

Due Date	Friday, 11 th September 2026
Name	



Y10 Triple T1 W2 - Working Scientifically

Keyword	Definition
Accurate	Close to the true value
Reliable	Consistent with one another: this means they have a small range
Valid	The investigation is appropriate to answer the question only one variable is changed
Repeatable	If the use of the same equipment, same method and same experimenter gives similar results
Reproducible	Similar results being obtained by other groups
Systematic error	Are consistent repeatable errors involving equipment
Random error	error in a measurement due to small uncontrollable effects

Comprehension Question

A student calculates the specific heat capacity of water. The student does one experiment and gets the result of 4250 J/kg°C. The textbook value of water is 4200 J/kg°C.

Complete the sentence below.

The students value is

How could the student make her results more reliable?

.....

The student reads the thermometer at an angle rather than at eye level. What sort of error is this?

.....

Look, Cover, Write, Check

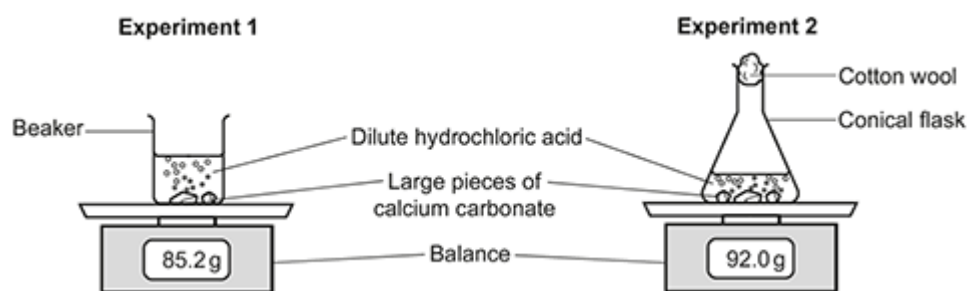
Keyword	Definition
Accurate	
	Consistent with one another: this means they have a small range
Valid	
	If the use of the same equipment, same method and same experimenter gives similar results
	Similar results being obtained by other groups
Systematic error	
	error in a measurement due to small uncontrollable effects

Application Questions

A student investigates the rate of reaction between large pieces of calcium carbonate and dilute hydrochloric acid.

Fig. 13.1 shows two different experiments the student could use.
In both experiments the mass decreases as the reaction progresses.

Fig. 13.1



The student decides to use **Experiment 2** because they think it will produce more accurate results than **Experiment 1**.

Explain why the student is correct.

.....

.....

.....(2)

Due Date	Friday, 18 th September 2026
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Y10 Triple T1 W3 - C1- History of the atom

Keyword	Definition
Solid sphere model	John Dalton's model from 1803 that stated that atoms are solid inelastic spheres.
Plum pudding model	J.J. Thomson's model from 1904 that had electrons scattered in a cloud of positive charge.
Nuclear model	Ernest Rutherford's model from 1911 that was mostly empty space with a small dense positive nucleus and electrons orbiting around.
Planetary model	Niels Bohr's model from 1913 that had electrons orbiting in fixed patterns called shells.
Proton	A subatomic particle found in the nucleus with a mass of 1, and a charge of +1.
Neutron	A subatomic particle found in the nucleus with a mass of 1, and no overall charge (charge of 0).
Electron	A subatomic particle found orbiting in the shells with a mass of 0.0005, and a charge of -1.
Model	A way to represent something that is normally hard to visualise.

Comprehension Question

1. Which subatomic particle did the plum pudding model add to the model of the atom?

2. Why do we use models to represent atoms?

3. Which scientist used the gold foil experiment to prove that atoms are largely made up of empty space?

Look, Cover, Write, Check

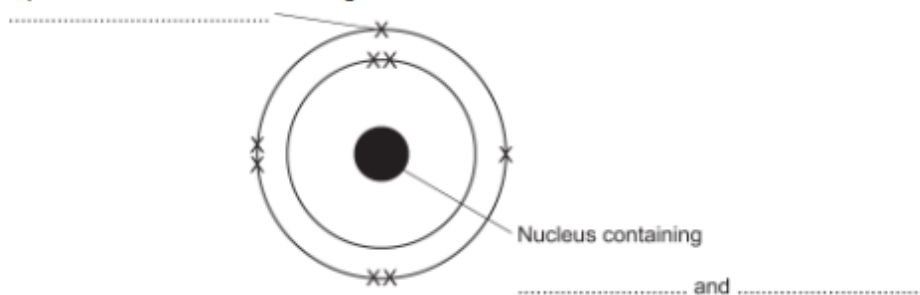
Keyword	Definition
Model	
Electron	
	Ernest Rutherford's model from 1911 that was mostly empty space with a small dense positive nucleus and electrons orbiting around.
Planetary model	
Proton	
	J.J. Thomson's model from 1904 that had electrons scattered in a cloud of positive charge.
Solid sphere model	
	A subatomic particle found in the nucleus with a mass of 1, and no overall charge (charge of 0).

Application Questions

All elements are made of atoms.

Atoms are made of subatomic particles.

i. Complete the labels on the diagram of an atom.



Theories about atoms have developed as new evidence has been discovered.

J.J. Thomson's model of the atom was called the "plum pudding" model.

i. Describe **two** differences between the current understanding of the structure of the atom and J.J. Thomson's "plum pudding" model.

- 1
- 2

[2]

Due Date	Friday, 25 th September 2026
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Y10 Triple T1 W4 – P1 Atomic Structure

Keyword	Definition
Atomic number	The number of protons in the nucleus of an atom
Ion	An atom that has gained or lost electrons to become a charged particle
Matter	The physical part of the universe consisting of solids, liquids and gases
Atom	A single sphere that makes up all matter
Density	How much mass there is in a certain volume
Mass	The amount of matter
Volume	The amount of space occupied by an object
Model	A description, analogy or equation which helps you explain the physical world

Comprehension Question

Why do we use models to explain the structure of different matter?

.....

The density of an iron is 7.87g/cm³ what does this tell me about iron?

.....

Iron becomes a Fe²⁺ ion what does this mean has happened to the element?

.....

Carbon has 6 protons, 6 neutrons and 6 electrons. What is the atomic number of Carbon?

.....

Look, Cover, Write, Check

Keyword	Definition
	The number of protons in the nucleus of an atom
Ion	
Matter	
	A single sphere that makes up all matter
	How much mass there is in a certain volume
	The amount of matter
Volume	
Model	

Application Questions

A student has made some notes on a simple model of an atom.

An atom consists of a negatively charged nucleus surrounded by protons.

Most of the atom is just empty space.

The nucleus contains neutrons and ions.

The student has made three mistakes.

Write down the **three** mistakes that the student has made.

.....

.....

.....

Due Date	Friday, 2 nd October 2026
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Y10 Triple T1 W5 – B1 Microscopes

Keyword	Definition
Resolution	A measure of the smallest object that can be seen using an instrument
Magnification	How much bigger an object appears
Prokaryotic Cell	A cell without a nucleus, whose genetic material is found within the cytoplasm
Eukaryotic Cell	A cell whose genetic material is contained within the nucleus
Stain	Used to colour the organelles when using a microscope
Mitochondria	An organelle which is the site of aerobic respiration
Ribosome	An organelle which is used for protein synthesis
Chloroplast	A plant organelle containing chlorophyll which is the site of photosynthesis

Comprehension Question

Electron microscopes have a higher magnification than light microscopes what does this mean?

.....

With an electron microscope you can distinguish between ribosomes and other organelles, why?

.....

Why do we use iodine stain on onion cells for light microscopes?

.....

There are a lot of ribosomes in muscles. Why is this an important organelle to have in the muscle tissue?

.....

.....

Look, Cover, Write, Check

Keyword	Definition
Resolution	
	How much bigger an object appears
Prokaryotic Cell	
Eukaryotic Cell	
	Used to colour the organelles when using a microscope
	An organelle which is the site of aerobic respiration
Ribosome	
	A plant organelle containing chlorophyll which is the site of photosynthesis

Application Questions

Transmission **electron** microscopes (TEM) work by passing a beam of electrons through a very thin slice of an object.

Suggest one advantage and one disadvantage of using TEM rather than a light microscope to look at cells.

Advantage

.....

Disadvantage

.....

Light microscopes let us see objects as small as 0.2 micrometres.

The diameter of cells similar to cell **X**, can vary between 0.008 mm and 0.5 mm.
(1 mm = 1000 micrometres)

Is it possible to see all these types of cells using a light microscope?

Explain your answer.

.....

.....

Due Date	Friday, 9 th October 2026
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Y10 Triple T1 W6 - C2 - Empirical Formula

Keyword	Definition
relative atomic mass (A_r)	mean mass of an atom of an element compared to one 12 th of the mass of a carbon-12 atom
relative formula mass (M_r)	mean mass of a molecule compared to one 12 th of the mass of a carbon-12 atom
empirical formula	the simplest whole number ratio of atoms of each element in a compound
molecular formula	the number of atoms of each element in a molecule
element	a pure substance made of one type of atom
compound	a pure substance made of more than one type of atom chemically joined together
ratio	a way of showing how many of one object there is compared to another

Comprehension Question

- Glucose has 6 atoms of carbon, 12 atoms of hydrogen and 6 atoms of oxygen. What is the word for this formula?

.....

- What is the ratio of atoms in glucose?

.....

- The simplest ratio of atoms in glucose is CH_2O . What is this called?

.....

- What word can be used describe glucose?

.....

- What is the empirical formula of butane C_4H_{10} ?

.....

- What is the empirical formula of $\text{C}_{12}\text{H}_{26}$?

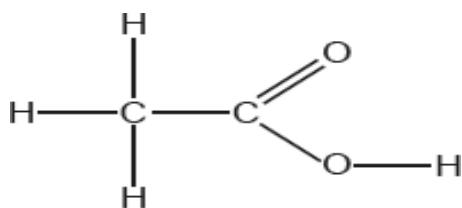
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Look, Cover, Write, Check

Keyword	Definition
	a pure substance made of one type of atom
compound	
	a way of showing how many of one object there is compared to another
empirical formula	
molecular formula	
	mean mass of a molecule compared to one 12 th of the mass of a carbon-12 atom

Application Questions

1. Look at the molecule below:



Write down the **empirical formula** for this molecule.

[1]

.....

2. The empirical formula of a compound Y is CH₂O. Compound Y has a relative formula mass of 90. What is the molecular formula of compound Y?

A - C₂H₂O₄

B - C₃H₆O₃

C - C₄H₁₀O₂

D - C₆H₁₂O₆

.....

[1]

Due Date	Friday, 16 th October 2026
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Y10 Triple T1 W7 - P1 – Specific Latent Heat

Keyword	Definition
Specific latent heat of fusion	The amount of energy needed to melt or freeze 1kg of a substance
Specific latent heat of vaporisation	The amount of energy needed to evaporate or condense 1kg of a substance
Freezing	Changing state from liquid to solid
Melting	Changing state from solid to liquid
Evaporation	Changing state from liquid to gas
Condensation	Changing state from gas to liquid
Internal energy	The total amount of kinetic and potential energy of particles in a system
State of matter	Solid, Liquid, Gas

Comprehension Questions

1. A student uses the equation $E = m \times L$ to calculate the amount of energy required to freeze a substance, where L = specific latent heat of _____. Which type of specific latent heat does the student need to use?

.....

2. Another student wants to calculate the total amount of energy required to change a solid substance into a gas. How might they calculate this?

.....

3. If the amount of energy required to melt 1kg of a substance is 150kJ, how much energy would be required to melt 2kg of the same substance?

.....

Look, Cover, Write, Check

Keyword	Definition
Specific latent heat of fusion	
Specific latent heat of vaporisation	
	Changing state from liquid to gas
	Changing state from gas to liquid
Internal energy	

Application Questions

1. A beaker contains water with a mass of 540 g

The specific latent heat of the vaporisation of water is $2.26 \times 10^6 \text{ J/kg}$.

How much energy is needed to boil the water?

- a) $1.22 \times 10^3 \text{ J}$
- b) $1.22 \times 10^6 \text{ J}$
- c) $1.22 \times 10^9 \text{ J}$
- d) $1.22 \times 10^{12} \text{ J}$

Your answer

2. Describe the difference between specific heat capacity and specific latent heat.

.....
.....

Due Date	Friday, 6 th November 2026
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Y10 Triple T2 W1- B1 Protein Synthesis

Keyword	Definition
Ribosomes	An organelle which is used for protein synthesis
Nucleotide	A monomer of DNA made up from an organic base, ribose sugar and phosphate group
Transcription	The process by which mRNA is formed
Translation	The process by which proteins are synthesised (made)
DNA	Is a polymer in the shape of a double helix
Mitochondria	An organelle which is the site of aerobic respiration
Eukaryotic Cell	A cell whose genetic material is contained within the nucleus
Enzyme	Biological catalyst

Comprehension Question

DNA is copied by an enzyme in the nucleus. Why does an enzyme copy the DNA?

.....

Where is the mRNA read once it has left the nucleus?

.....

What are the two stages of protein synthesis known as?

.....

Explain why DNA is a polymer.

.....

.....

What are the three components of a nucleotide?

.....

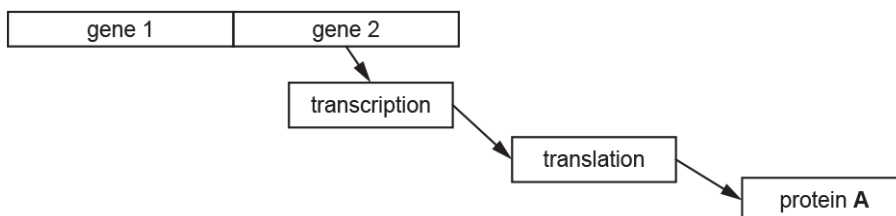
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Look, Cover, Write, Check

Keyword	Definition
Ribosomes	
	A monomer of DNA made up from an organic base, ribose sugar and phosphate group
Transcription	
Translation	
	Is a polymer in the shape of a double helix
	An organelle which is the site of aerobic respiration
Eukaryotic Cell	
	Biological catalyst

Application Questions

Gene **1** and gene **2** are both needed for the production of protein **A**.



What is the function of **gene 1** in this process?

- A** It codes for the amino acids in protein **A**.
- B** It codes for the mRNA needed to make protein **A**.
- C** It acts as the site for protein synthesis.
- D** It controls the expression of **gene 2**.

Describe the role of the DNA template and mRNA nucleotides in the production of the protein

.....

.....

Describe the role of the tRNA nucleotides and ribosomes in the production of the protein.

.....

.....

Due Date	Friday, 13 th November 2026
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Y10 Triple T2 W2 - C2 – Separation Techniques

Keyword	Definition
soluble	can dissolve in a solvent
insoluble	cannot dissolve in a solvent
solute	the substance that dissolves
solvent	the liquid a solute dissolves in
solution	the mixture formed when a solute dissolves in a solvent
impure substance	contains more than one type of particle
chromatography	a method used to separate a mixture of solutes and determine the purity of a substance
stationary phase	a substance that does not move during chromatography e.g., paper or silica gel
mobile phase	a substance that moves during chromatography e.g., solvent
distillation	a method that separates a solvent from a solution
filtration	a method that separates an insoluble substance from a liquid
crystallisation	a method that separates a soluble substance from solution

Comprehension Question

1. A student wants to separate a soluble salt from water. What method should they use?
.....
2. In question one, which substance is the solute?
.....
3. In question one, which substance is the solvent?
.....
4. Another student wants to separate a flavouring from a mixture of liquids. What method should they use?
.....
5. A teacher demonstrates using chromatography to show the different pigments in spinach. She uses ethanol to dissolve the pigments, then puts a spot of the substance on a silica gel plate. What is the mobile and stationary phase in this example?

Mobile:

Stationary:

Look, Cover, Write, Check

Keyword	Definition
	a method used to separate a mixture of solutes and determine the purity of a substance
solvent	
distillation	
	cannot dissolve in a solvent
	a method that separates an insoluble substance from a liquid
	a method that separates a soluble substance from solution

Application Questions

A student is separating a mixture of three substances, **A**, **B** and **C**.

Look at the table. It gives information about these substances.

Substance	State at room temperature	Melting point (°C)	Boiling point (°C)	Solubility in water
A	liquid	0	100	soluble
B	liquid	-117	78	soluble
C	solid	1535	2750	insoluble

A and **B** mix together completely.

* Suggest how the student can separate the mixture to get pure samples of substances **A**, **B** and **C**.

Explain in detail how each method works. [6]

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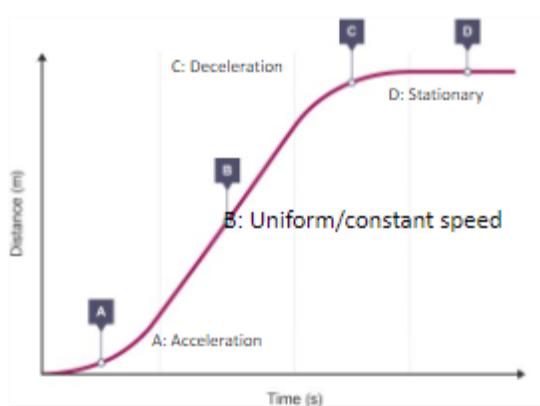
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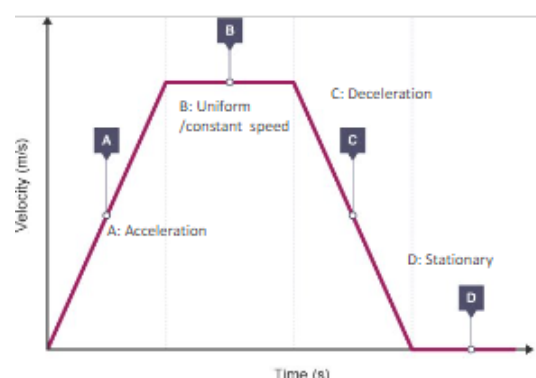
Y10 Triple T2 W3 – P2 Velocity/time and Distance/time graphs

Keyword	Definition
Vector	A value which has both magnitude and direction
Scalar	A value which has magnitude only
Speed	The rate at which distance changes
Rate	A measure of the change in a value over time
Velocity	The rate at which displacement changes
Displacement	The change in distance in a single direction
Uniform motion	Constant motion
Non-uniform motion	Motion which has a changing value

Distance-Time Graph



Velocity-Time Graph or Speed-Time Graph



Comprehension Question

Velocity is the rate at which displacement changes. Is this quantity and vector or a scalar?

.....

On the graphs above where identify the letters than show uniformed motion.

.....

Describe what acceleration would look like on a velocity time graph.

.....

What is the difference between a vector and a scalar.

.....

Look, Cover, Write, Check

Keyword	Definition
	A value which has both magnitude and direction
Scalar	
	The rate at which distance changes
	A measure of the change in a value over time
	The rate at which displacement changes
Displacement	
	Constant motion
Non-uniform motion	

Application Questions

Helen and Finn take part in a cross-country run. Look at the information about their run. Their speeds have been plotted on a graph.

Use the graphs to compare Helen’s and Finn’s **acceleration** over the whole run. (6)

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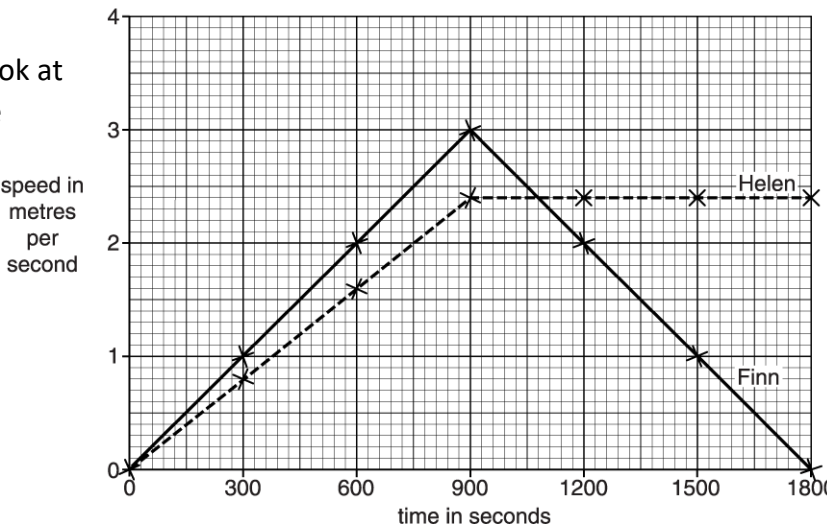
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Due Date	Friday, 4 th December 2026
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Y10 Triple T2 W4 - B2 – Mitosis

Keyword	Definition
Mitosis	A method of cell division which produces 2 genetically identical daughter cells that are diploid cells.
DNA Replication	A process where the chromosomes duplicate (copy) themselves.
Diploid Cell	A cell containing a full set of chromosomes (46 chromosomes in human cells)
Divide	To separate.
Cytokinesis	The division of the cytoplasm occurring at the end of mitosis.
Prophase	The nuclear membrane breaks down and chromosomes condense and become visible.
Metaphase	The chromosomes line up in the centre of the cell and spindle fibres begin to form.
Anaphase	Spindle fibres attach to the chromosomes and the chromosomes are pulled apart opposite ends of the cell.
Telophase	A new nucleus forms around each group of chromosomes.

Comprehension Question

- Holly uses a microscope to view a cell undergoing mitosis. She described the cell as having 2 nuclei inside. What stage of mitosis is the cell that Holly can see in?

.....

- A standard dog cell has 78 chromosomes (39 pairs).

- What word could be used to describe this cell?

.....

- This dog cell undergoes mitosis. What is produced from mitosis?

.....

- Simon's microscope showed 3 cells. Cell A had the chromosomes in the middle of the cell. Cell B has no nucleus, but the chromosomes are visible. Cell C showed the chromosomes being separated.

What stage of mitosis are each cell in?

A:..... B:..... C:.....

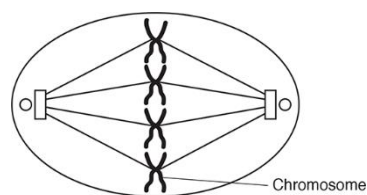
Look, Cover, Write, Check

Keyword	Definition
	A process where the chromosomes duplicate (copy) themselves.
Mitosis	
	A cell containing a full set of chromosomes (46 chromosomes in human cells)
	The nuclear membrane breaks down and chromosomes condense and become visible.
Divide	
	A new nucleus forms around each group of chromosomes.
Cytokinesis	
Anaphase	
	The chromosomes line up in the centre of the cell and spindle fibres begin to form.

Application Questions

Mitosis occurs in 4 stages. In order, there are: prophase, metaphase, anaphase and telophase

The diagram shows a cell during one stage of mitosis.



- (i) Describe **two** things that happen to the chromosomes in the next stage of mitosis.

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.....

.....[2]

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Y10 Triple T2 W5- C2 - Bonding

Keyword	Definition
simple covalent	a type of bonding between a few non-metal atoms
giant covalent	a type of bonding between many non-metal atoms
ionic bonding	a type of bonding between metal and non-metal atoms
metallic bonding	a type of bonding between metal atoms
electrostatic	a force of attraction between two oppositely charged particles
cation	a positively charged particle
anion	a negatively charged particle
delocalised	free to move
intermolecular	between molecules
polymer	a substance made of many repeating units called monomers
allotrope	a different form of the same element

Comprehension Question

- Which type of bond does a particle of sodium chloride have?
.....
- Silicon dioxide is a substance made of many atoms of silicon and oxygen bonded together. What type of structure is silicon dioxide?
.....
- For a substance to change state from a solid to a liquid, the forces between the particles must be weakened. What other name is given to these forces?
.....
- Why are allotropes of carbon defined as 'giant covalent structures'?
.....
.....

Look, Cover, Write, Check

Keyword	Definition
	between molecules
allotrope	
electrostatic	
	free to move
ionic bonding	
	a type of bonding between many non-metal atoms
	a substance made of many repeating units called monomers
	free to move

Application Questions

Describe **metallic bonding** and explain why metals are good conductors of electricity.

You may wish to draw a labelled diagram.

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.....[3]

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Y10 Triple T2 W6 – P2 Momentum

Keyword	Definition
Vector	A value which has both magnitude and direction
Momentum	A vector quantity of moving objects
Conservation of momentum	The principle that the total momentum of a system stays the same
Inertia	The tendency of an object to continue in its current state
Velocity	The rate at which displacement changes
Contact forces	Forces exerted when objects touch e.g friction, air resistance
Uniform motion	Constant motion
Kinetic energy	Moving objects have energy in their kinetic store

Comprehension Question

If the momentum of two cars before a collision is 5.6 kgm/s what is the momentum of the two cars after the collision?

.....

Why is momentum a vector quantity?

.....

Gravity is not a contact force. Why?

.....

How will increasing the velocity of an object effect the momentum of the object?

.....

Which object has the higher kinetic energy. Object A with a momentum of 15 kgm/s or object B with a momentum of 4.5 kgm/s?

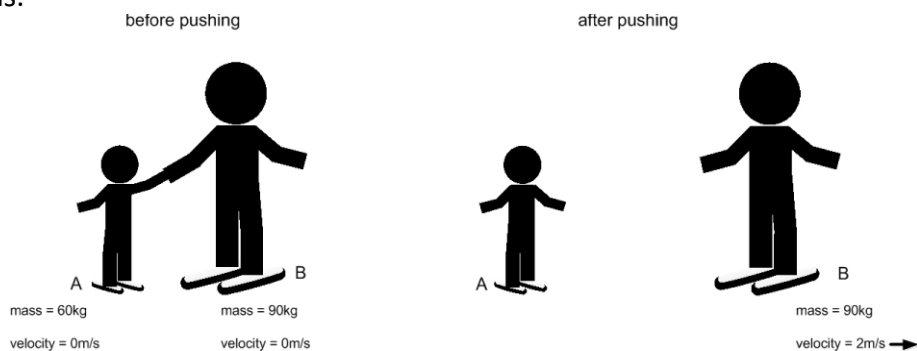
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Look, Cover, Write, Check

Keyword	Definition
Vector	
	A vector quantity of moving objects
Conservation of momentum	
	The tendency of an object to continue in its current state
Velocity	
Contact forces	
Uniform motion	
	Moving objects have energy in their kinetic store

Application Questions

Two ice skaters A and B, at rest, start together on the ice. The ice skaters push apart and they move off in opposite directions.



Use the data and your knowledge of momentum to calculate the velocity of skater **A** after pushing.

.....

.....

The mass of the pebble is 0.30 kg. Calculate the momentum of the pebble when it is falling at a speed of 4.0 m / s.

answer _____ kg m / s

Due Date	Friday, 8 th January 2027
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Y10 Triple T3 W1 - B2 – Osmosis PAG

Keyword	Definition
Diffusion	The net movement of particles from a region of high concentration to a region of low concentration.
Active transport	The net movement of particles from a region of low concentration to a region of high concentration, using ATP.
Osmosis	the net movement of water particles from a region of higher water potential to a region of lower water potential, across a partially permeable membrane.
Independent variable	The variable that is changed in an experiment.
Dependent variable	The variable that is measured in the experiment.
Control variable	The variable that is kept the same.
Partially	To a limited extent.
Permeable	Allowing liquids or gases to pass through.
Concentration	The amount of matter per unit volume.

Comprehension Question

1. A heart is left in a jar of water. Water is moving into the cells. Why is this described as osmosis?

.....

2. Why does a cell need a partially permeable membrane for diffusion and osmosis to occur?

.....

.....

3. Harry puts pieces of potatoes into 3 different concentrations of sugar solutions. He uses the mass of the potato pieces before and after his experiment to calculate the change in mass. In this

a. What is a control variable?.....

b. What is the independent variable?

c. What is the dependent variable?

Look, Cover, Write, Check

Keyword	Definition
	The variable that is kept the same.
	The amount of matter per unit volume
Active transport	
	The variable that is changed in an experiment.
Partially	
Diffusion	
	Allowing liquids or gases to pass through.
Dependent variable	
Osmosis	

Application Questions

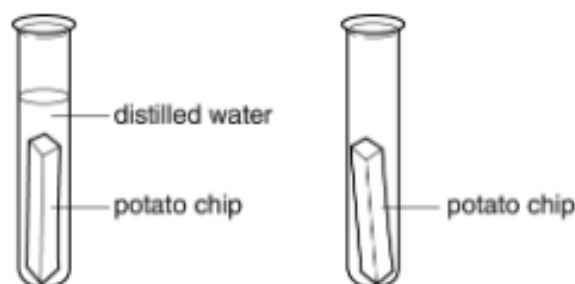
Katie cuts two chips from a potato.

She puts one of the chips into a test tube of distilled water.

Katie puts the other chip into an empty test tube.

Water enters the cells of the potato chip that has been left in the distilled water.

Explain how.



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