does the 'molecular formula' show you?	The numbers of atoms of each element in a molecule or the ratio of atoms in an ionic compound.
What are the 4 different states and the corresponding state symbols?	Solid (s), liquid (l), gas (g) and aqueous (aq)
What is a mole?	The amount of a substance that contains the same number of particles (6.02×10^{23}) as there are atoms in 12g of carbon-12 (¹² C).
How many particles in 1 mole?	6.02×10^{23}
What is an exothermic reaction?	A reaction in which thermal energy is released into the surroundings, increasing the temperature of the surroundings.
What is an endothermic reaction?	A reaction in which thermal energy is absorbed (taken in) from the surroundings, decreasing the temperature of the surroundings.
What is the general word equation for combustion?	Fuel + oxygen → carbon dioxide + water
Define 'activation energy'	The minimum amount of energy required to start a reaction by breaking the bonds in the reactants.

Look, Cover, Write, Check

Question	Answer
Define 'activation energy'	
What are the rules for writing the formulae of elements?	
What is an exothermic reaction?	
What are the 4 different states and the corresponding state symbols?	
What is a mole?	
What is an endothermic reaction?	
What does the 'molecular formula' show you?	
How many particles in 1 mole?	
What is the general word equation for combustion?	
What is a diatomic molecule?	

Look, Cover, Write, Check

Question	Answer
What are the rules for writing the formulae of elements?	
What is a mole?	
	The numbers of atoms of each element in a molecule or the ratio of atoms in an ionic compound.
What are the 4 different states and the corresponding state symbols?	
	6.02×10^{23}
What is an exothermic reaction?	
	A reaction in which thermal energy is absorbed (taken in) from the surroundings, into the reaction, decreasing the temperature of the surroundings.
What is the general word equation for combustion?	
	A molecule containing 2 atoms e.g. Cl_2 .
Define 'activation energy'	

1. Magnesium carbonate, MgCO_3 , reacts with dilute hydrochloric acid, HCl .

Magnesium chloride, MgCl_2 , water and carbon dioxide are made.

Write the **balanced symbol equation** for the reaction.

[2]

2. Draw a labelled reaction profile for an **endothermic** reaction.

Use the following labels on your reaction profile:

- products
- energy change
- activation energy.

