Please write clearly in block capitals.

Centre number | | | | | | Candidate number | | | | |

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Forename(s) _____

Candidate signature _____

I declare this is my own work.

# GCSE
# COMBINED SCIENCE: TRILOGY

**F**

## Foundation Tier
## Biology Paper 1F

Tuesday 12 May 2026 Afternoon Time allowed: 1 hour 15 minutes

**Materials**

For this paper you must have:
- a ruler
- a scientific calculator.

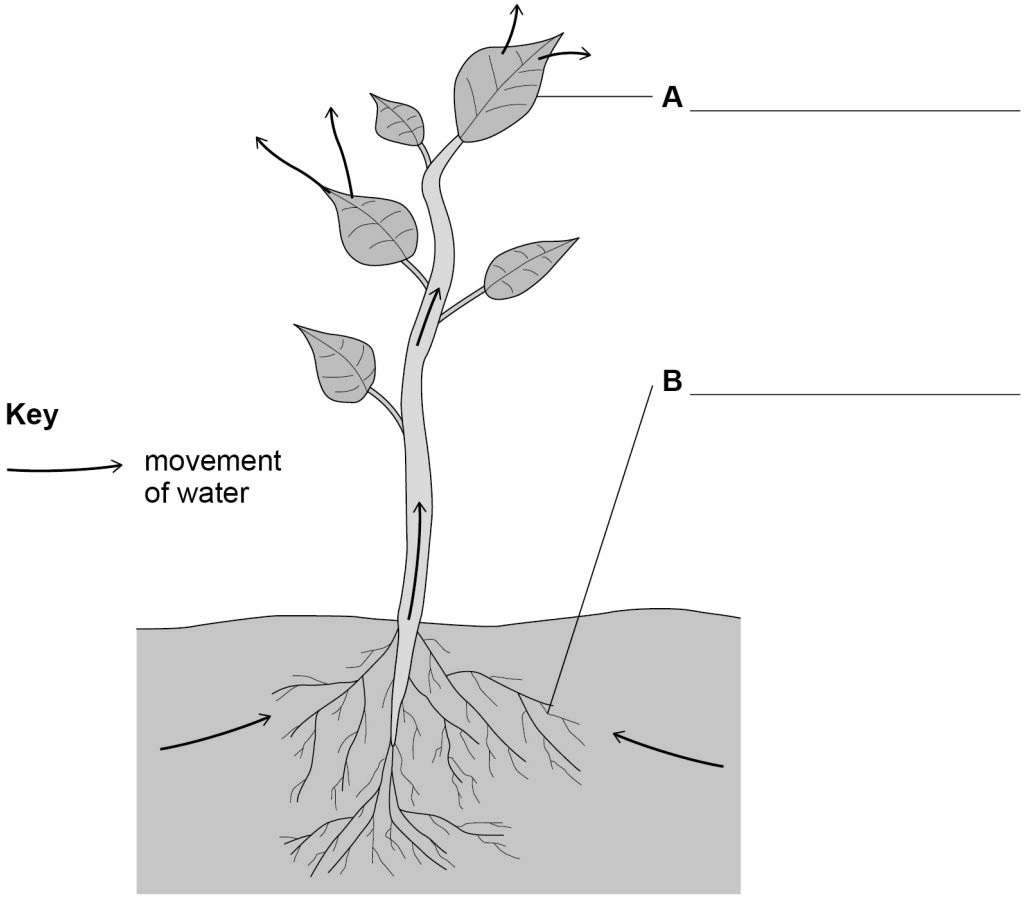
**Instructions**
- Use black ink or black ball-point pen.
- Pencil should only be used for drawing.
- Fill in the boxes at the top of this page.
- Answer **all** questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- If you need extra space for your answer(s), 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.

| For Examiner's Use | |
|---|---|
| Question | Mark |
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| 5 | |
| 6 | |
| 7 | |
| **TOTAL** | |

**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.

**0 1** **Figure 1** shows the movement of water through a plant.

**Figure 1**




**0 1 . 1** Organs **A** and **B** help move water through the plant.

Label organs **A** and **B** on **Figure 1**.

**[1 mark]**

**0 1 . 2** How do plants lose water?

**[1 mark]**

Tick (✓) **one** box.

By absorption ☐

By respiration ☐

By transpiration ☐

**0 1 . 3** Name the specialised cells that plants use to absorb water from the soil.

**[1 mark]**

_____

**Question 1 continues on the next page**

**Table 1** shows the rate of water loss from three plants.

The plants were the same size and were kept in the same conditions.

**Table 1**

| Plant | Rate of water loss in arbitrary units |
|---|---|
| **X** | 327 |
| **Y** | 204 |
| **Z** | 53 |

**0 1 . 4** Which plant in **Table 1** is most likely to die in a dry desert?

**[1 mark]**

Tick (✓) **one** box.

**X** ☐ **Y** ☐ **Z** ☐

**0 1 . 5** Which environmental change would cause an **increase** in the rate of water loss from plants?

**[1 mark]**

Tick (✓) **one** box.

Greater wind speed ☐

Lower air temperature ☐

More moisture in the air ☐

**0 1 . 6** Some plant cells go through the cell cycle.

The cell cycle has different stages.

Complete the sentences.

Choose answers from the box.

**[3 marks]**

| | | |
|---|---|---|
| **contracts** | **diffuses** | **divides** |
| **doubles** | **grows** | |

Before mitosis occurs, the plant cell _____.

When the DNA replicates, the number of chromosomes _____.

Finally, the cytoplasm _____.

8

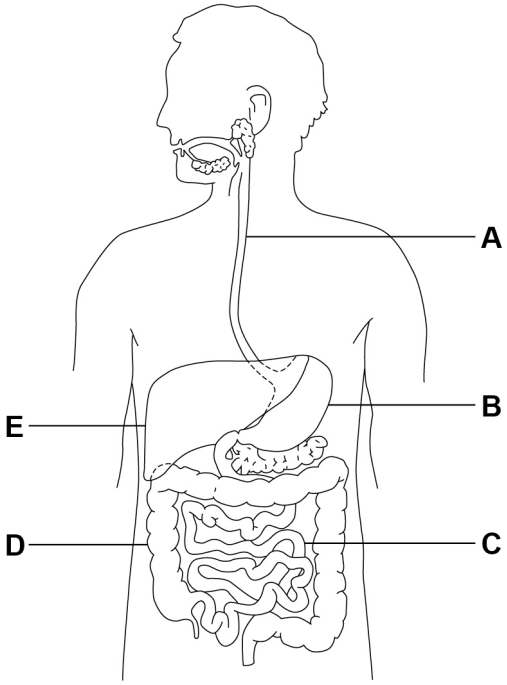
**Turn over for the next question**

**0 2** Digestion is the process of breaking down food.

Digested food is absorbed into the blood.

**Figure 2** shows the human digestive system.

**Figure 2**




**0 2 . 1** Which **two** organs produce digestive enzymes?

**[2 marks]**

Tick (✓) **two** boxes.

**A** ☐ **B** ☐ **C** ☐ **D** ☐ **E** ☐

**0 2 . 2** Where is digested food absorbed into the blood?

**[1 mark]**

Tick (✓) **one** box.

**A** ☐ **B** ☐ **C** ☐ **D** ☐ **E** ☐

**0 2 . 3** Which organ produces hydrochloric acid?

**[1 mark]**

Tick (✓) **one** box.

Liver ☐

Mouth ☐

Stomach ☐

Starch is digested by the enzyme amylase.

**0 2 . 4** Which statement is correct about amylase and starch in the 'lock and key theory'?

**[1 mark]**

Tick (✓) **one** box.

Amylase and starch are destroyed by low temperatures. ☐

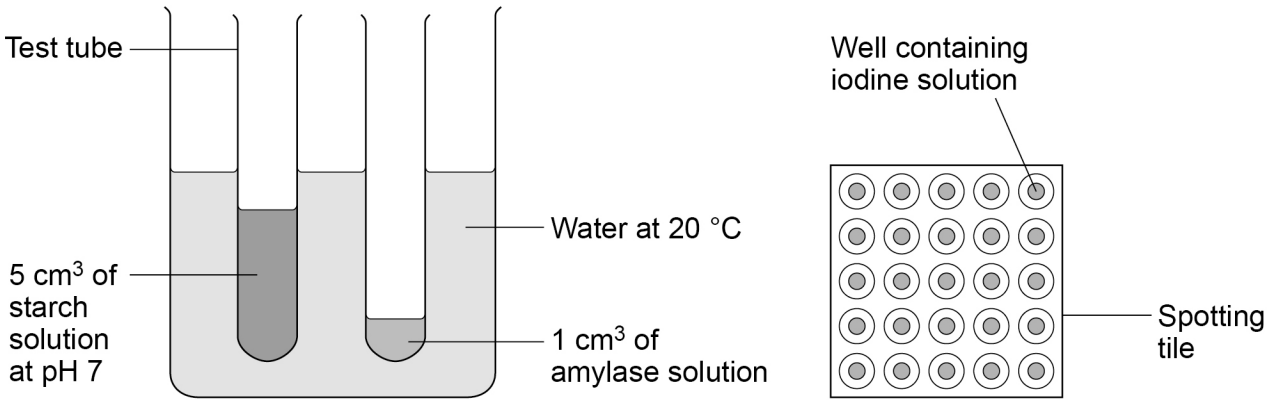
Amylase and starch bind together permanently. ☐

Amylase has an active site which is specific to starch. ☐

A student investigated the effect of pH on the activity of amylase.

**Figure 3** shows the apparatus.

**Figure 3**




This is the method used.

1. Set up the apparatus as shown in **Figure 3**.

2. Pour the starch solution into the amylase solution and mix. Start a timer.

3. Remove one drop of the mixture and place into a well of the spotting tile.

4. Repeat step 3 every minute.

5. Record the time when the iodine solution does **not** change colour.

6. Repeat steps 1 to 5 using starch solution at different pH values.

**0 2 . 5** The colour of iodine solution is yellow-brown.

What colour is iodine solution when starch is present?

**[1 mark]**

**Table 2** shows the results.

**Table 2**

| pH of mixture | Time taken for the iodine solution to NOT change colour in minutes |
|---|---|
| 5 | 9 |
| 6 | 6 |
| 7 | 2 |
| 8 | 9 |
| 9 | 14 |

**0 2 . 6** What is the optimum pH for amylase?

Give a reason for your answer.

Use **Table 2**.

**[2 marks]**

Tick (✓) **one** box.

pH 5 ☐ pH 6 ☐ pH 7 ☐ pH 8 ☐ pH 9 ☐

Reason _____

_____

**Question 2 continues on the next page**

**0 2 . 7** The student repeated the investigation at pH 3.

For 25 minutes, the iodine solution continued to change colour when the starch and amylase mixture was added.

Explain why the iodine solution continued to change colour.

**[2 marks]**

**0 2 . 8** The student then investigated the effect of temperature on the activity of amylase.

How could the student change the method to investigate the effect of temperature on the activity of amylase?

**[1 mark]**

Tick (✓) **one** box.

Keep the concentration of the solutions the same and change the pH. ☐

Keep the pH the same and change the temperature. ☐

Keep the temperature the same and change the concentration of the solutions. ☐

**11**

**0 3** Pathogens cause disease.

**0 3 . 1** Draw **one** line from each disease to the type of pathogen that causes the disease.

**[3 marks]**

| Disease | Type of pathogen |
| --- | --- |
| HIV | Bacteria |
| Rose black spot | Fungi |
| Salmonella food poisoning | Protists |
| | Viruses |

**Question 3 continues on the next page**

Tuberculosis (TB) is an infection caused by bacteria.

TB bacteria infect a person's lungs.

**0 3 . 2** Suggest **one** way TB bacteria are spread from one person to another person.

**[1 mark]**

**0 3 . 3** Which adaptation prevents TB bacteria entering the lungs?

**[1 mark]**

Tick (✓) **one** box.

Large surface area of alveoli ☐

Mucus in the trachea ☐

Thin capillary walls ☐

**0 3 . 4** What do white blood cells produce to defend the body against bacteria?

**[1 mark]**

Tick (✓) **one** box.

Antibodies ☐

Glucose ☐

Toxins ☐

**0 3 . 5** A vaccine for TB is available.

Complete the sentence.

Choose the answer from the box.

**[1 mark]**

| | | |
|---|---|---|
| **activated** | **excreted** | **weakened** |

The vaccine could contain TB bacteria that have been _____.

**0 3 . 6** A person with TB can be treated with antibiotics.

What is a possible problem linked to the overuse of antibiotics?

**[1 mark]**

Tick (✓) **one** box.

Bacteria will become resistant. ☐

Bacteria will spread more slowly. ☐

Bacteria will stop reproducing. ☐

**Question 3 continues on the next page**

Chlamydia is a sexually transmitted disease caused by bacteria.

**0 3 . 7** Suggest **one** way to reduce the spread of chlamydia.

Do **not** refer to vaccination or to antibiotics in your answer.

**[1 mark]**

**0 3 . 8** Aspirin is a painkiller.

Aspirin could be used by adults to treat the pain caused by chlamydia.

Where does aspirin originate from?

**[1 mark]**

Tick (✓) **one** box.

Foxglove ☐

Mould ☐

Willow ☐

**10**

**Turn over for the next question**

**DO NOT WRITE ON THIS PAGE**
**ANSWER IN THE SPACES PROVIDED**

**0 4** Bread is made using a mixture of flour, sugar, water and yeast.

The mixture is called dough.

The dough increases in volume before being cooked.

A student investigated how temperature affects the volume of the dough.

This is the method used.

1. Make a dough using flour, sugar, water and yeast.

2. Pour 20 $cm^3$ of dough into five measuring cylinders.

3. Place each measuring cylinder into a different water bath. Each water bath is at a different temperature.

4. Record the volume of the dough after one hour.

**Figure 4** shows some of the apparatus used.

**Figure 4**

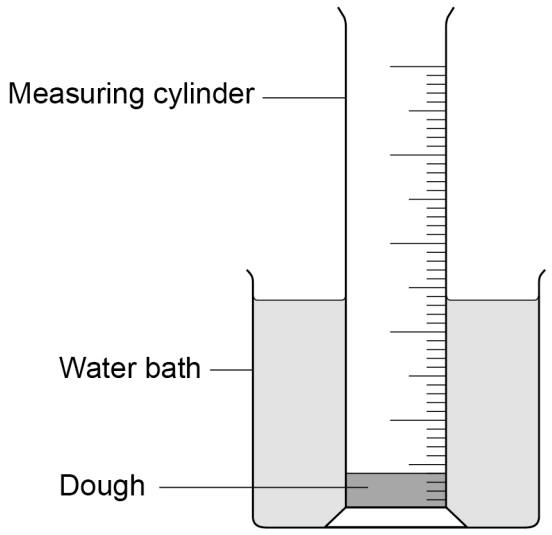


**Table 3** shows the results.

**Table 3**

| Temperature in °C | Volume of dough after one hour in $cm^3$ |
|---|---|
| 20 | 45 |
| 30 | 80 |
| 40 | 115 |
| 50 | 120 |
| 60 | 100 |

**0 4 . 1** Give **one** control variable the student used in the investigation.

Do **not** refer to the measuring cylinder in your answer.

**[1 mark]**

**0 4 . 2** How many times greater is the volume of dough after one hour at 30 °C than at the start?

**[2 marks]**

Number of times greater = _____

**0 4 . 3** Which temperature causes the dough to increase in volume the most?

**[1 mark]**

Tick (✓) **one** box.

20 °C ☐ 30 °C ☐ 40 °C ☐ 50 °C ☐ 60 °C ☐

**0 4 . 4** The volume of dough increases because the yeast produces carbon dioxide.

Which process produces carbon dioxide?

**[1 mark]**

Tick (✓) **one** box.

Differentiation ☐

Fermentation ☐

Mitosis ☐

**0 4 . 5** The student used glucose to make the dough.

Glucose is a type of sugar.

Why was glucose added to the dough?

**[1 mark]**

**0 4 . 6** Yeast is also used when making alcoholic drinks.

The yeast produces carbon dioxide and ethanol.

Draw **one** line from each product to its use in making alcoholic drinks.

**[2 marks]**

| **Product** | **Use in alcoholic drinks** |
|---|---|
| Carbon dioxide | To add bubbles |
| Ethanol | To give the drinks colour |
| | To provide the alcohol |

**0 4 . 7** During high intensity exercise, humans produce lactic acid in muscles.

Give **one** effect lactic acid has on the muscles.

**[1 mark]**

_____

_____

9

**Turn over for the next question**

**0 5** Plants carry out photosynthesis.

**0 5 . 1** Complete the word equation for photosynthesis.

**[2 marks]**

_____ + water $\xrightarrow{\text{light}}$ _____ + _____

**0 5 . 2** Name the plant **tissue** where the most photosynthesis takes place.

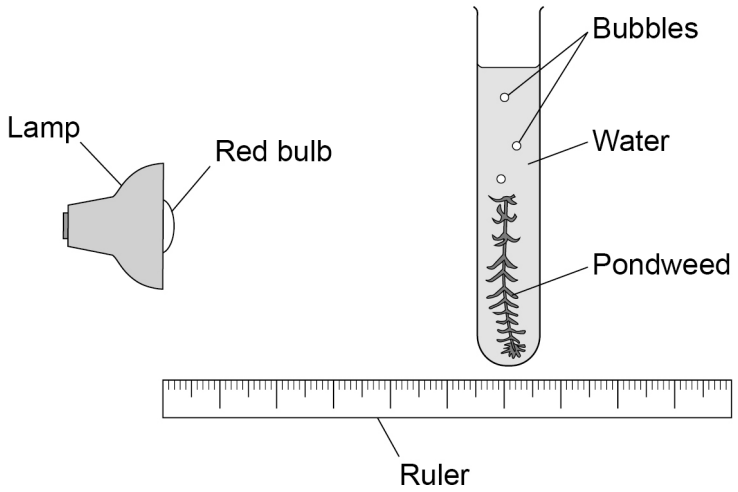
**[1 mark]**

_____

A student investigated how the colour of light affects the rate of photosynthesis.

**Figure 5** shows the apparatus used.

**Figure 5**



This is the method used.

1. Place a lamp with a red bulb 6 cm from the pondweed.

2. Count the number of bubbles released from the pondweed each minute for 3 minutes.

3. Repeat steps 1 and 2 using bulbs that produce different colours of light.

**0 5 . 3** What was the independent variable in the investigation?

**[1 mark]**

Tick (✓) **one** box.

The colour of the light from the bulb ☐

The distance between the bulb and the pondweed ☐

The length of the piece of pondweed ☐

**0 5 . 4** How could the student improve the investigation?

**[1 mark]**

Tick (✓) **one** box.

Control the temperature of the water ☐

Switch on the other lights in the room ☐

Use a different type of pondweed each time ☐

**Question 5 continues on the next page**

**Table 4** shows the results.

**Table 4**

| Colour of light | Number of bubbles produced in one minute | | | |
|---|---|---|---|---|
| | 1st minute | 2nd minute | 3rd minute | Mean |
| Red | 24 | 19 | 20 | **X** |
| Yellow | 18 | 14 | 16 | 16 |
| Blue | 32 | 49 | 32 | 32 |

**0 5 . 5** Calculate mean value **X** in **Table 4**.

**[2 marks]**

Mean value **X** = _____ bubbles

**0 5 . 6** The student identified one anomalous result.

Draw a ring around the anomalous result in **Table 4**.

**[1 mark]**

**0 5 . 7** Give the range of the results for yellow light.

Use **Table 4**.

**[1 mark]**

Range = from _____ to _____ bubbles

**0 5 . 8** Plants do **not** absorb much green light.

Explain why pondweed in green light would **not** produce many bubbles.

**[2 marks]**

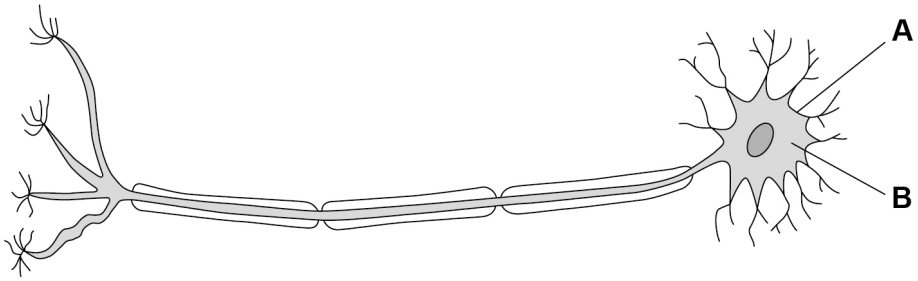
11

**Turn over for the next question**

**0 6** Some cells are specialised for a particular function.

**Figure 6** shows a nerve cell.

**Figure 6**




**0 6 . 1** Name parts **A** and **B** in **Figure 6**.

**[2 marks]**

**A** _____

**B** _____

**0 6 . 2** Explain **one** way a nerve cell is adapted to its function.

**[2 marks]**

_____

_____

_____

_____

**0 6 . 3** A different nerve cell has a real length of 0.15 mm.

The nerve cell is viewed at a magnification of ×40

Calculate the image length.

Use the equation:

$$\text{magnification} = \frac{\text{image length}}{\text{real length}}$$

**[3 marks]**

Image length = _____ mm

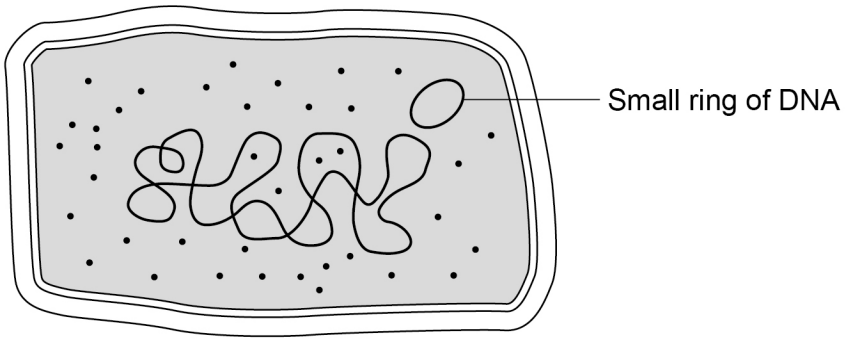
**Question 6 continues on the next page**

**0 6 . 4** Nerve cells are eukaryotic cells.

Bacteria are prokaryotic cells.

**Figure 7** shows a prokaryotic cell.

**Figure 7**




Complete the sentences.

Choose answers from the box.

**[2 marks]**

| | | | |
|---|---|---|---|
| **cell wall** | **nucleus** | **plasmid** | **ribosome** |

The DNA in a eukaryotic cell is contained in a _____.

The prokaryotic cell contains a small ring of DNA

called a _____.

9

**Turn over for the next question**

**DO NOT WRITE ON THIS PAGE**
**ANSWER IN THE SPACES PROVIDED**

**0 7** Geese are birds that fly to warmer countries during the autumn.

Different species of geese fly at different heights.

The amount of oxygen available to geese changes depending on how high the geese fly.

**Table 5** shows the effect of height on the oxygen available to geese.

**Table 5**

| Height above sea level in kilometres | Oxygen available in arbitrary units |
|---|---|
| 0 | 21.0 |
| 2 | 16.0 |
| 4 | 12.5 |
| 6 | 9.5 |
| 8 | 7.5 |
| 10 | 6.0 |

**0 7 . 1** Describe the relationship between height above sea level and the oxygen available.

Use **Table 5**.

**[1 mark]**

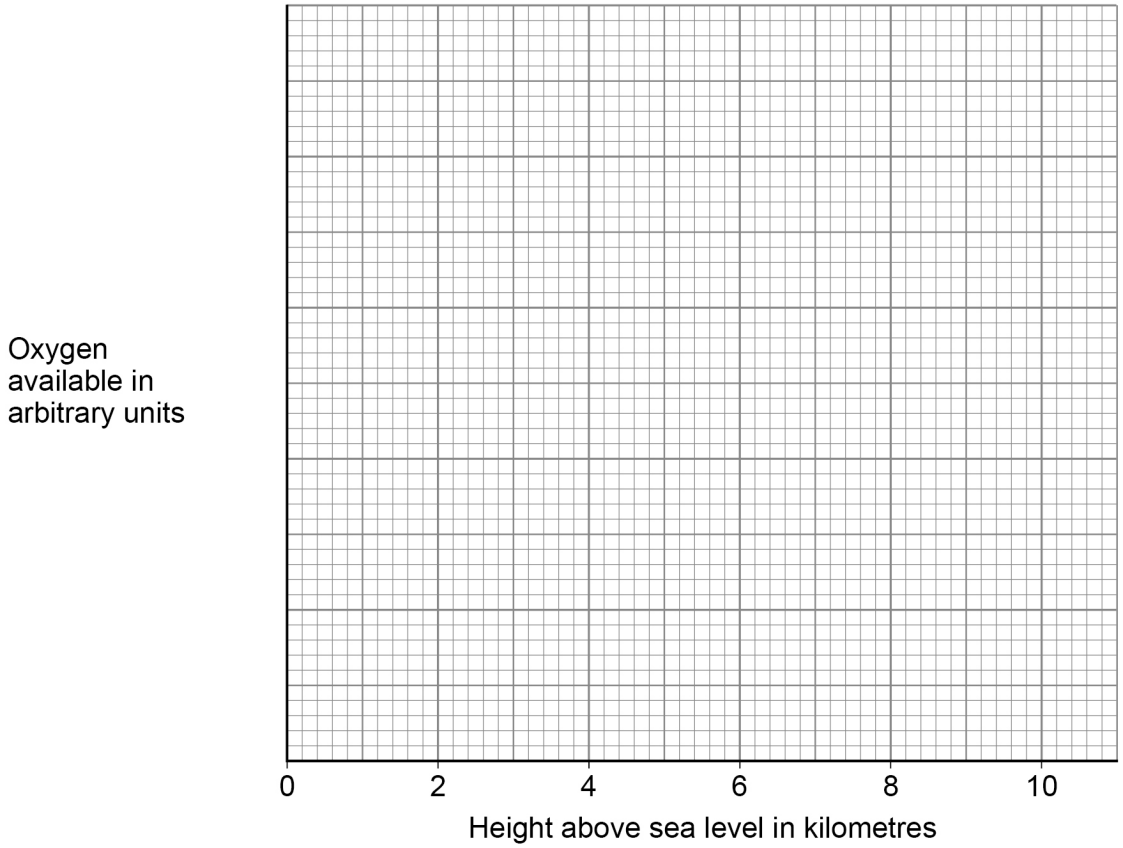
**0 7 . 2** Complete **Figure 8**.

You should:

- use a suitable scale for the *y*-axis
- plot the data from **Table 5**
- draw a line of best fit.

**[4 marks]**

**Figure 8**




**0 7 . 3** How much oxygen is available for geese flying at a height of 7.5 kilometres?

Use **Figure 8**.

**[1 mark]**

Oxygen available = _____ arbitrary units

**Question 7 continues on the next page**

**0 7 . 4** **Table 6** shows information about two species of geese.

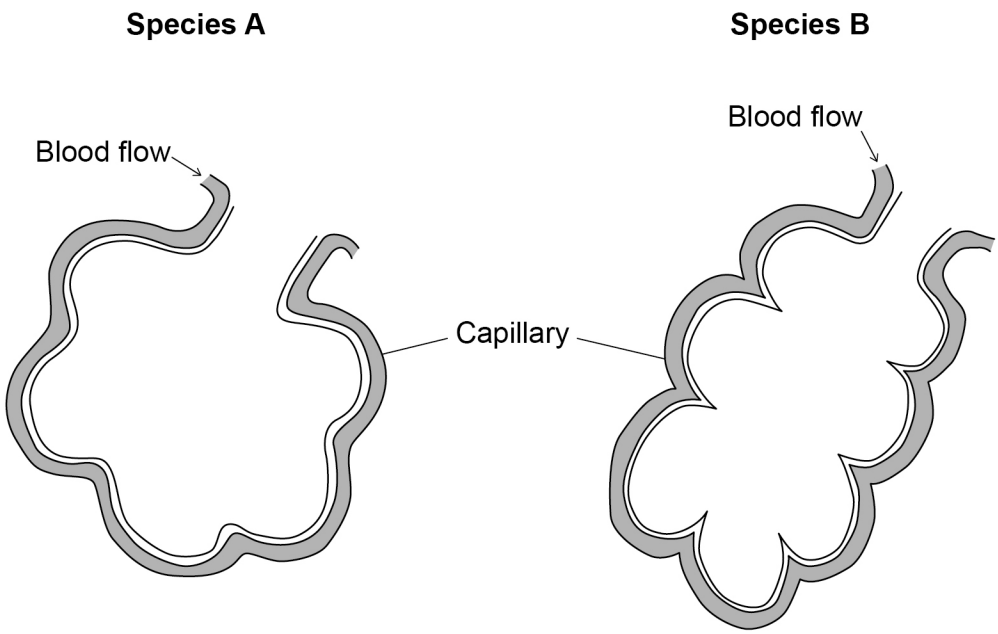
Cardiac output is the volume of blood pumped out of the heart in one minute.

**Table 6**

| | **Species A** | **Species B** |
|---|---|---|
| Maximum flying height in kilometres above sea level | 2 | 7 |
| Lung volume in $cm^3$/kg of body mass | 11 | 18 |
| Percentage (%) increase in cardiac output at maximum flying height (compared to at sea level) | 18 | 110 |
| Number of red blood cells per $mm^3$ of blood | $4.0 \times 10^6$ | $4.8 \times 10^6$ |

**Figure 9** shows alveoli from the lungs of each species.

**Figure 9**



Explain why species **B** can fly at a greater height above sea level than species **A**.

Use **Table 6** and **Figure 9**.

**[6 marks]**

Extra space

12

**END OF QUESTIONS**

**There are no questions printed on this page**

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**ANSWER IN THE SPACES PROVIDED**

| Question number | **Additional page, if required.**<br>**Write the question numbers in the left-hand margin.** |
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