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BIOLOGY **0610/33**

Paper 3 Theory (Core) **May/June 2026**

1 hour 15 minutes

You must answer on the question paper.

No additional materials are needed.

INSTRUCTIONS
- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen. Do **not** use correction fluid or tape.
- Do **not** write on any bar codes.
- You may use a calculator.
- You should show all your working and use appropriate units.

INFORMATION
- The total mark for this paper is 80.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **20** pages. Any blank pages are indicated.

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1 **(a)** All biological molecules contain elements.

View solution

Complete Table 1.1 by placing ticks (✓) in the boxes to show the elements that each biological molecule contains.

Table 1.1

biological molecule	element			
	carbon	hydrogen	nitrogen	oxygen
carbohydrate				
fat				
protein				

[3]

(b) State the name of the smaller molecules that join to form proteins.

View solution

..... [1]

(c) **(i)** State where hydrochloric acid acts in the digestive system.

View solution

..... [1]

(ii) Describe **two** functions of hydrochloric acid in the digestive system.

View solution

1 .....

2 .....

[2]

[Total: 7]

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2 **(a)** The box on the left shows the beginning of a sentence about water.

View solution

The boxes on the right show some sentence endings.

Draw **three** lines from the box on the left to the boxes on the right to make three correct sentences.

Water	cannot move through cell walls.
	is a product of photosynthesis.
	is a solvent.
	is absorbed in the colon.
	moves through partially permeable membranes.
	uses energy from respiration to move.

[3]

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(b) Scientists investigated the effect of four different concentrations of salt solution on the volume of red blood cells.

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First, they measured the volumes of 10 red blood cells and calculated a mean value.

Then they placed red blood cells into four different solutions.

After 10 minutes, they removed 10 red blood cells from each solution. They measured the volumes of the red blood cells and calculated the final mean volumes.

Table 2.1 shows the results.

Table 2.1

percentage concentration of the salt solution	initial mean volume of the red blood cells / arbitrary units	final mean volume of the red blood cells / arbitrary units
0.4	100	139
0.8	100	107
1.2	100	71
1.6	100	30

Complete the sentences to describe the data shown in Table 2.1.

As the percentage concentration of salt solution increases, the final mean volume of

the red blood cells ..... .

The final mean volume of the red blood cells is greater than the initial volume in

.....% salt solution and .....% salt solution.

The mean volume of the red blood cells in the 1.6% salt solution changes

by ..... arbitrary units.

[3]

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(c) Some red blood cells and some plant cells were placed in distilled water for 10 minutes.

View solution

After 10 minutes the red blood cells had burst. The plant cells increased in volume but did **not** burst.

(i) State the name of the process by which water diffuses into cells.

..... [1]

(ii) Suggest a reason why the plant cells do **not** burst when placed in distilled water.

..... [1]

[Total: 8]

View solution

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3 **(a)** Figure 3.1 is a diagram of a cell from a leaf.

View solution

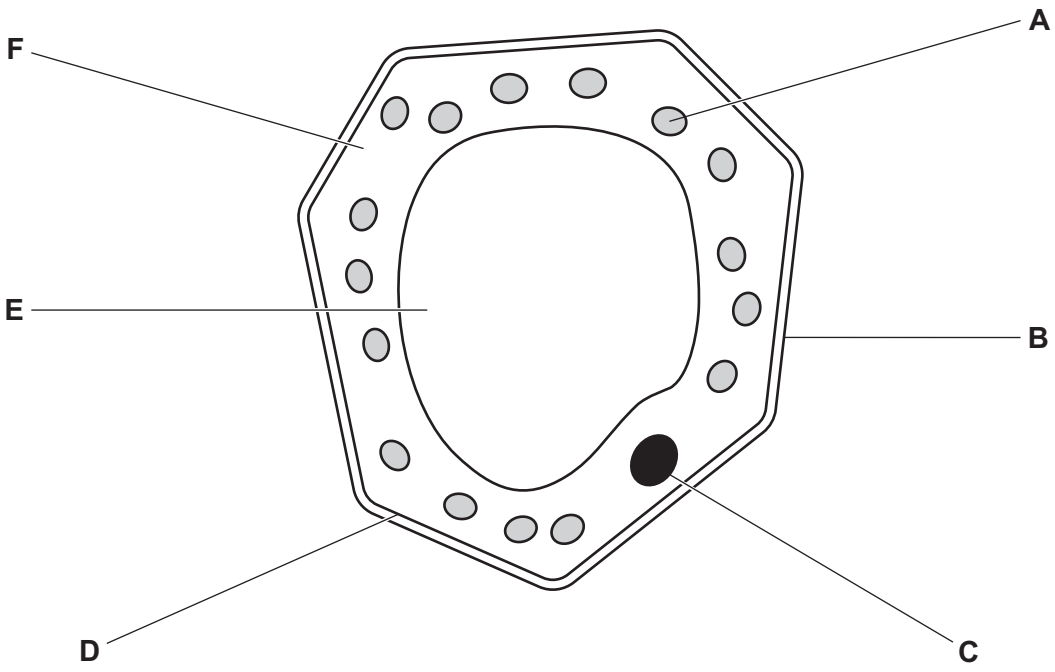

Figure 3.1

(i) Use the information in Figure 3.1 to complete Table 3.1.

Table 3.1

cell component feature	letter from Figure 3.1
contains the chromosomes	
controls substances moving into and out of the cell	
contains the cell sap	
where most of the chemical reactions take place	

[4]

(ii) State how new cells are produced.

..... [1]

View solution

(b) Figure 3.2 is a diagram of a cross-section of part of a leaf.

View solution

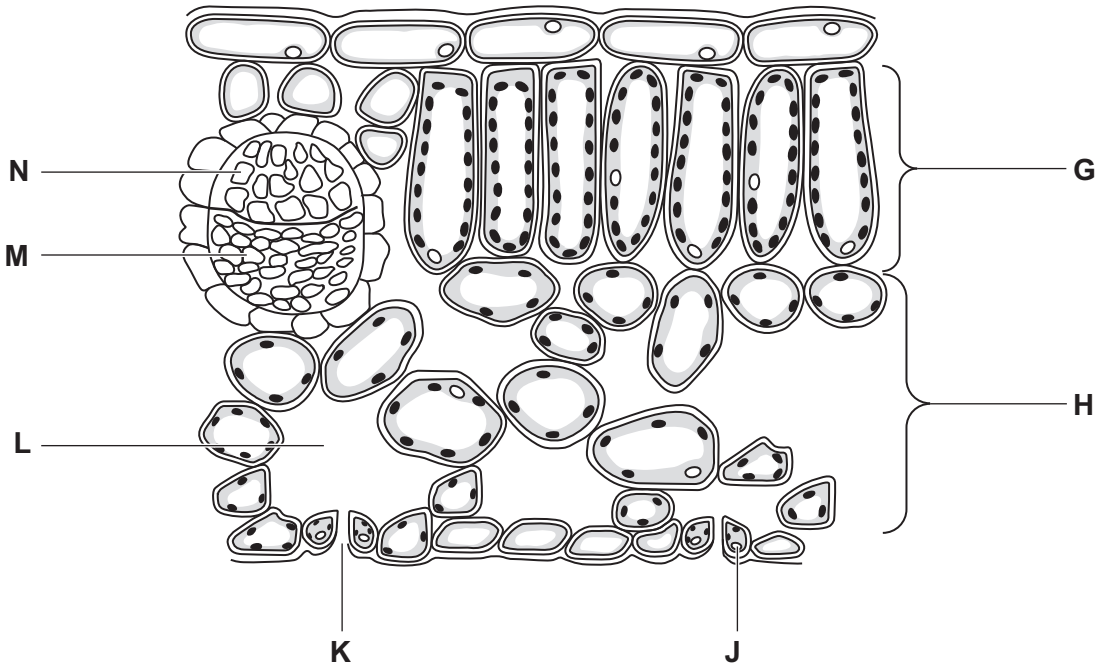

Figure 3.2

(i) Describe how tissue **G** in Figure 3.2 is adapted for photosynthesis.

.....

.....

.....

.....

.....

.....

..... [3]

(ii) State the letter of the structure shown in Figure 3.2 that supplies the leaf with water and mineral ions.

..... [1]

(iii) State the names of **J** and **K** in Figure 3.2.

J .....

K .....

[2]

[Total: 11]

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4 **(a)** Enzymes are biological catalysts.

View solution

(i) Describe the meaning of the term catalyst.

.....

.....

.....

.....

..... [2]

View solution

(ii) Complete the sentences about enzymes.

Enzymes are involved in all ..... reactions.

Enzyme activity is affected by ..... and pH.

Enzymes are used in the digestive system to catalyse the breakdown of large food molecules into smaller molecules, so that they can be ..... .

[3]

View solution

(iii) Figure 4.1 is a diagram of a digestive enzyme, its substrate, and the products of enzyme action.

Label the active site **and** a product on Figure 4.1.

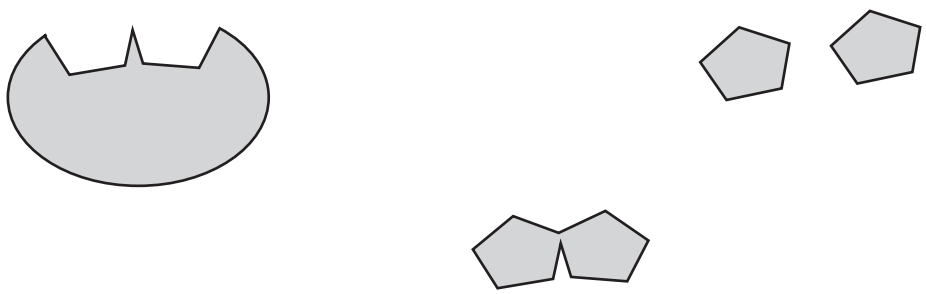

Figure 4.1

[2]

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(b) Figure 4.2 shows the percentage enzyme activity at a range of pH values.

View solution

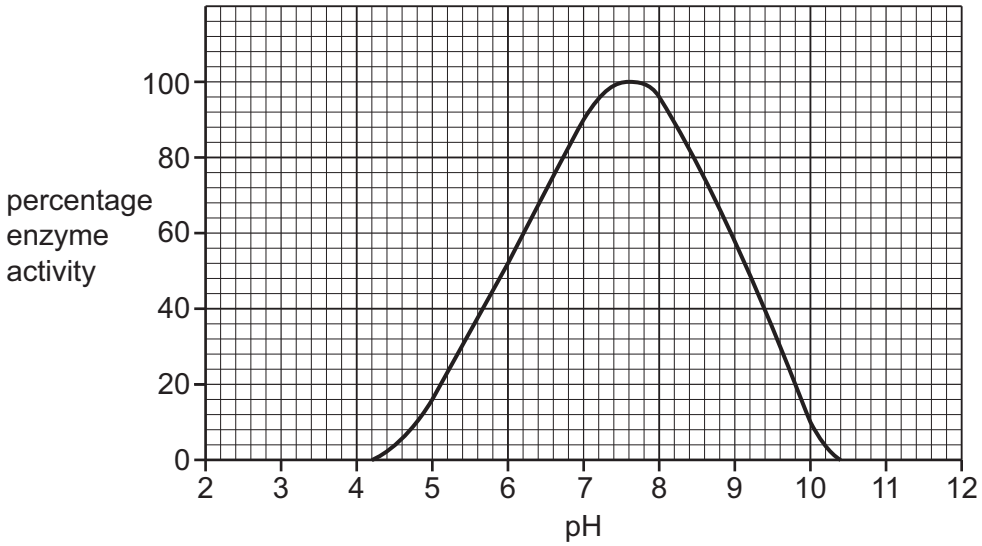

Figure 4.2

(i) Describe the effect of pH on the activity of the enzyme shown in Figure 4.2.

.....

.....

.....

.....

.....

.....

..... [3]

(ii) The product of the enzyme catalysed reaction investigated in Figure 4.2 gave a positive result when tested with Benedict's solution.

View solution

State the name of the product of the reaction.

..... [1]

(c) State the name of the enzyme that catalyses the breakdown of starch.

View solution

..... [1]

[Total: 12]

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5 **(a)** Figure 5.1 is a diagram of the human heart and associated blood vessels.

View solution

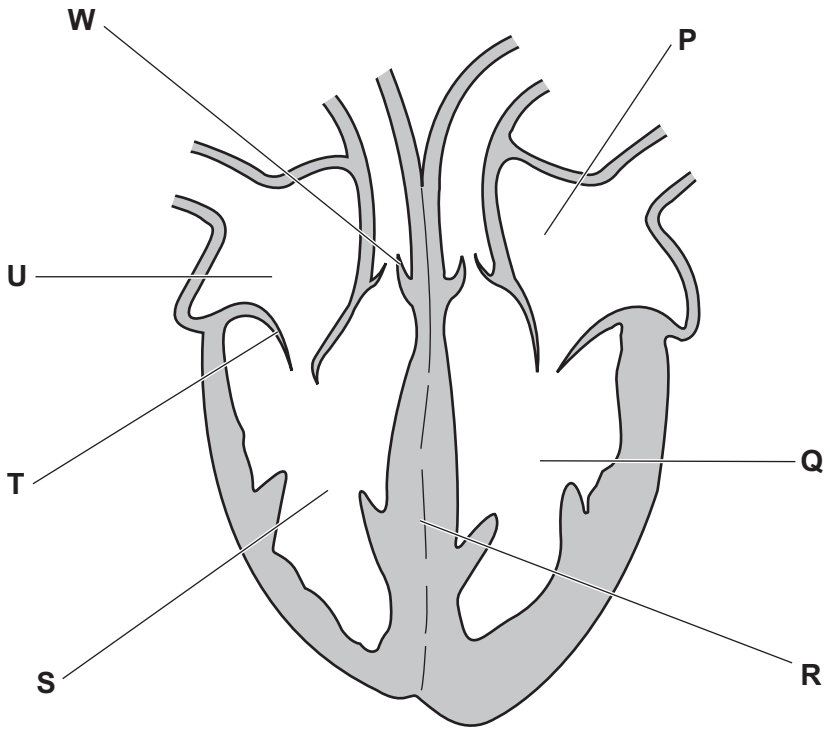

Figure 5.1

(i) State **one** letter from Figure 5.1 that identifies:

a structure that ensures blood flows in one direction .....

the left ventricle .....

the septum .....

[3]

View solution

(ii) The list shows six statements about the circulatory system.

Place ticks (✓) in **two** boxes to show which statements are correct.

An ECG is one way of monitoring the activity of the heart.	
Capillaries pump blood around the body.	
Coronary arteries supply the heart with carbon dioxide.	
The walls in arteries are thinner than the walls in veins.	
Veins return blood to the heart.	

[2]

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(b) A 24-year-old person started an exercise programme to improve their fitness.

The person was advised to keep their heart rate below 60% of the recommended maximum heart rate when exercising.

The recommended maximum heart rate, in beats per minute (bpm), can be calculated using the formula:

View solution

recommended maximum heart rate = 220 – age in years

- Calculate the recommended maximum heart rate for this 24-year-old person.

..... bpm

- Calculate the heart rate that is 60% of their recommended maximum heart rate.

  Give your answer as a whole number.

..... bpm
[3]

(c) State the name of a hormone that increases heart rate.

View solution

..... [1]

[Total: 9]

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6 **(a)** **(i)** State the word equation for anaerobic respiration in humans.

..... [2]

(ii) Circle the correct word or phrase to make **three** correct sentences about respiration.

View solution

Respiration is a chemical reaction in cells that breaks down **all / nutrient / waste** molecules to release energy.

Compared to aerobic respiration, anaerobic respiration releases **less / more / the same amount of** energy per molecule respired.

Aerobic respiration occurs in **chloroplasts / mitochondria / vacuoles**.

[3]

(b) State **three** uses of the energy released by respiration.

View solution

1 .....

2 .....

3 .....

[3]

[Total: 8]

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7 **(a)** Complete the sentences about sense organs.

View solution

Each sense organ is a group of ..... cells. These cells respond to specific ..... . The cells can respond to light, ..., temperature, ... or touch.

[4]

View solution

(b) Figure 7.1 is a diagram of the human eye.

On Figure 7.1, label the structure that focuses light onto the retina with the name and a label line.

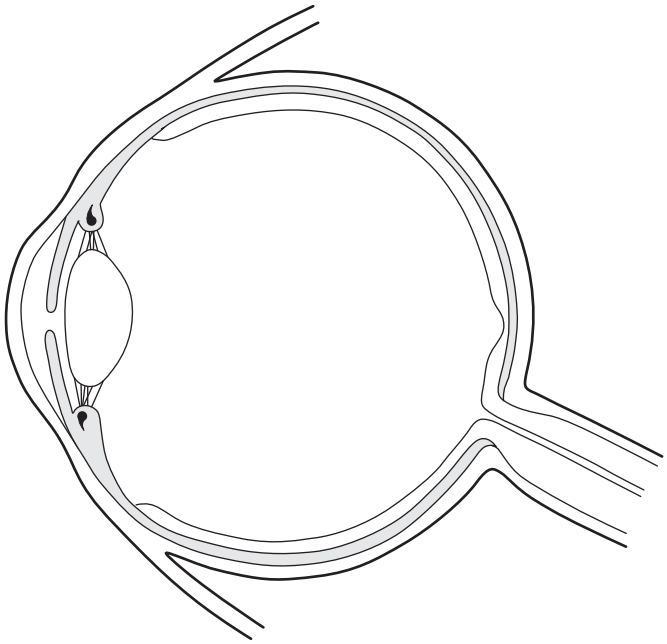

Figure 7.1

[2]

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(c) Figure 7.2 and Figure 7.3 are diagrams showing the response of an eye to different light conditions.

View solution

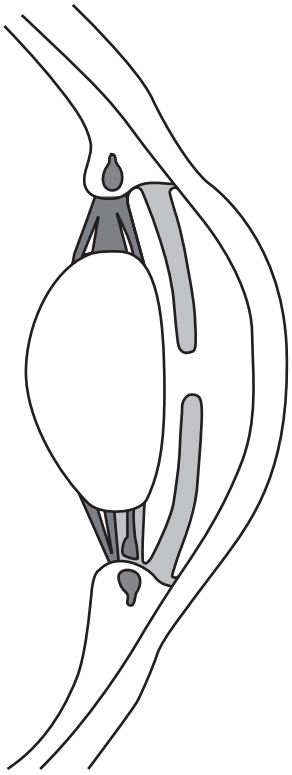

Figure 7.2

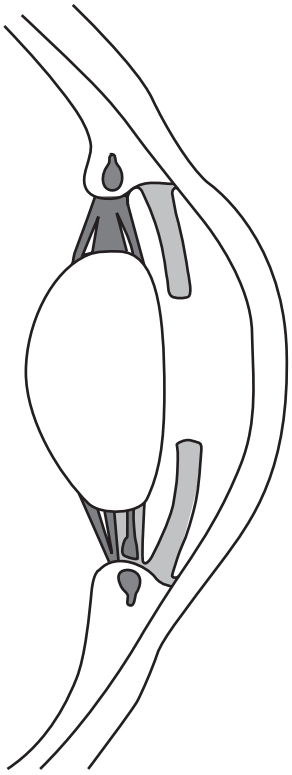

Figure 7.3

(i) Describe the difference between Figure 7.2 and Figure 7.3.

.....

.....

..... [1]

(ii) Explain the importance of the response shown in Figure 7.2 and Figure 7.3.

View solution

.....

.....

..... [1]

[Total: 8]

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8 **(a)** Figure 8.1 shows part of the carbon cycle.

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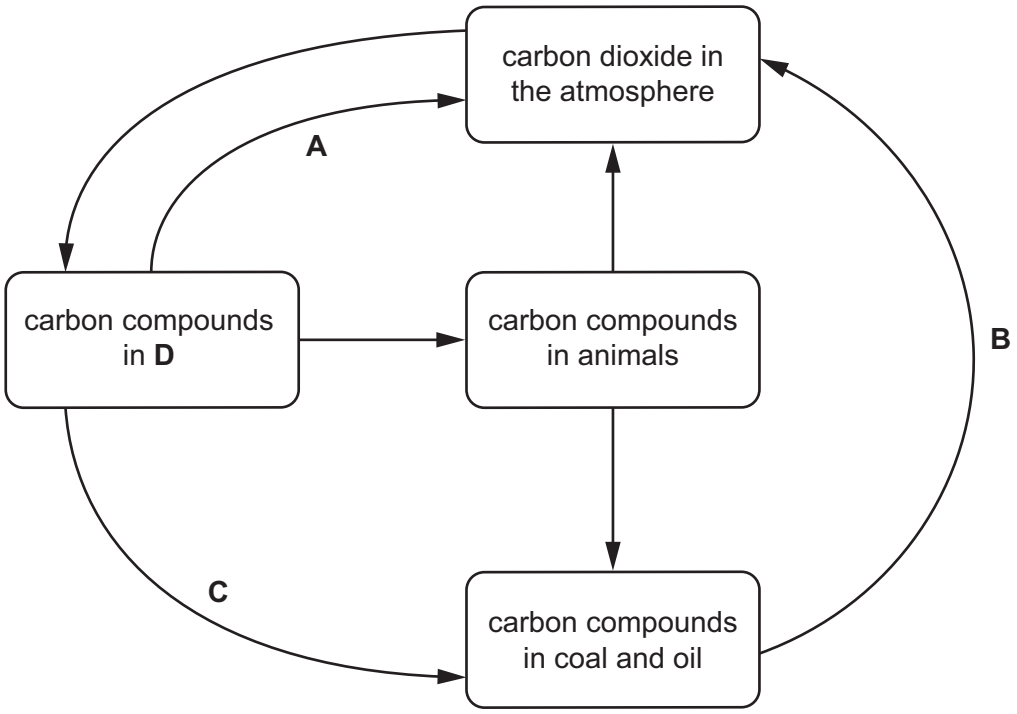

Figure 8.1

(i) State the name of **D** in Figure 8.1.

..... [1]

(ii) State the name of the processes labelled **A**, **B** and **C** in Figure 8.1.

View solution

A .....

B .....

C .....

[3]

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(b) Scientists have observed increasing levels of methane in the atmosphere.

(i) Describe the sources of methane **and** the effects of methane pollution on ecosystems.

.....

.....

.....

.....

.....

.....

.....

.....

..... [4]

View solution

(ii) Figure 8.2 shows the estimated changes in the methane concentration in the atmosphere from the year 200 to the year 2000.

View solution

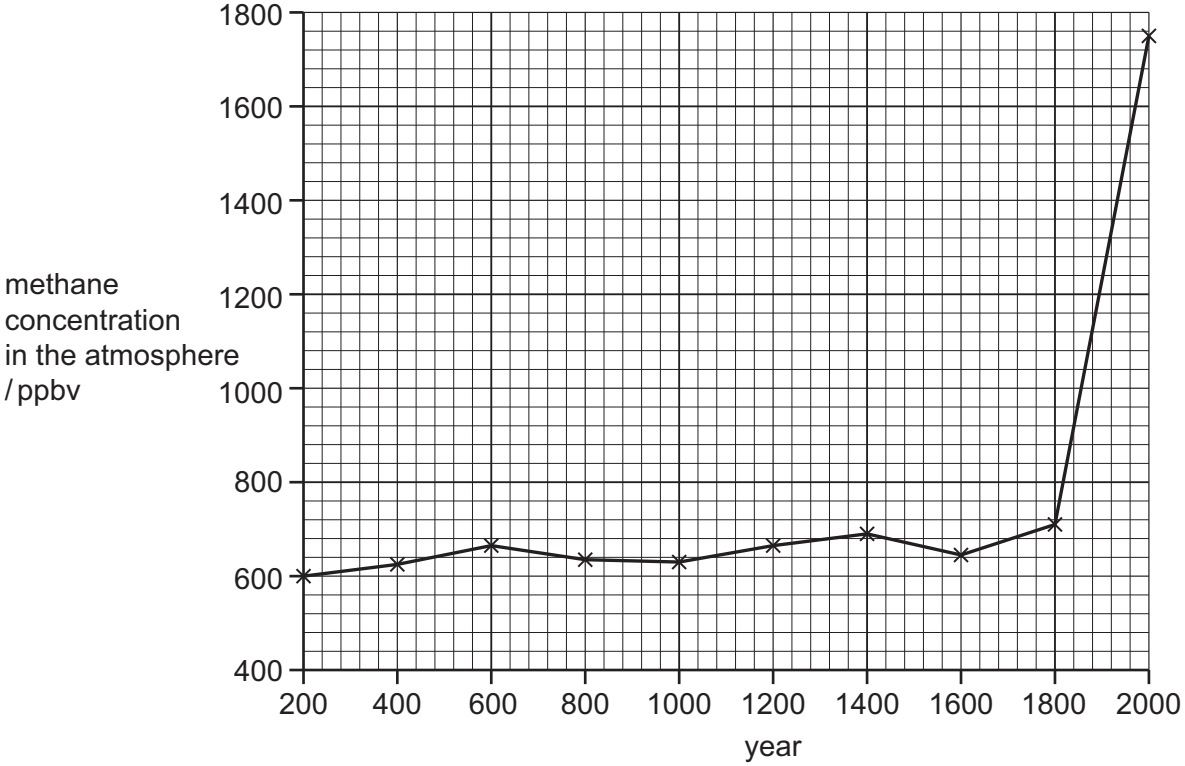

Figure 8.2

The list shows some statements about the data in Figure 8.2.

Tick (✓) **three** statements that are correct for these data.

The greatest increase in methane concentration was between the years 1600 and 1800.	
The maximum methane concentration reached was greater than 1720 ppbv in the year 2000.	
The methane concentration decreased between the years 1400 and 1600.	
The methane concentration was greater than 700 ppbv between the years 600 and 800.	
The overall trend is for the methane concentration to increase.	
The years 600 and 1400 have the same methane concentration.	

[3]

[Total: 11]

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9 **(a)** Figure 9.1 is a photograph of a female goat, *Capra hircus*.

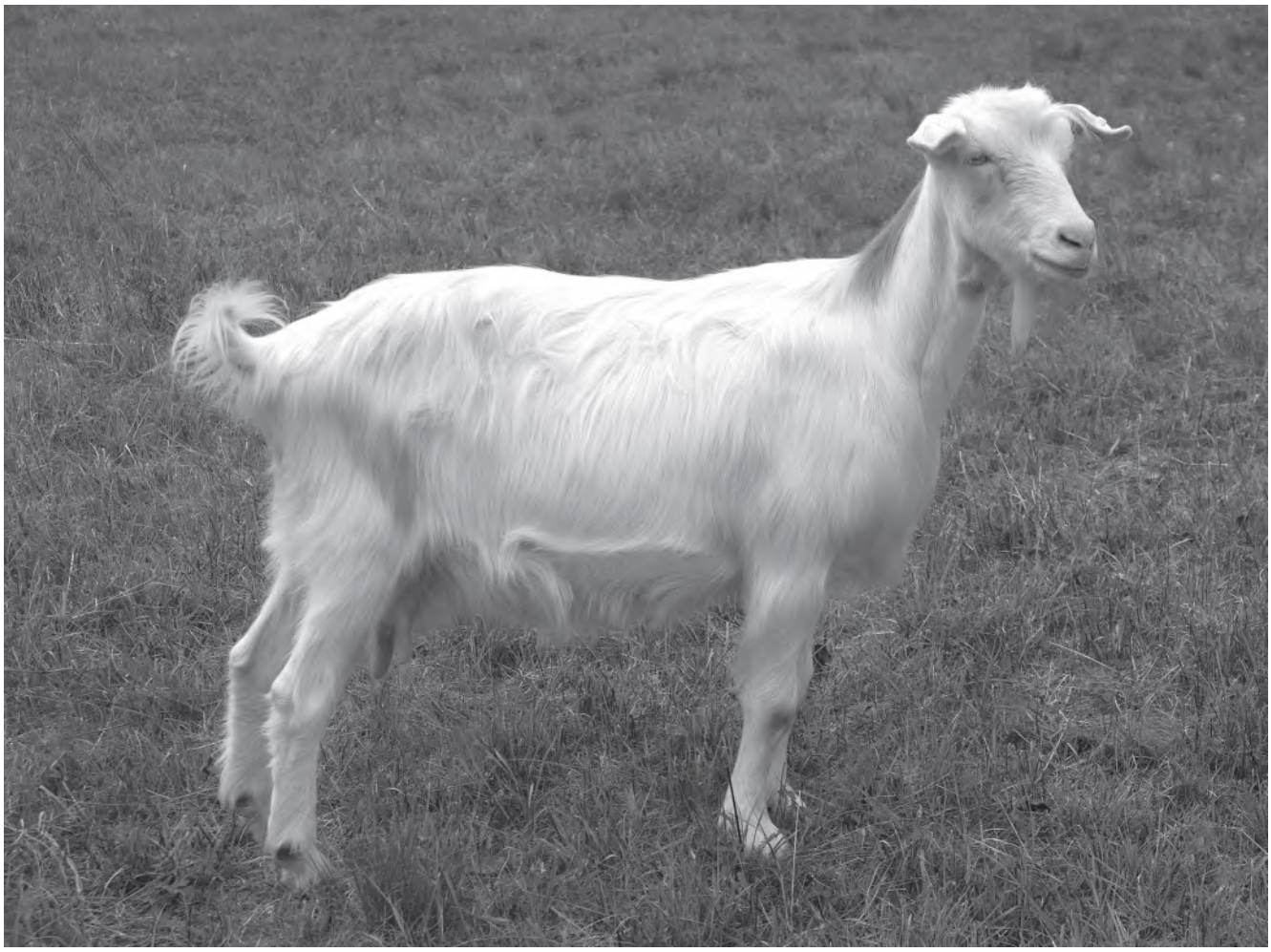

Figure 9.1

View solution

(i) State the genus of the goat in Figure 9.1.

..... [1]

(ii) State **two** features, visible in Figure 9.1, that classify the goat as a mammal.

View solution

1 .....

2 .....

[2]

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(b) Goats are often kept as livestock.

View solution

Some types of livestock are farmed intensively.

Underline **three** statements that describe **advantages** of intensive livestock production compared to non-intensive livestock production.

- Less agricultural land is needed.
- Livestock grow faster.
- Livestock must have food provided for them.
- Optimum conditions can be provided.
- There is a greater chance of infections being transmitted between animals.
- There is a greater chance of environmental damage.

[3]

[Total: 6]

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