



Please write clearly in block capitals.

Centre number

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Candidate number

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Surname

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Forename(s)

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Candidate signature

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I declare this is my own work.

GCSE COMBINED SCIENCE: TRILOGY

F

Foundation Tier
Biology Paper 2F

Time allowed: 1 hour 15 minutes

Materials

For this paper you must have:

- a ruler
- a scientific calculator.

Instructions

- Use black ink or black ball-point pen.
- Pencil should only be used for drawing.
- Fill in the boxes at the top of this page.
- Answer **all** questions in the spaces provided.
- If you need extra space for your answer(s), use the lined pages at the end of this book. Write the question number against your answer(s).
- Do all rough work in this book. Cross through any work you do not want to be marked.
- In all calculations, show clearly how you work out your answer.

Information

- The maximum mark for this paper is 70.
- The marks for questions are shown in brackets.
- You are expected to use a calculator where appropriate.
- You are reminded of the need for good English and clear presentation in your answers.

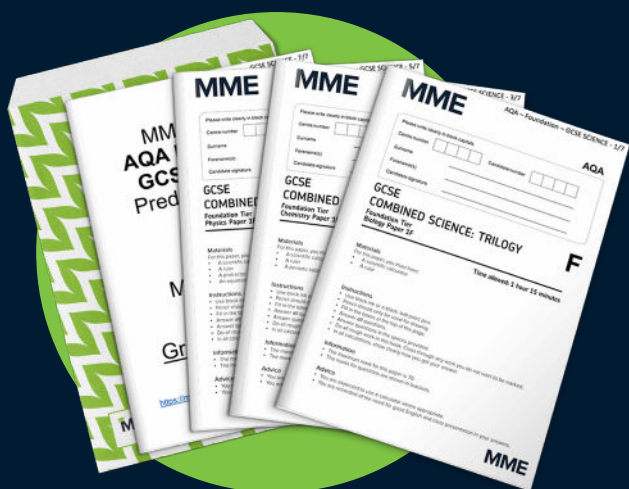
For Examiner's Use	
Question	Mark
1	
2	
3	
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5	
6	
TOTAL	



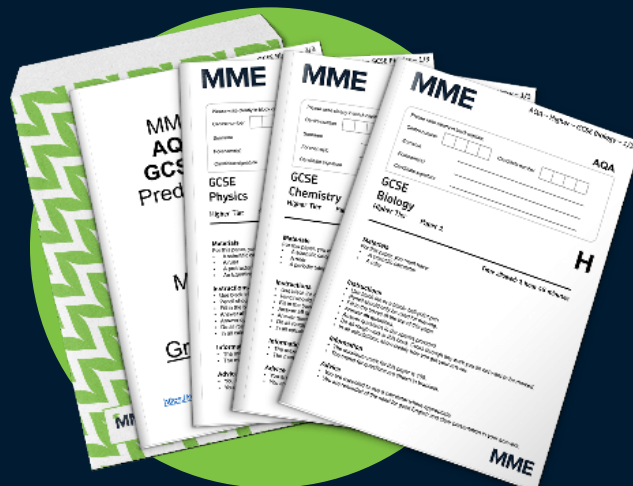
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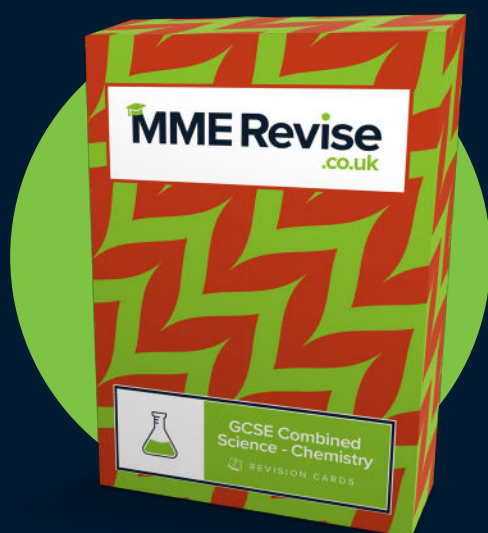
Revision Products - GCSE Science



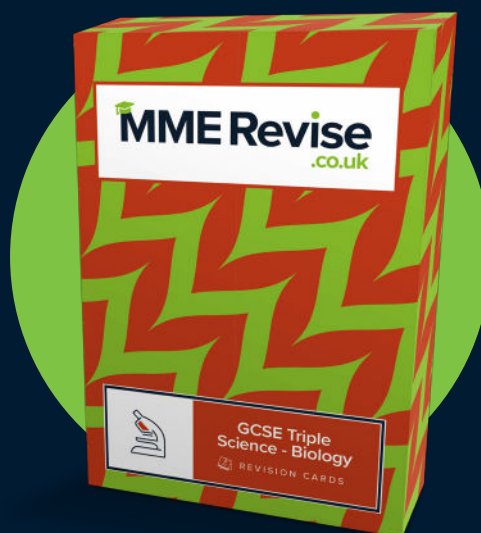
GCSE Combined Science
Predicted Papers 2024



AQA GCSE Triple Science
Predicted Papers 2024



GCSE Combined
Science Revision Cards



GCSE Triple Science
Revision Cards

0 1

This question is about genetics.

0 1 . 1

Crop plants are genetically modified (GM) for useful characteristics.

Which useful characteristic are crops genetically modified for?

[1 mark]

Tick (✓) **one** box.

Fewer roots ☐

Larger yields ☒

Smaller fruits ☐

0 1 . 2

What is **one** concern about GM crops?

[1 mark]

Tick (✓) **one** box.

GM crops will add to global warming. ☐

GM crops will cause air pollution. ☐

GM crops will harm wildlife. ☒

GM crops will produce too much food. ☐

Some inherited disorders are caused by a faulty piece of DNA.

0 1 . 3

What is the name of a piece of DNA that codes for a characteristic?

[1 mark]

gene



0 1 . 4 DNA contains a code for making substances in the cell.

What type of substance is made using the DNA code?

[1 mark]

Tick (✓) **one** box.

Fat

☐

Protein

☒

Starch

☐

Sugar

☐

Cystic fibrosis (CF) is an inherited disorder.

The allele for having CF is recessive (**h**).

The allele for **not** having CF is dominant (**H**).

0 1 . 5 What is a recessive allele?

[1 mark]

Tick (✓) **one** box.

An allele that is always expressed.

☐

An allele that is expressed if only one copy is present.

☐

An allele that is only expressed if two copies are present.

☒

Question 1 continues on the next page

Turn over ►



A man and a woman do **not** have CF. The man has the alleles **Hh**.

0 1 . 6 What word describes the alleles of the man?

[1 mark]

Tick (✓) **one** box.

- Heterozygous ☒
- Homozygous ☐
- Phenotype ☐

0 1 . 7 The man and the woman want to have a child.

Complete **Figure 1** to show the possible genotypes of the child.

Draw a ring around the genotype of a child who will have CF.

[3 marks]

Figure 1

		Woman	
		H	h
Man	H	HH	Hh
	h	Hh	hh



0 1 . 8

What is the chance that a child of the man and the woman will have CF?

[1 mark]

Tick (✓) **one** box.

25% ☒

50% ☐

75% ☐

100% ☐

0 1 . 9

The woman is pregnant.

The woman can have embryo screening to find out if the child will have CF.

Suggest **one** reason why the woman might **not** want to have embryo screening.

[1 mark]

Embryonic screening can cause harm to the embryo. In extreme cases this could even lead to a miscarriage.

11

Turn over for the next question

Turn over ►



0 2

On a school field:

- one area of the soil was usually wet
- another area of the soil was usually dry.

Students investigated the effect of water in the soil on the number of buttercup plants growing in each area.

On the field the students marked out:

- an area of 10 m by 10 m on the wet soil
- an area of 10 m by 10 m on the dry soil.

0 2 . 1

Describe how a quadrat can be used to measure the size of the buttercup population on the wet soil area.

[4 marks]

They should divide the $10\text{m} \times 10$ area into a grid. Then using a random number generator generate coordinates within the grid. They should place the quadrat at these coordinates and count the number of buttercups in the quadrat. Record this in a table. They then should repeat this several times (5-15) in both $10\text{m} \times 10$ m plots.

Using the recorded number of buttercups they can calculate a mean number of buttercups per quadrat for each $10\text{m} \times 10\text{m}$ area. They can then use this mean, the area of the quadrat and that the area of the plot is 100m^2 to predict estimate the number of buttercups in each plot.



0 2 . 2 What type of factor is water in the soil?

[1 mark]

Tick (✓) **one** box.

- A biotic factor ☐
- A control factor ☐
- An abiotic factor ☒

0 2 . 3 Give **two** factors which might affect the number of buttercups growing on the school field.

Do **not** refer to water in your answer.

[2 marks]

- 1 light intensity
- 2 level of grazing by herbivores

0 2 . 4 Complete the sentence.

Choose the answer from the box.

[1 mark]

a control the dependent the independent

In this investigation the number of buttercups in each quadrat was

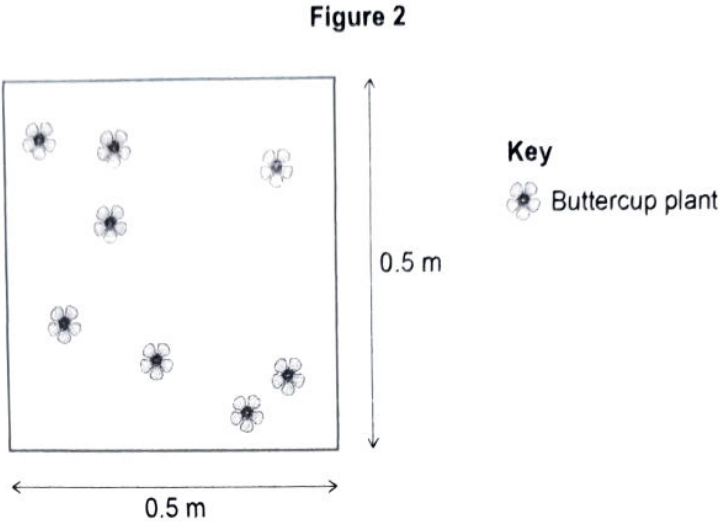
the dependent variable.

Question 2 continues on the next page

Turn over ►



Figure 2 shows a quadrat on an area of the school field.



0 2 . 5 Calculate the area of the quadrat.

[1 mark]

Area = Length 1 \times Length 2
= 0.5 m \times 0.5 m
= 0.25 m²
Area of the quadrat = 0.25 m²

0 2 . 6 The mean number of buttercups in one quadrat was 8

Calculate the number of buttercups per m²

Use your answer from Question **02.5**

[2 marks]

$8 \div 0.25 = \underline{\underline{32}}$
OR
 $8 \times 4 = \underline{\underline{32}}$
Number of buttercups = 32 per m²

1 m
0.5 m
0.5 m
0.5 m



Question 2 continues on the next page

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outside the
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ANSWER IN THE SPACES PROVIDED**

Turn over ►



In a laboratory another group of students investigated the effect of soil acidity on the growth of beans.

This is the method used.

1. Put soil with a neutral pH in two large boxes.
2. Add acid to the soil in one box.
3. Plant some bean seeds in each box.
4. Water the seeds over 3 weeks.
5. After 3 weeks, measure the height of the bean plants in each box.
6. Calculate the mean height of bean plants in each box.

0 2 . 7

Give **two** improvements the students could make to the method to give more valid results.

[2 marks]

- 1 Make sure to use the same volume of water on each plant.
- 2 Repeat the experiment with same conditions.



The students then carried out a valid investigation.

Table 1 shows the students' results.

Table 1

Bean plant	Height of bean plants in cm	
	Acid soil	Neutral soil
1	8	11
2	6	12
3	4	11
4	10	17
5	7	19
Mean	7	X

0 2 . 8 Calculate mean value X in Table 1.

[2 marks]

Mean = $\frac{11 + 12 + 11 + 17 + 19}{5} = \underline{\underline{14}}$

X = 14 cm

0 2 . 9 What conclusion can the students make about the effect of acid soil on the growth of bean plants?

[1 mark]

The bean plants grew better in neutral soil, so acidity disadvantaged the growth of the plants.

16

Turn over ►



0 3

The theory of evolution by natural selection was suggested by Charles Darwin in 1859.

Evidence from fossils supports Darwin's theory.

0 3 . 1

What evidence supports the theory of evolution by natural selection?

[1 mark]

Tick (✓) **one** box.

Knowledge of how DNA controls inheritance

☒

Knowledge of how the dinosaurs became extinct

☐

Knowledge of how the Earth was formed

☐

Knowledge of what causes global warming

☐

0 3 . 2

Figure 3 shows a fossil fly preserved in amber.

The fossil formed when the amber solidified with the fly trapped inside.

Figure 3



Why has the fly been preserved?

[1 mark]

Tick (✓) **one** box.

The amber has been kept at a constant temperature.

☐

The fly was soft-bodied.

☐

There was no oxygen in the amber.

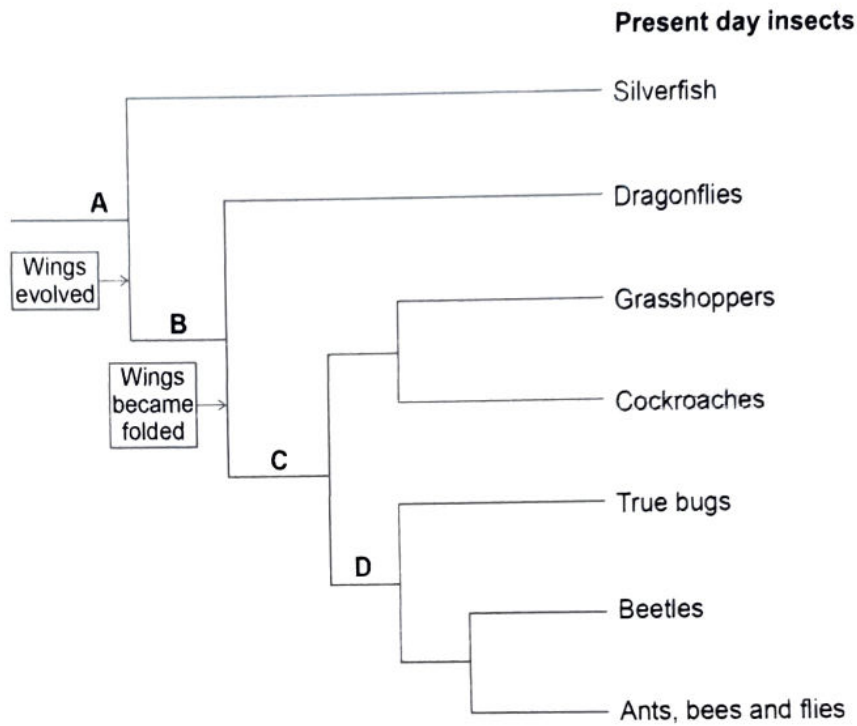
☒

Turn over ►



Figure 4 shows a simplified evolutionary tree for the insect group of animals.

Figure 4



0 3 . 3

Which present day insect evolved first?

[1 mark]

silverfish

0 3 . 4

Animals A, B, C and D were ancestors of present day insects.

Which animal is the most recent ancestor of both grasshoppers and beetles?

[1 mark]

Tick (✓) one box.

A	<input type="checkbox"/>	B	<input type="checkbox"/>	C	<input checked="" type="checkbox"/>	D	<input type="checkbox"/>
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0 3 . 5

Name the group of present day insects which have wings which do **not** fold.

[1 mark]

dragonflies



0 3 . 6

The house fly has the binomial name *Musca domestica*.

Table 2 shows part of the classification for the house fly.

Table 2

Classification group	Name
Kingdom	animalia
Phylum	arthropoda
Class	insecta
Order	diptera
Family	muscidae
Genus	Musca
Species	domestica

Complete Table 2.

Choose answers from the box.

[3 marks]

animalia	domestica	Musca	insecta
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Question 3 continues on the next page

Turn over ►



03.7

Carl Woese proposed the 'three-domain system' of classification.

Which domain are insects in?

[1 mark]

Tick (✓) **one** box.

Archaea

☐

Eukaryota

☒

Prokaryota

☐

9



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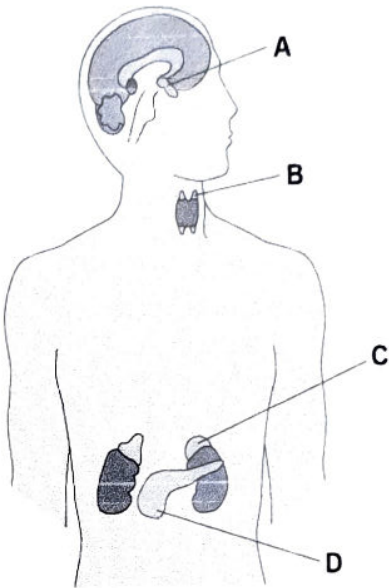


0 4

The endocrine system is made up of glands which secrete hormones.

Figure 5 shows the position of endocrine glands in the human body.

Figure 5



0 4 . 1

Which letter shows the pancreas?

[1 mark]

Tick (✓) **one** box.

A	<input type="checkbox"/>	B	<input checked="" type="checkbox"/>	C	<input type="checkbox"/>	D	<input checked="" type="checkbox"/>
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0 4 . 2

Which letter shows the thyroid gland?

[1 mark]

Tick (✓) **one** box.

A	<input type="checkbox"/>	B	<input checked="" type="checkbox"/>	C	<input type="checkbox"/>	D	<input type="checkbox"/>
---	--------------------------	---	-------------------------------------	---	--------------------------	---	--------------------------

0 4 . 3

Hormones travel from the gland where they are made to the target organ where they have an effect.

How do hormones travel from the gland to the target organ?

[1 mark]

Hormones travel through the bloodstream to the target organs.

When blood glucose concentration becomes too high, hormone X from the pancreas causes a decrease in the glucose concentration.

0 4 . 4

Name hormone X.

[1 mark]

insulin

0 4 . 5

In what **two** ways does hormone X cause a decrease in blood glucose concentration?

[2 marks]

Tick (✓) **two** boxes.

Glucose is broken down.

☐

Glucose is converted to glycogen.

☒

Glucose is excreted by the kidneys.

☐

Glucose moves from the blood into the cells.

☒

Glucose moves into the small intestine.

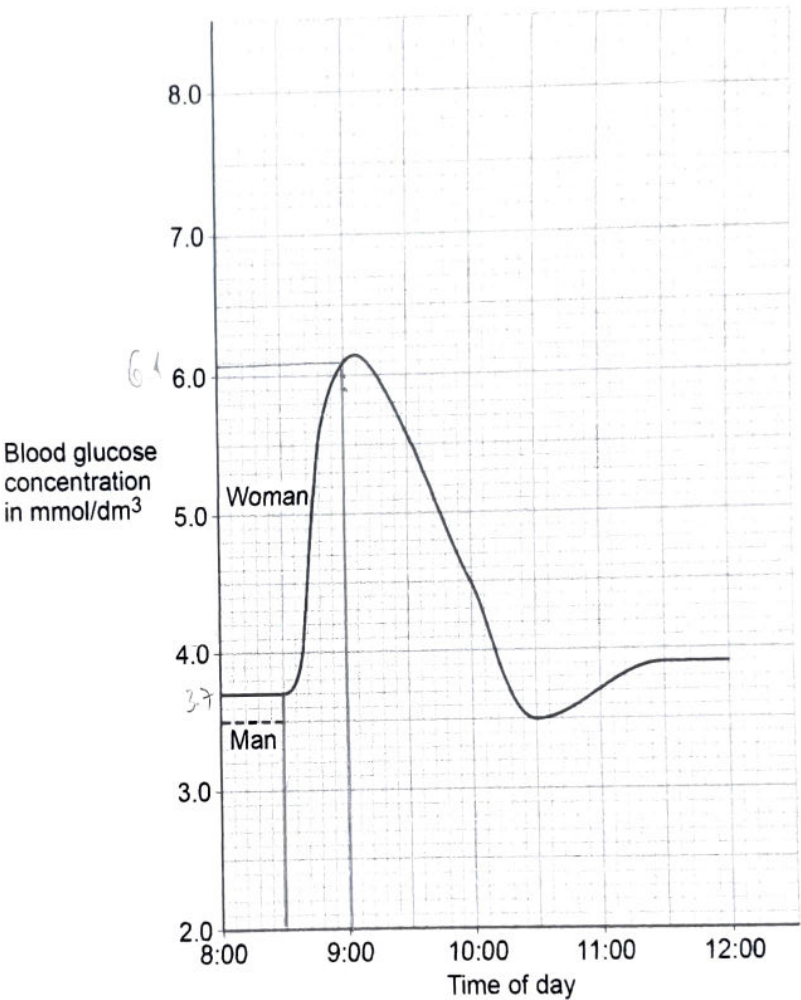
☐

Turn over ►



Figure 6 shows the blood glucose concentration in a woman.

Figure 6



0 4 . 6 Suggest what time of day the woman ate her breakfast of sugar-coated cereal. [1 mark]

The time before her blood glucose conc. starts increasing. Time of day = 8:30 am



The man in **Figure 6** has Type 2 diabetes but he has **not** been treated.

0 4 . 7 The man ate:

- the same type and amount of breakfast cereal as the woman
- at the same time as the woman.

Suggest what his blood glucose concentration would be at 9:00

[1 mark]

Blood glucose concentration = 7.0 mmol/dm³

0 4 . 8 The man:

- is an obese office worker
- does not exercise
- eats sugary snacks at his desk.

Give **two** lifestyle changes a doctor might recommend to the man to help him control his diabetes.

[2 marks]

- 1 Start an exercise plan, regularly exercising.
- 2 Change his diet to lower his carbohydrate / sugar consumption.

0 4 . 9 Describe how a **low** blood glucose concentration would lead to a person feeling weak.

[2 marks]

Glucose is required for respiration. Low blood glucose level may limit the rate of respiration, hence limit how much energy can be released for functions, such as muscle contractions.

12

Turn over ►



0 5

This question is about the cycling of water and carbon in ecosystems.

0 5 . 1

Which reaction produces water?

[1 mark]

Tick (✓) **one** box.

Aerobic respiration

☒

Anaerobic respiration

☐

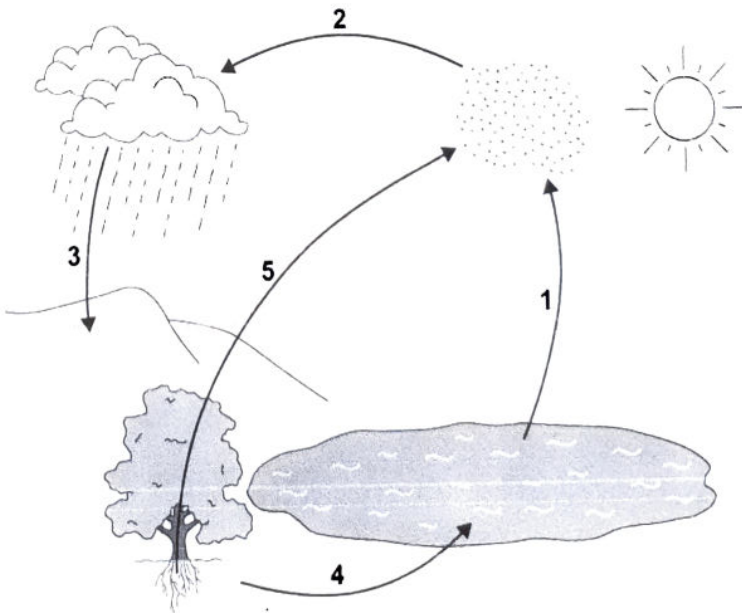
Photosynthesis

☐

The water cycle provides water for plants and animals on land before the water goes into lakes and seas.

Figure 7 represents the water cycle.

Figure 7



0 5 . 2 Name the processes 1 to 5 shown on Figure 7.

[5 marks]

- 1 ~~Evaporation~~ Evaporation
- 2 Condensation
- 3 Precipitation
- 4 Drainage
- 5 Transpiration

0 5 . 3 In 2007 the population of the world was 6 000 000 000

A study found that 4.5% of the population had severe water shortage.

Calculate how many people had severe water shortage.

Give your answer in standard form.

[3 marks]

$$4.5\% \rightarrow 0.045$$

$$6\,000\,000\,000 \times 0.045 = 270\,000\,000$$

$$270\,000\,000 \rightarrow \underline{\underline{2.7 \times 10^8}}$$

Number of people (in standard form) = 2.7×10^8

Question 5 continues on the next page

Turn over ►



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0 5 . 4

Why do more people have severe water shortage now than in 2007?

[2 marks]

Tick (✓) **two** boxes.

Climate change has increased the area of deserts.

☒

Each person drinks less water.

☐

More water is used to grow crops.

☒

Sea levels have risen because the ice caps are melting.

☐

Some countries have built de-salting factories for seawater.

☐

Leaves on a tree contain carbon compounds.

In autumn the leaves fall to the ground.

0 5 . 5

Microorganisms in the soil recycle carbon from the leaves so that the carbon is used for new plant growth.

Explain how.

[4 marks]

Microorganisms use the leaves as a food source, decomposing them through respiration. As they respire they release carbon dioxide. This releases carbon from the leaves back into the atmosphere. This carbon dioxide then can be fixed again by plants through photosynthesis.



0 5 . 6 What is **one** benefit of fallen leaves for living plants?

[1 mark]

Tick (✓) **one** box.

Energy is released for living plants.

☐

Insect pests in the soil are killed.

☐

Nitrates are released into the soil.

☒

Oxygen is supplied to root cells.

☐

16

Turn over for the next question

Turn over ►



0 6

Water pollution is a problem for humans and wildlife.

Explain how human activities are polluting rivers, lakes and seas.

[6 marks]

A growing human population uses more and more fertilisers and pesticides, as well as produces more waste. These interfere with water ways and natural habitats. The entering of ~~for~~ nutrients from fertilisers and sewage can lead to eutrophication. Through this process algae rapidly grow, blocking out light for other plants. This leads to other plants dying and decomposers breaking them down. This creates an oxygen low water wasteland, ecologically destroying everything ~~nearly~~. On the other hand pesticides and other chemicals and waste, such as microplastics can build up in organisms along the food chain. We call this bio-accumulation. This can lead to suffering and eventual death of these organisms. Same results could be achieved with continuous release and dumping of industrial waste chemicals into waterways which can be carcinogenic, ~~radiating~~ and toxic to ~~the~~ fauna and flora.

END OF QUESTIONS

