Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER			

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.

© UCLES 2018

CAMBRIDGE International Examinations

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

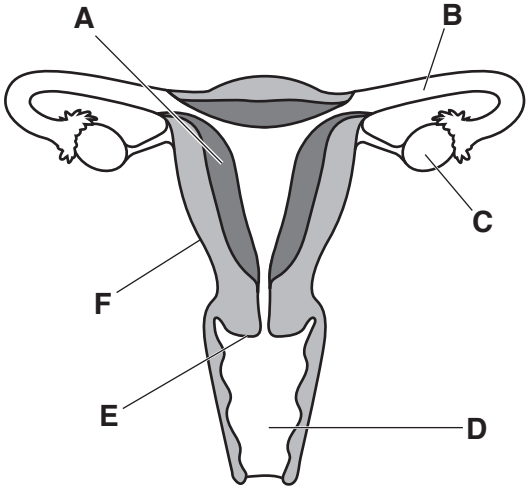


Fig. 1.1

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

View solution

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.

View solution

.....

.....[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.

View solution

Table 1.1

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

[4]

© UCLES 2018

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

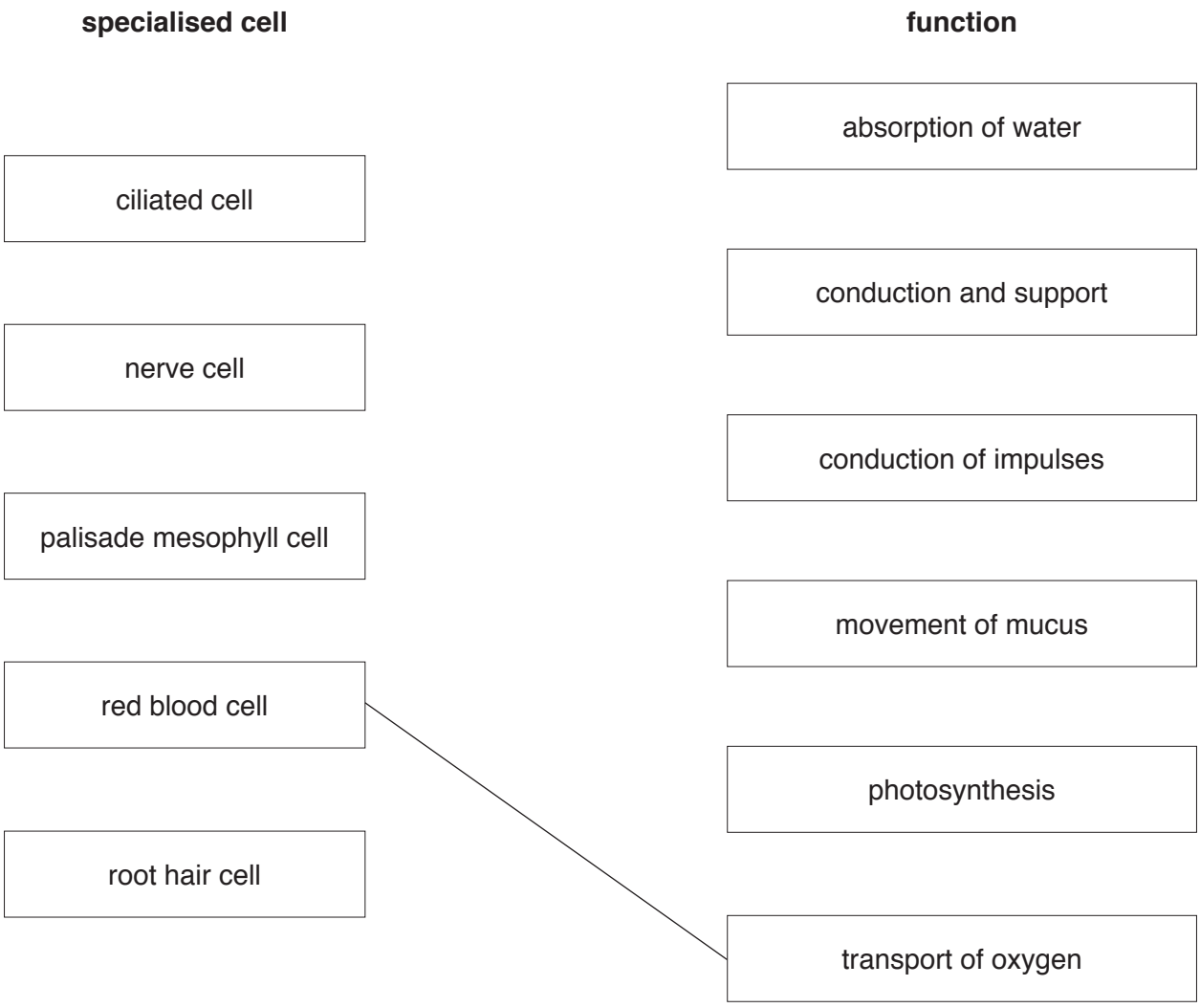
View solution

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.

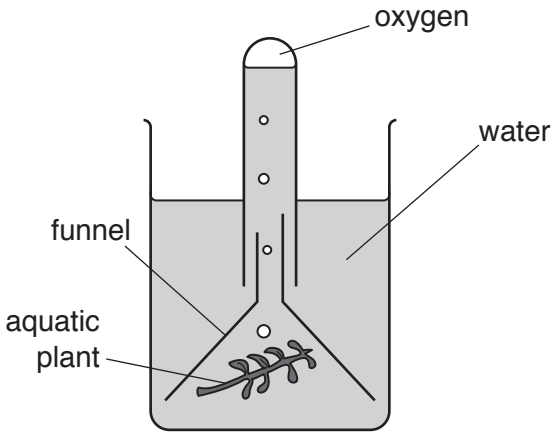


Fig. 2.1

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]

View solution

© UCLES 2018

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

View solution

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.

View solution

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.

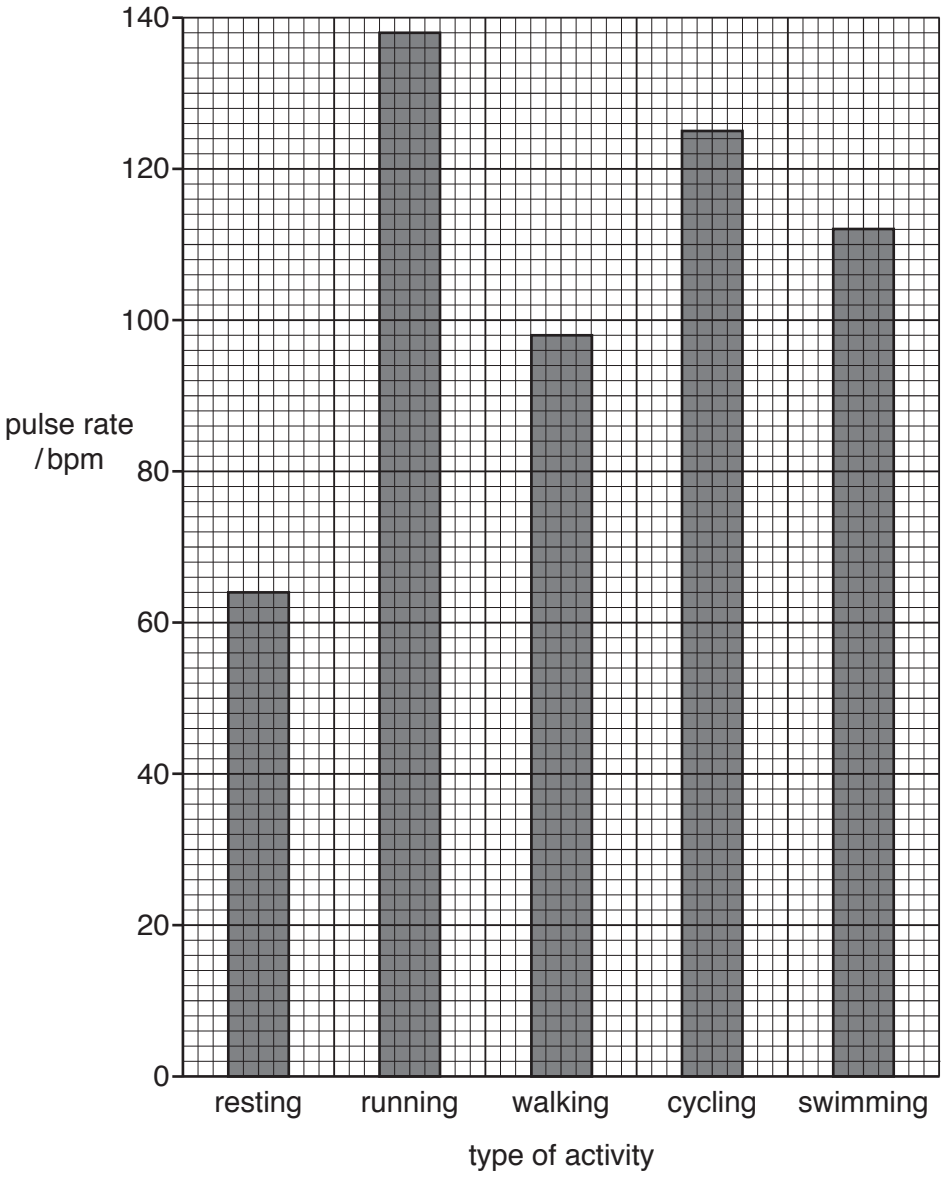


Fig. 3.1

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

View solution

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

.....[1]

© UCLES 2018

(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.

View solution

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

.....

.....[1]

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

View solution

.....

.....

.....[2]

(d) Aerobic respiration increases during exercise.

View solution

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]

© UCLES 2018

(e) Anaerobic respiration occurs when exercising vigorously.

View solution

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

.....[1]

View solution

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

.....

.....[1]

[Total: 12]

© UCLES 2018

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

View solution

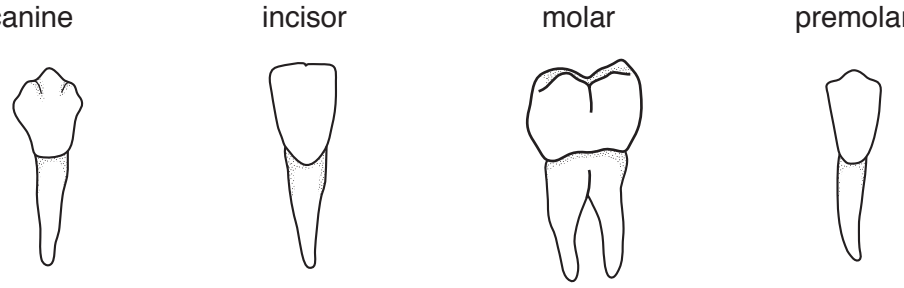


Fig. 4.1

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

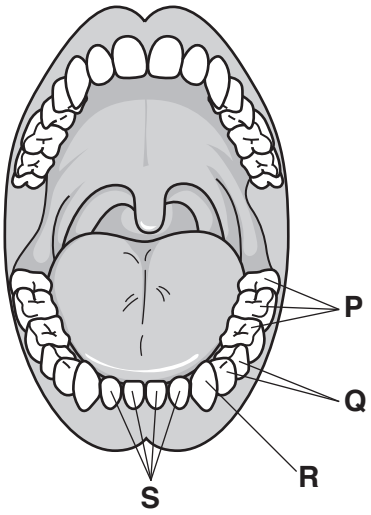


Fig. 4.2

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]

© UCLES 2018

(b) Teeth can develop dental decay.

View solution

(i) Explain how dental decay is caused.

.....

.....

.....

.....

.....

.....

.....

.....

.....[4]

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

View solution

1 .....

.....

2 .....

.....

[2]

[Total: 10]

© UCLES 2018

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.

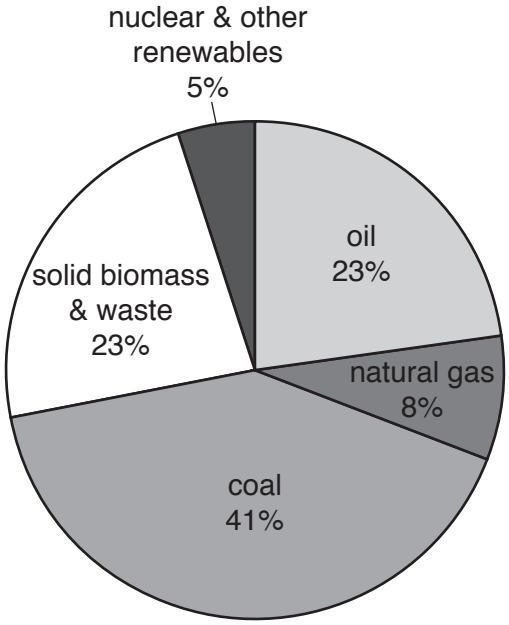


Fig. 5.1

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

View solution

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.

View solution

.....

.....

.....[1]

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

View solution

(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.

View solution

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

.....

.....

.....

.....

.....

.....

.....[3]

[Total: 10]

© UCLES 2018

6 Fig. 6.1 is a photograph of a lion.



Fig. 6.1

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

View solution

(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.

View solution

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.

View solution

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.

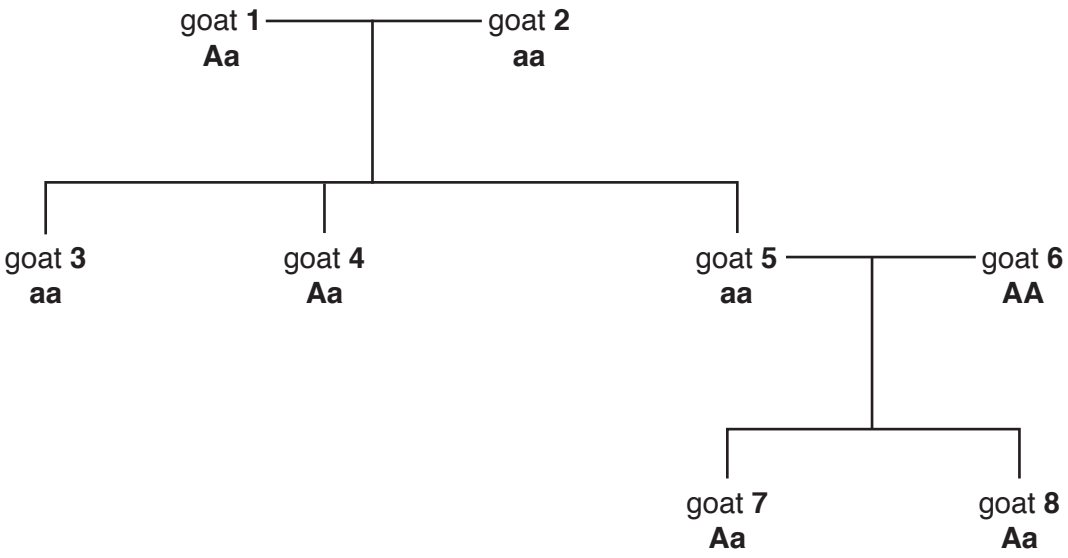


Fig. 7.2

© UCLES 2018

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

View solution

(i) State how many goats have white fur.

.....[1]

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

View solution

.....[1]

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

View solution

black **dominant** **heterozygous**

homozygous **recessive** **white**

[2]

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

View solution

.....[1]

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

View solution

- 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]

View solution

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

View solution

The effect of temperature on catalase activity was investigated.

The results are shown in Fig. 8.1

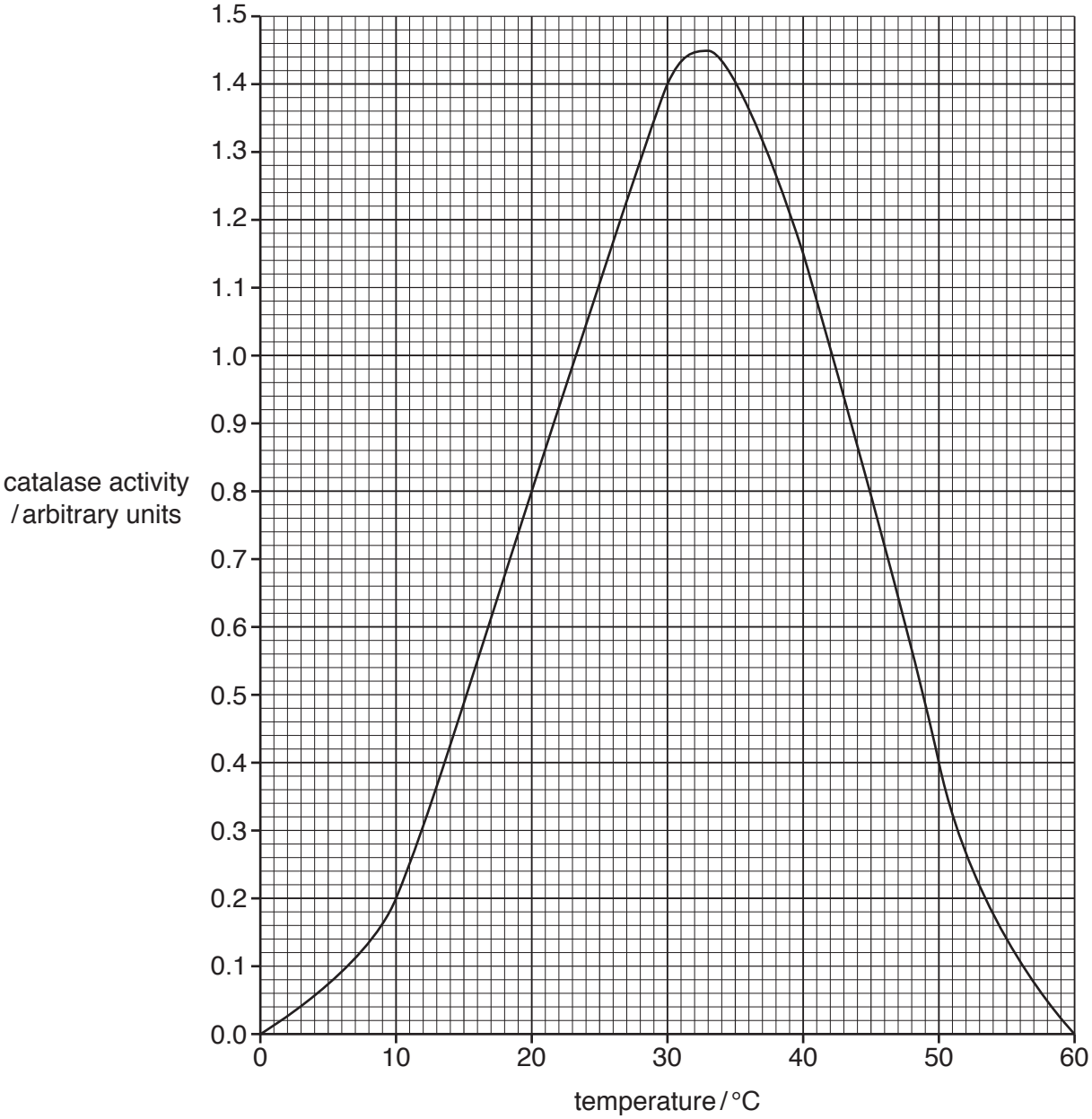


Fig. 8.1

(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.

View solution

.....

.....

.....[1]

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

View solution

.....[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.

View solution

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]

© UCLES 2018

BLANK PAGE

© UCLES 2018

BLANK PAGE

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced online in the Cambridge International Examinations Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download at www.cie.org.uk after the live examination series.

Cambridge International Examinations is part of the Cambridge Assessment Group. Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.

© UCLES 2018