Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME	
CENTRE NUMBER	CANDIDATE NUMBER

4992228368

BIOLOGY **0610/31**

Paper 3 Theory (Core) **October/November 2018**

1 hour 15 minutes

Candidates answer on the Question Paper.

No Additional Materials are required.

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.

Electronic calculators may be used.
You may lose marks if you do not show your working or if you do not use appropriate units.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.

This syllabus is approved for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate.

This document consists of **18** printed pages and **2** blank pages.

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1 Fig. 1.1 shows a diagram of the human female reproductive system.

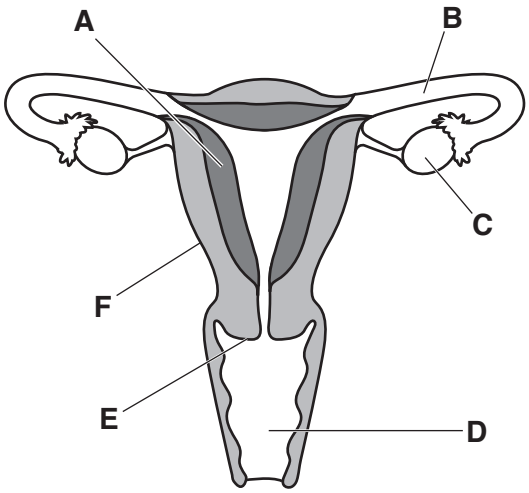


Fig. 1.1

(a) Using letters **A**–**F**, identify the parts of the human female reproductive system in Fig. 1.1.

where eggs are made .....

where fertilisation occurs .....

where implantation of the zygote occurs .....

[3]

(b) Oestrogen is a hormone responsible for the development of secondary sexual characteristics during puberty.

(i) State the name of the part of the female reproductive system that secretes oestrogen.

.....[1]

(ii) Describe how the hormone oestrogen is transferred to its target organs.

.....

.....[1]

(c) Table 1.1 shows some secondary sexual characteristics.

Place ticks (✓) in Table 1.1 to show which characteristics develop during puberty in boys and girls.

One row has been done for you.

Table 1.1

secondary sexual characteristic	boy	girl
breasts grow		✓
growth of sex organs		
growth of pubic hair		
start of menstruation		
voice deepens		

[4]

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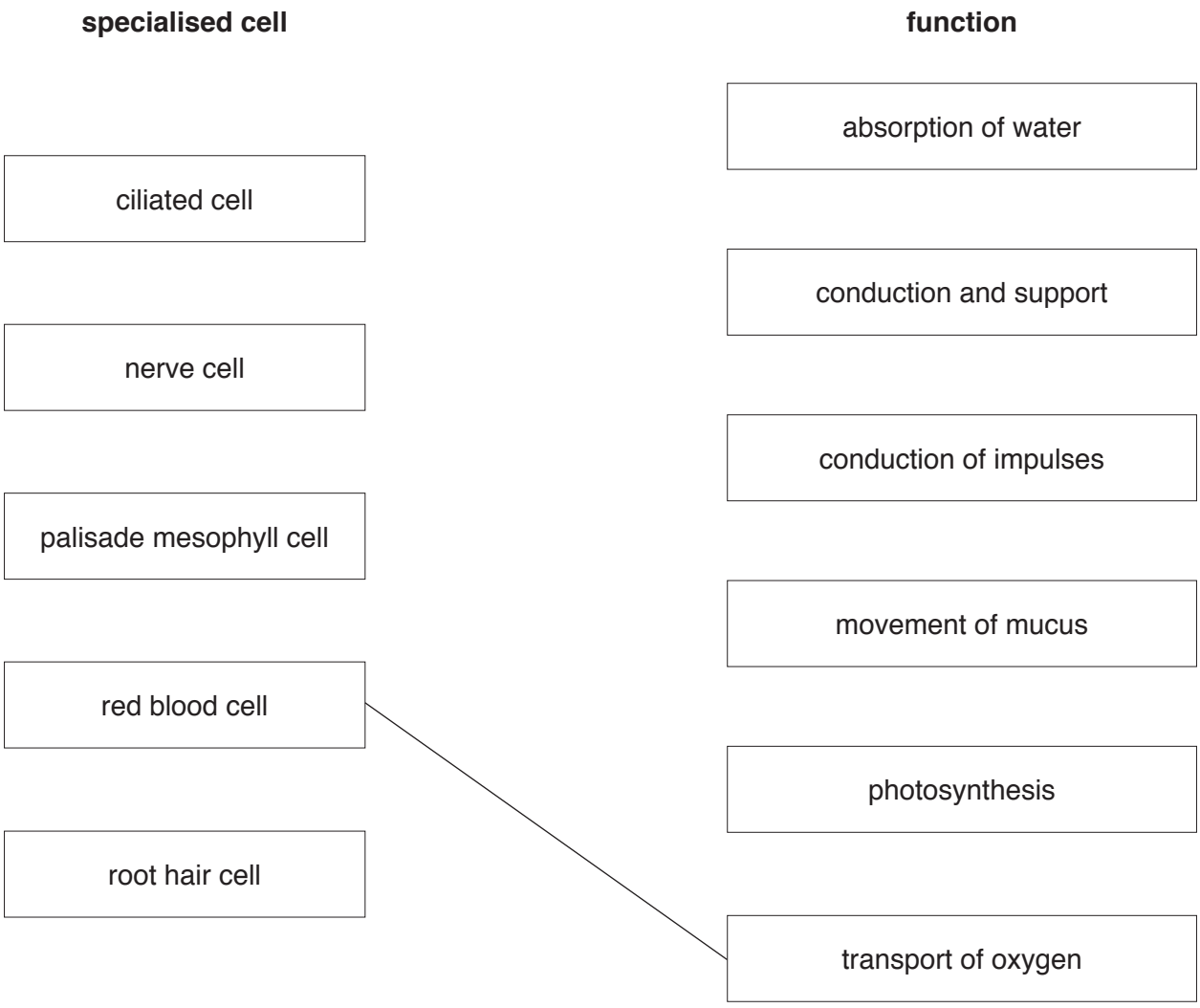
(d) Sperm and egg cells are specialised cells that are adapted for reproduction.

The boxes on the left show some specialised cells.

The boxes on the right show the functions of some specialised cells.

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

One has been done for you.



[4]

[Total: 13]

2 The apparatus shown in Fig. 2.1 was used to investigate the effects of different conditions on the rate of photosynthesis in an aquatic plant.

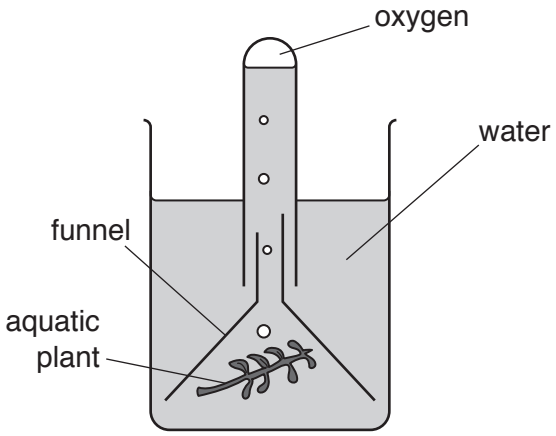


Fig. 2.1

A student investigated the effects of light and carbon dioxide on the rate of photosynthesis.

The number of bubbles of oxygen produced in one minute was counted in four different conditions.

Table 2.1 shows the results.

Table 2.1

test	conditions		number of bubbles of oxygen per minute
	light	carbon dioxide source added to the water	
1	present	no	2
2	absent	no	0
3	present	yes	20
4	absent	yes	0

(a) State **two** conclusions about the conditions needed for photosynthesis using the information in Table 2.1.

1 .....

.....

2 .....

.....

[2]

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(b) The investigation was carried out at 15 °C. It was repeated at 25 °C.

Suggest **and** explain the effect this had on the results of test **2** and test **3**.

test **2** .....

.....

.....

test **3** .....

.....

.....

[4]

(c) Carbon dioxide enters plant cells by diffusion.

The word diffusion on the left can be joined to two boxes on the right to make two correct statements about diffusion.

Draw **two** straight lines from diffusion to the boxes to complete the two statements.

	involves a genetic change.
	is the movement of particles from high concentration to low concentration.
	is the movement of particles from low concentration to high concentration.
Diffusion	occurs due to the random movement of particles.
	only occurs in plant cells.
	requires a partially permeable membrane.
	requires energy.

[2]

[Total: 8]

3 A student completed different types of activity.

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

The results are shown in Fig. 3.1.

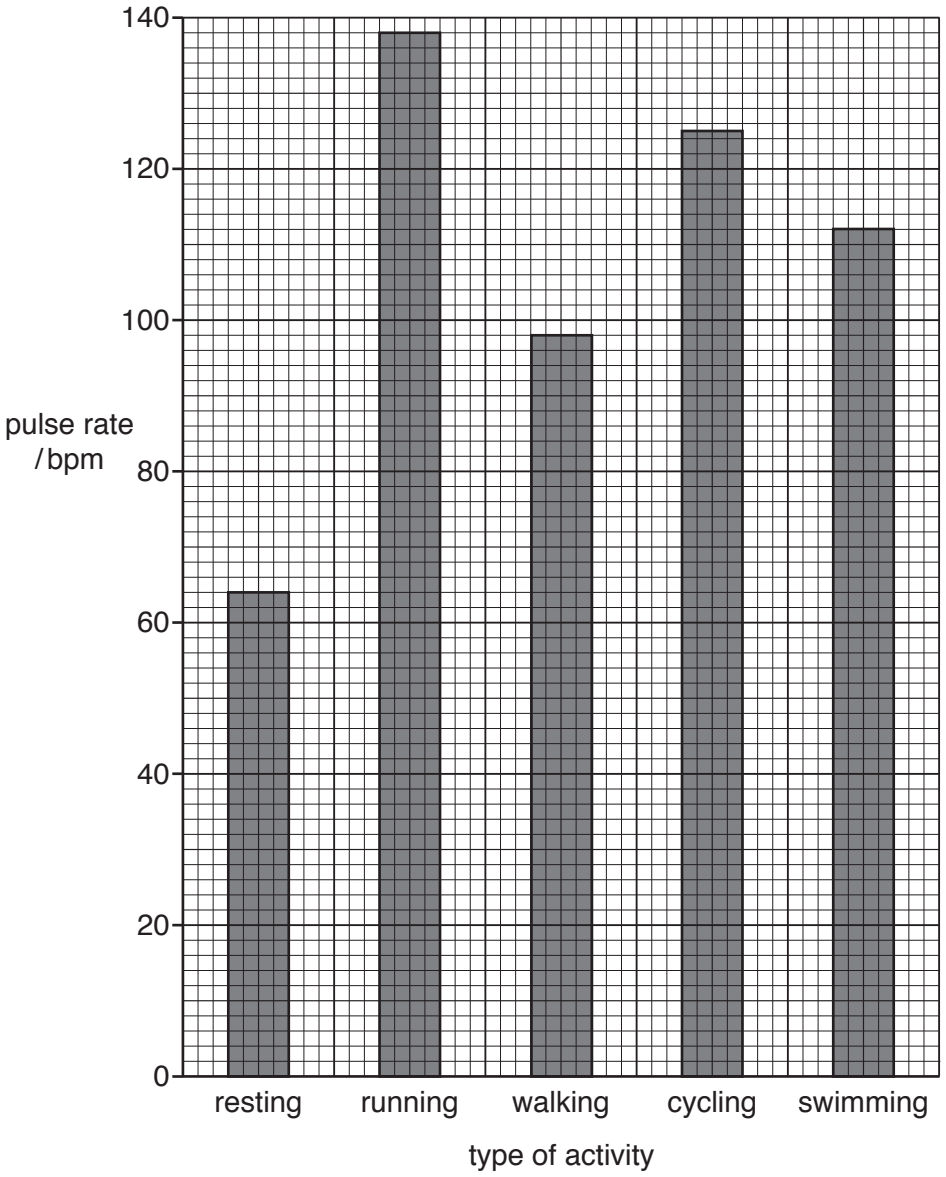


Fig. 3.1

(a) Use Fig. 3.1 to answer these questions.

(i) State the type of activity that results in the highest pulse rate.

.....[1]

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

..... bpm [1]

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

Show your working and give your answer to the nearest whole number.

..... %
[2]

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

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

.....

.....[1]

(c) Describe the changes to a person's breathing during exercise.

.....

.....

.....[2]

(d) Aerobic respiration increases during exercise.

Use the words from the list to complete the definition of *aerobic respiration*.

Each word or phrase may be used once, more than once or not at all.

cells **carbon dioxide** **DNA** **oxygen**

the heart **the brain** **nutrient**

Aerobic respiration is the chemical reactions in ..... that use

..... to break down ..... molecules to release

energy. [3]

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(e) Anaerobic respiration occurs 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: 12]

4 **(a)** Fig. 4.1 shows the four different types of human teeth.

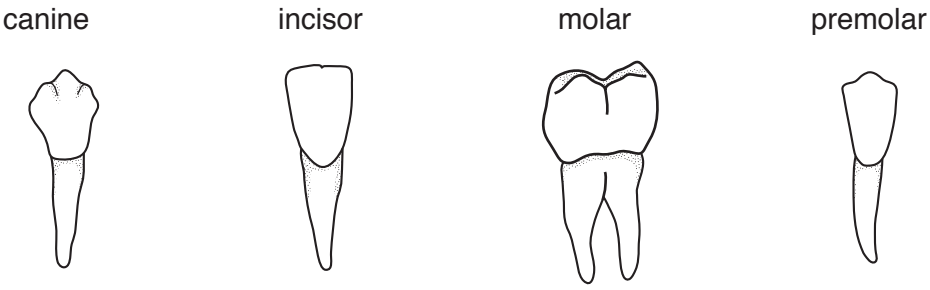


Fig. 4.1

Fig. 4.2 shows a diagram of the position of the different types of teeth in the mouth.

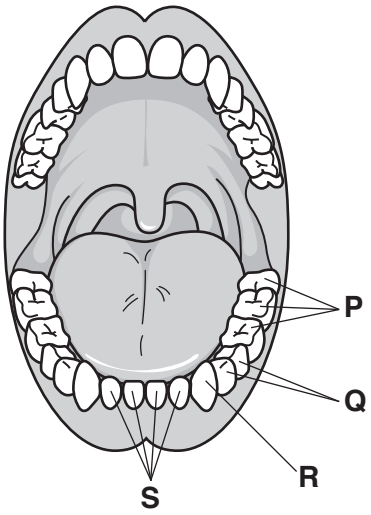


Fig. 4.2

Complete Table 4.1 by writing the names, positions and functions of the different types of teeth in the mouth shown in Fig. 4.2.

Table 4.1

name of type of tooth	letter on Fig. 4.2	function
	R	
incisor		
		grinding
premolar		tearing and grinding

[4]

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[Turn over

(b) Teeth can develop dental decay.

(i) Explain how dental decay is caused.

.....

.....

.....

.....

.....

.....

.....

.....

.....[4]

(ii) Describe **two** ways to avoid dental decay.

1 .....

.....

2 .....

.....

[2]

[Total: 10]

5 The energy we use comes from a variety of sources.

Fig. 5.1 shows the percentage of each source of energy used in one country in 2011.

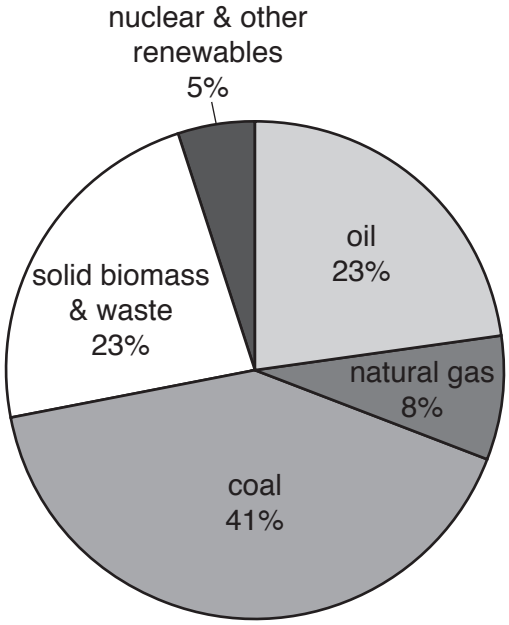


Fig. 5.1

(a) Coal, natural gas and oil are types of fossil fuel.

Calculate the total percentage of energy in Fig. 5.1 that came from fossil fuels.

.....% [1]

(b) Explain why fossil fuels are **not** sustainable resources.

.....

.....

.....[1]

(c) Combustion of fossil fuels releases carbon dioxide into the atmosphere.

(i) State the name of **two other** processes that release carbon dioxide into the atmosphere.

1 .....

2 .....
[2]

(ii) State the name of **one** process that removes carbon dioxide from the atmosphere.

.....[1]

(d) Describe the effects on the environment of increasing carbon dioxide concentration in the atmosphere.

.....

.....

.....

.....

.....[2]

(e) Improvements in food production have allowed human populations to increase.

Describe how modern technology has increased the production of crop plants.

.....

.....

.....

.....

.....

.....

.....[3]

[Total: 10]

6 Fig. 6.1 is a photograph of a lion.



Fig. 6.1

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

(i) State **one** feature **visible** in Fig. 6.1 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.

The list describes some of the features of fish, amphibians, reptiles, mammals and birds. Some features belong to more than one group.

State the name of **one** vertebrate group which has the distinguishing feature of:

scales .....

feathers .....

gills .....

smooth moist skin .....
[4]

(c) State **two** features of the cells of all living organisms.

1 .....

2 .....
[2]

[Total: 8]

7 Fig. 7.1 shows a goat with white fur.



Fig. 7.1

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. 7.2.

Fig. 7.2 shows a diagram of the inheritance of fur colour in a herd of goats.

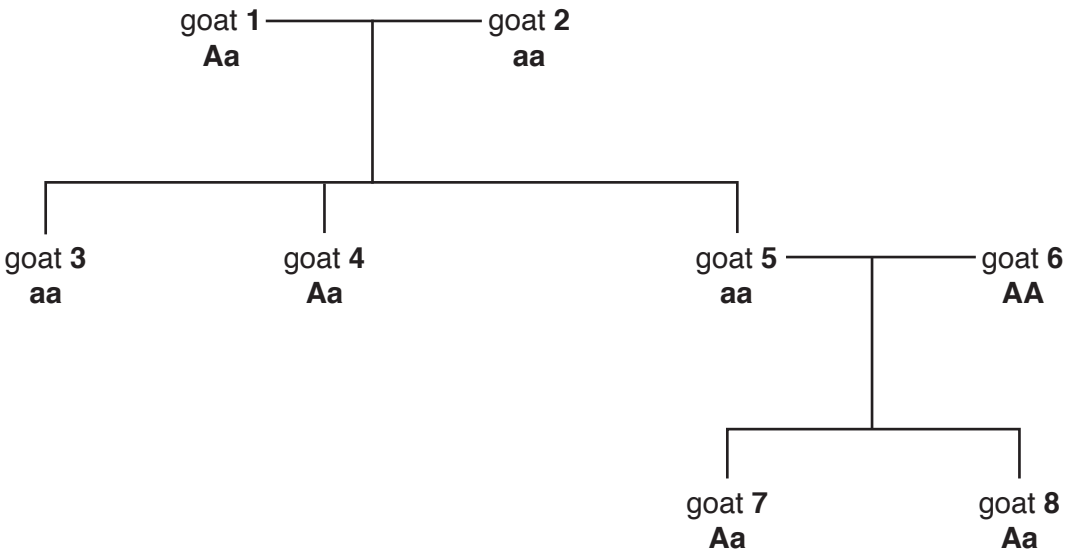


Fig. 7.2

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(a) Use Fig. 7.2 to answer these questions.

(i) State how many goats have white fur.

.....[1]

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

.....[1]

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

black **dominant** **heterozygous**

homozygous **recessive** **white**

[2]

(b) State the name of 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 genetic diagram and the phenotypic ratio for this cross.

		male	
female			

phenotypic ratio ..... white : ..... black

[3]

(d) Describe the process a farmer could use to breed a herd of white goats.

.....

.....

.....

.....

.....

.....

.....[3]

[Total: 11]

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8 **(a)** Catalase is an enzyme that catalyses the breakdown of hydrogen peroxide into water and oxygen.

The effect of temperature on catalase activity was investigated.

The results are shown in Fig. 8.1

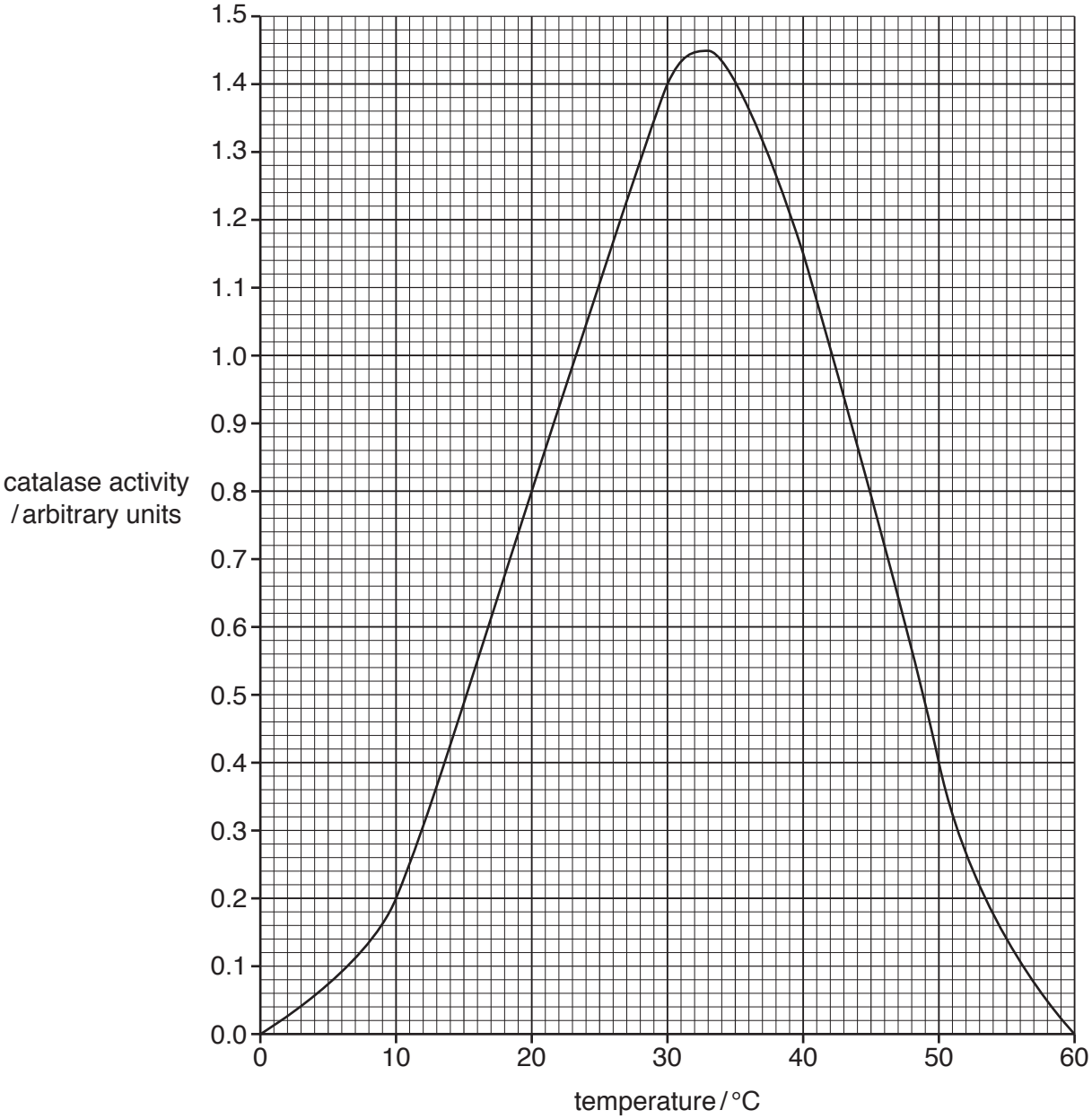


Fig. 8.1

(i) State the temperature at which catalase is most active in Fig. 8.1.

.....°C [1]

(ii) Explain why there is no enzyme activity at 60 °C.

.....

.....

.....[1]

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

.....[1]

(c) Digestive enzymes are used in chemical digestion to break down large insoluble molecules to smaller soluble molecules.

The boxes show some large insoluble molecules, some digestive enzymes and some smaller soluble molecules that are produced during digestion.

Draw **one** straight line from each enzyme to the insoluble molecule it acts on.

Draw another line from each enzyme to the smaller soluble molecule that is produced.

Draw a total of **six** lines.

insoluble molecule	**enzyme**	**soluble molecules**
fat	amylase	amino acids
protein	lipase	fatty acids and glycerol
starch	protease	sugars

[5]

[Total: 8]

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