



Cambridge IGCSE™ (9–1)

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BIOLOGY

0970/03

Paper 3 Theory (Core)

For examination from 2023

SPECIMEN PAPER

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 or correction fluid.
- 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 **22** pages. Any blank pages are indicated.

1 Fig. 1.1 is a photograph of a lion.



Fig. 1.1

(a) Lions are mammals and have the scientific name *Panthera leo*.

(i) State **one** feature **visible** in Fig. 1.1 that identifies the lion as a mammal.

..... [1]

(ii) State the genus of this mammal.

..... [1]

(b) Mammals are one of the five groups of vertebrates.

Some features of three vertebrate groups are listed.

Identify the vertebrate groups.

lay soft-shelled eggs

feathers

smooth, moist skin

[3]

(c) Fig. 1.2 is a diagram of an animal cell.

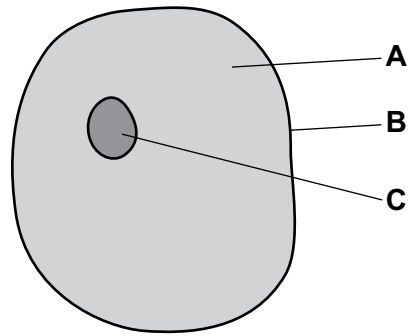


Fig. 1.2

(i) Identify the parts labelled **A**, **B** and **C** in Fig. 1.2.

A

B

C

[3]

(ii) State the names of **two** structures in plant cells that are absent in animal cells.

1

2

[2]

(iii) State the name of **one** structure that is present in bacterial cells and in plant cells but absent in animal cells.

..... [1]

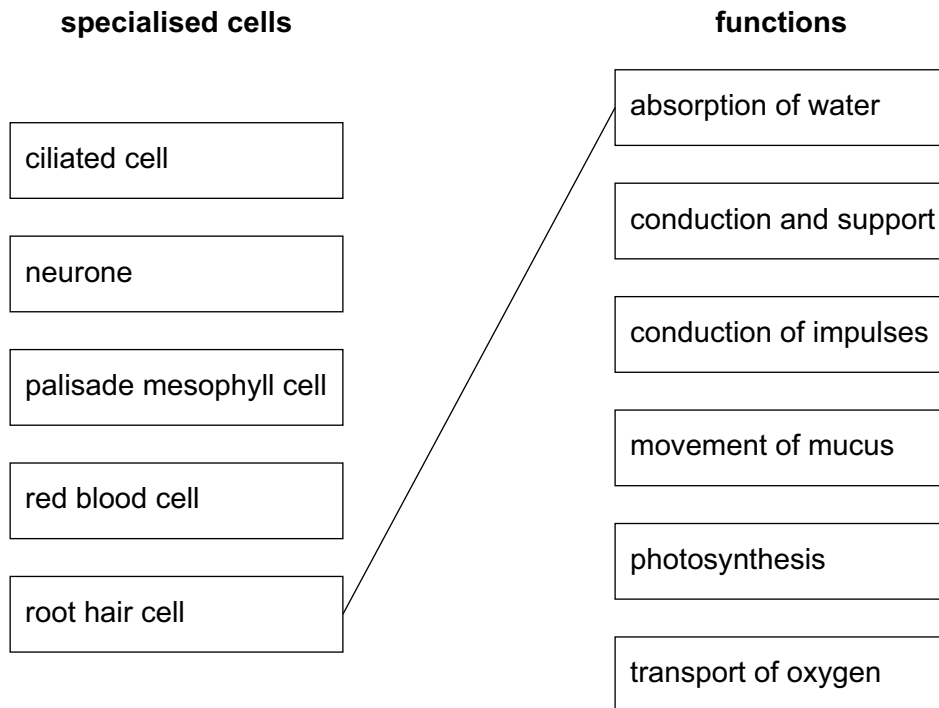
(d) Some cells are specialised to perform a particular function.

The boxes on the left show the names of some specialised cells.

The functions of some specialised cells are in the boxes on the right.

Draw **four** lines to link each specialised cell with its function.

One line has been drawn for you. Draw four additional lines.



[4]

[Total: 15]

- 2 (a) A student performed different types of activity.

She measured her heart rate during each type of activity in beats per minute (bpm).

The results are shown in Fig. 2.1.

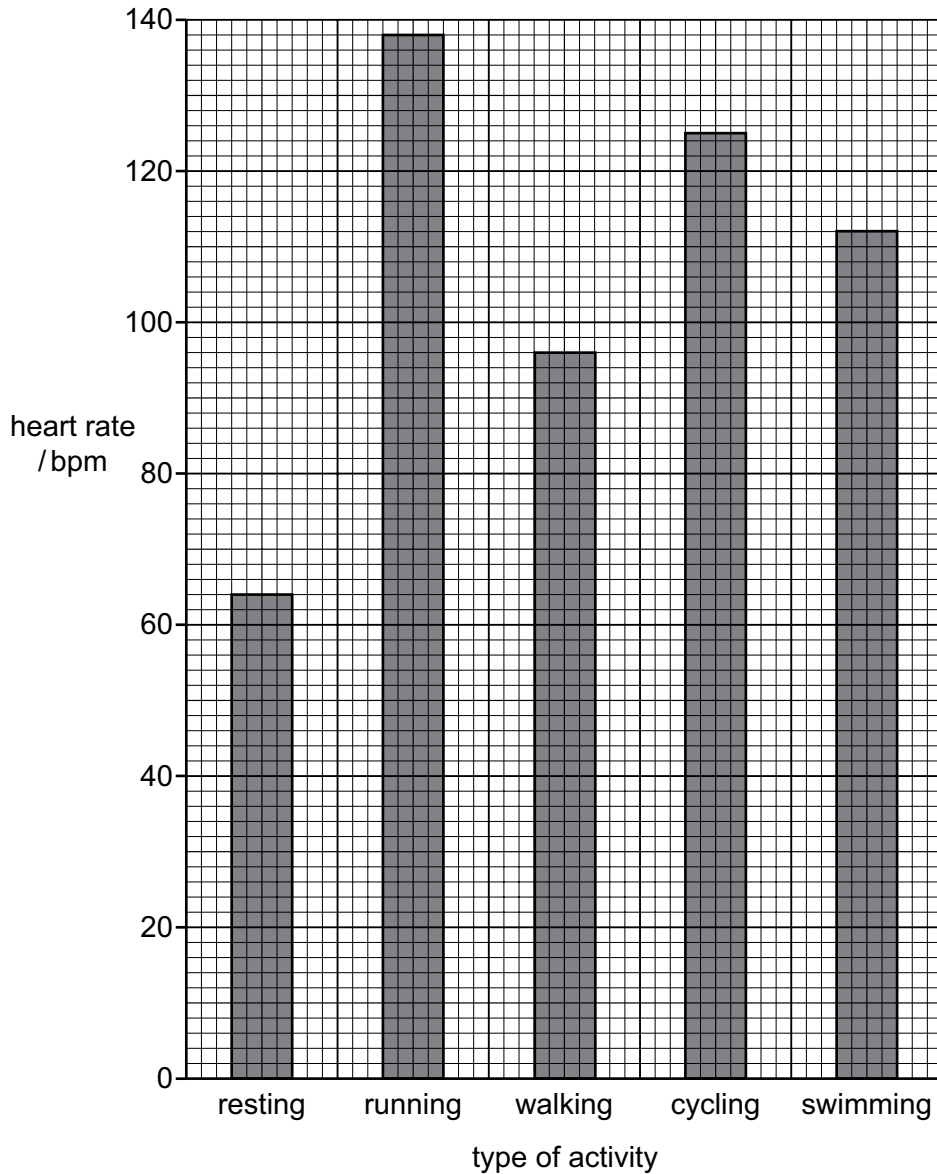


Fig. 2.1

- (i) State the type of activity that results in the highest heart rate in Fig. 2.1.

..... [1]

- (ii) State the heart rate of the student when she was cycling.

..... bpm [1]

(iii) Calculate the percentage increase in her heart rate between resting and walking.

.....%
[2]

(b) Measuring the pulse rate is one way of monitoring the activity of the heart.

State **one other** way of monitoring the activity of the heart.

.....
.....
..... [1]

(c) Breathing is also affected by exercise.

Describe the effects of exercise on breathing.

.....
.....
.....
.....
..... [2]

(d) Aerobic respiration increases during exercise.

(i) State the name of the gas required for aerobic respiration.

..... [1]

(ii) State where aerobic respiration occurs in a cell.

..... [1]

(e) Anaerobic respiration can occur when exercising vigorously.

(i) State the word equation for anaerobic respiration in muscle cells.

..... [1]

(ii) State **one** advantage of using aerobic rather than anaerobic respiration in humans.

.....

.....

..... [1]

[Total: 11]

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3 Fig. 3.1 shows a goat with white fur.



Fig. 3.1

Fur colour is inherited in goats.

- The allele for white fur is represented by **A**.
- The allele for black fur is represented by **a**.
- Each goat is identified by the numbers **1** to **8** in Fig. 3.2.

Fig. 3.2 shows a diagram of the inheritance of fur colour in a herd of goats.

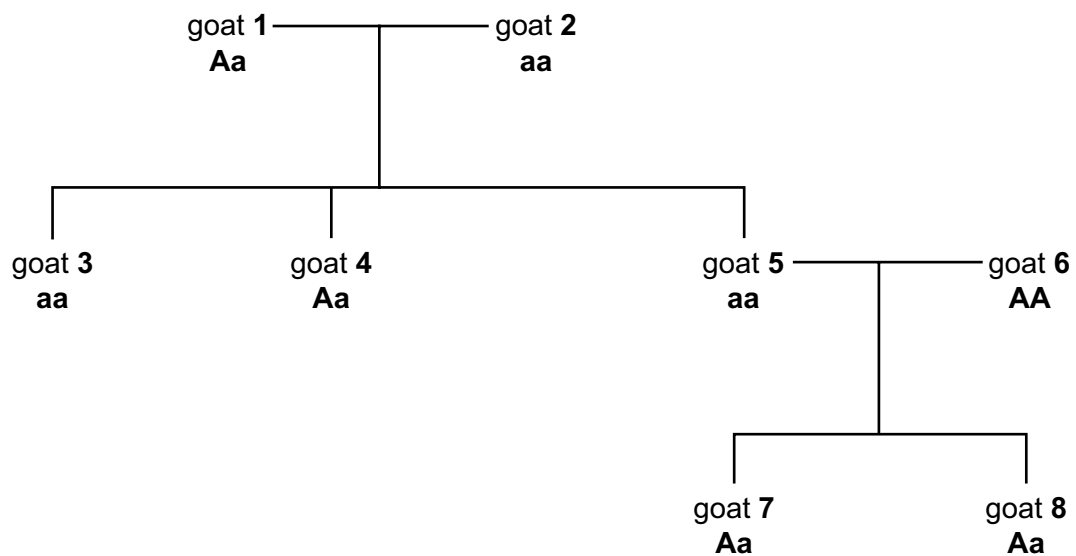


Fig. 3.2

(a) (i) State the number of goats in Fig. 3.2 that have white fur.

..... [1]

(ii) State the **phenotype** of goat 5.

..... [1]

(iii) Circle **two** terms that can be used to describe the **genotype** of goat 6.

- black** **dominant** **heterozygous**
homozygous **recessive** **white**

[2]

(b) State the type of variation shown by fur colour in these goats.

..... [1]

(c) A farmer identified two goats to breed together.

- The genotype of the male goat is **Aa**.
- The genotype of the female goat is **Aa**.

Complete the Punnett square and the phenotypic ratio for this cross.

		male	
female			

phenotypic ratio white : black

[3]

(d) A farmer has a group of goats. Some have white fur and some have black fur.

Describe how the farmer can use selective breeding to produce a group of goats that only have **white** fur.

.....

.....

.....

.....

.....

.....

.....

..... [3]

[Total: 11]

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(b) Water is required for the process of photosynthesis.

(i) Describe where **and** how water enters a plant.

.....
.....
.....
.....
.....
.....
..... [3]

(ii) Describe **one** function of water in a plant other than for photosynthesis.

..... [1]

(iii) State the name of the tissue in a plant that transports water.

..... [1]

(iv) State the name of the part of a leaf through which most water vapour is lost from the plant.

..... [1]

[Total: 10]

5 Fig. 5.1 shows a diagram of part of the male reproductive system.

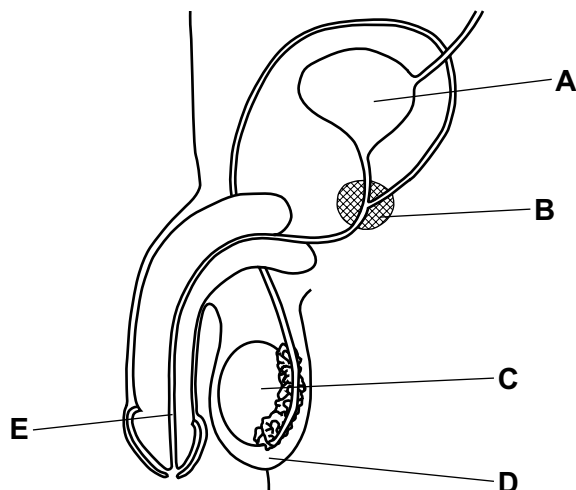


Fig. 5.1

(a) State the letter on Fig. 5.1 that identifies:

where sperm are made

the part that carries urine and sperm out of the body

where the fluid that is added to the sperm is made

[3]

(b) Sperm must pass through different structures in the female reproductive system to reach an egg cell.

State the names of **three** of these structures.

1

2

3

[3]

(c) State **three** ways that sperm are adapted for their function.

1

2

3

[3]

(d) Sperm contain chromosomes. Chromosomes contain genes.

(i) State **all** the possible sex chromosomes that normal sperm can contain.

..... [1]

(ii) Complete the definition of the term gene.

Use words from the list.

Each word can only be used once or not at all.

carbohydrate

DNA

fat

nuclei

protein

A gene is a length of that codes for a

[2]

[Total: 12]

- 6 (a) The effect of temperature on enzyme activity was investigated.

The results are shown in Fig. 6.1.

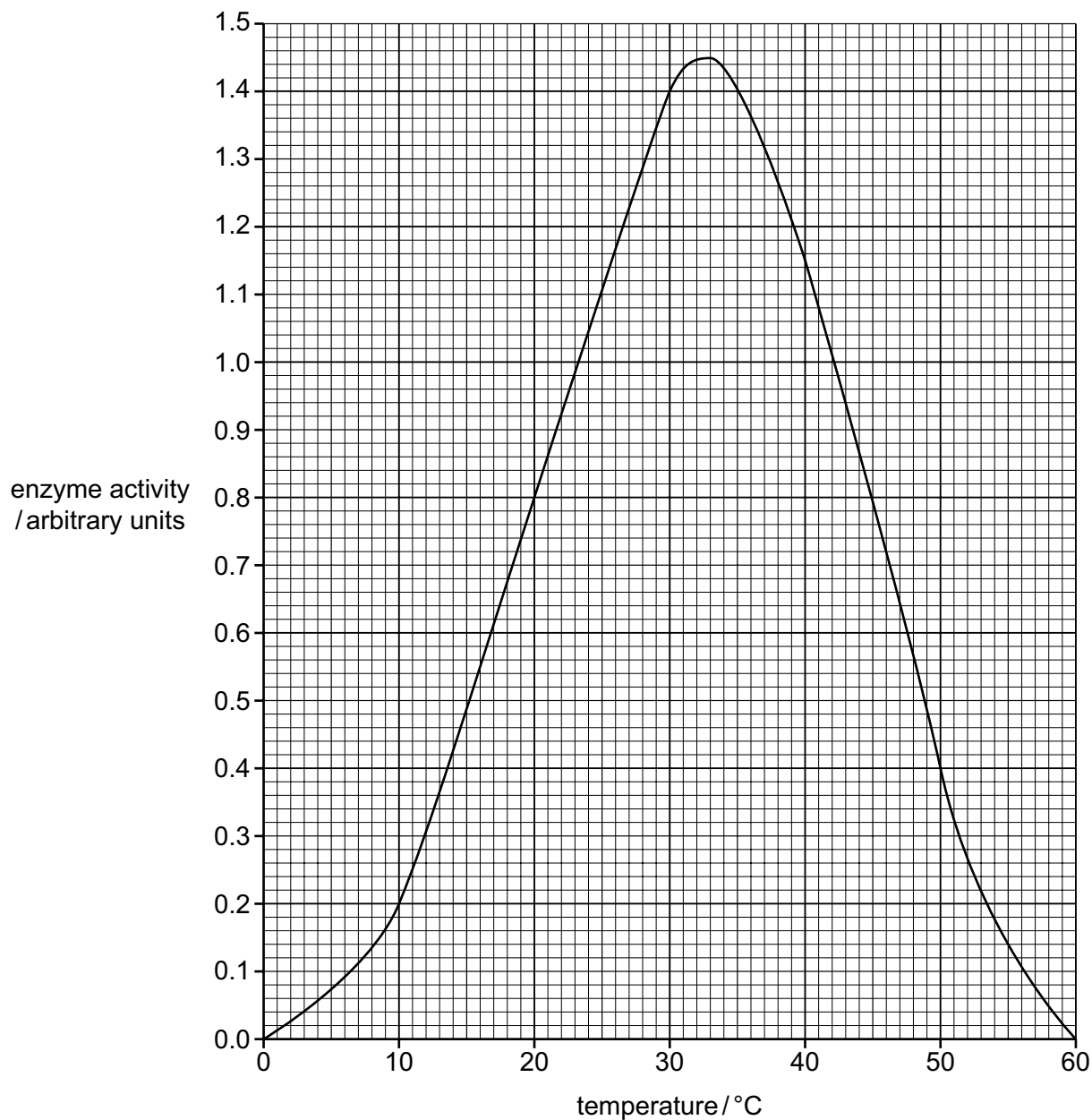


Fig. 6.1

- (i) State the optimum temperature for the enzyme in Fig. 6.1.

..... °C [1]

- (ii) State why there is **no** enzyme activity at 60 °C.

.....

 [1]

- (b) State **one** factor other than temperature that affects enzyme activity.

..... [1]

- (c) Table 6.1 shows some large insoluble molecules, some digestive enzymes and some smaller soluble molecules that are produced during digestion.

Table 6.1

insoluble molecule	enzyme	soluble molecules
starch	amylase	reducing sugars
fat		
	protease	

Complete Table 6.1 by writing the names of the missing enzyme and molecules.

The first row has been done for you. [5]

- (d) List the chemical elements present in fats.

..... [1]

- (e) State where in the digestive system protease is secreted.

..... [1]

[Total: 10]

7 (a) Carbon dioxide is a greenhouse gas.

State the name of **one other** greenhouse gas.

..... [1]

(b) Deforestation can cause an increase in the concentration of carbon dioxide in the atmosphere.

State **three** other undesirable effects of deforestation.

1

2

3

[3]

(c) Fig. 7.1 shows a simple food web.

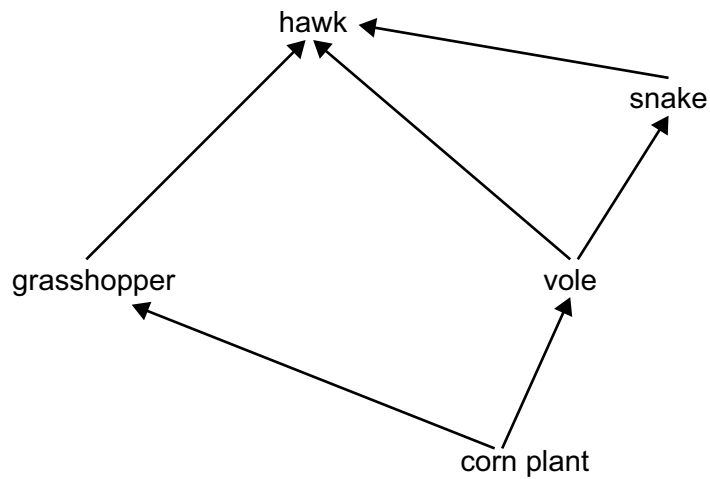


Fig. 7.1

- (i) Table 7.1 shows some of the terms that can be used to describe the organisms in the food web in Fig. 7.1.

Place ticks (✓) in the boxes to show the terms that can be used to describe each organism.

Table 7.1

organism	producer	herbivore	secondary consumer
corn plant			
vole			
grasshopper			
hawk			

[3]

- (ii) State the number of trophic levels in the food web in Fig. 7.1.

..... [1]

- (iii) Identify **one** organism that feeds at more than one trophic level.

..... [1]

- (iv) State the term used to describe an organism that gets its energy from dead or waste organic material.

..... [1]

- (v) State the principal source of energy for food webs.

..... [1]

[Total: 11]

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Copyright Acknowledgements:

Fig. 1.1

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Fig. 3.1

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