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8302029497

BIOLOGY **0610/31**

Paper 3 Theory (Core) **October/November 2025**

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 **16** pages. Any blank pages are indicated.

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1 **(a)** Complete the statements about classification.

Organisms are classified into groups by the ..... that they share.

The internationally agreed system for naming species is the ..... system.

The scientific name of an organism is made up of the ..... name

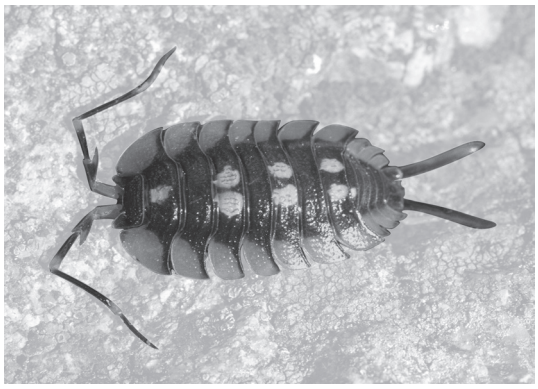
and the ..... name.

[4]

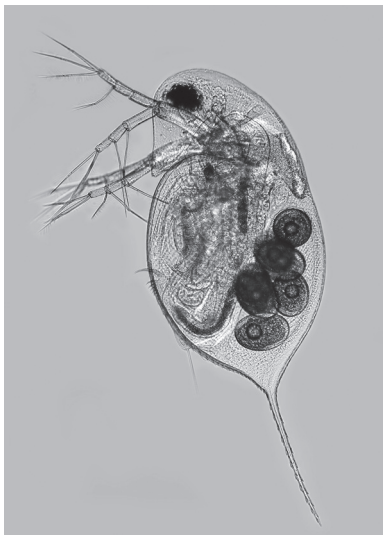
(b) Fig. 1.1 shows six species of crustacean.



A



B



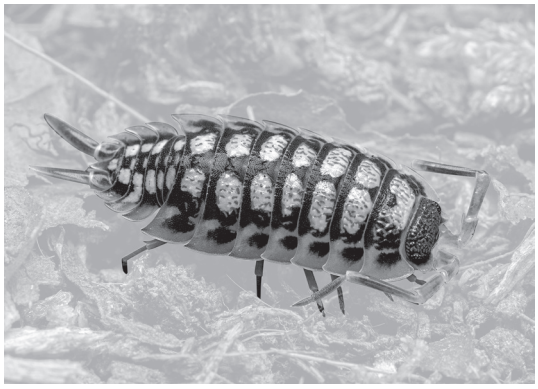
C



D



E



F

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Fig. 1.1

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Use the key to identify each species shown in Fig. 1.1.

Write the letter of each species (**A** to **F**) in the correct box in the key.

Key

1	(a)	pincers visible	*go to 2*	
	(b)	pincers **not** visible	*go to 4*	
2	(a)	pincers are the same size	*go to 3*	
	(b)	pincers are different sizes	*Minuca pugnax*	
3	(a)	body is nearly round	*Maja brachydactyla*	
	(b)	body is long	*Astacus leptodactylus*	
4	(a)	body has visible segments	*go to 5*	
	(b)	body has **no** visible segments	*Daphnia pulex*	
5	(a)	fewer than eight spots are visible on the body	*Porcellio expansus*	
	(b)	more than eight spots are visible on the body	*Porcellio haasi*	

[5]

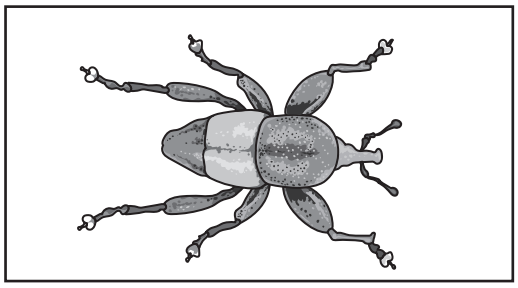
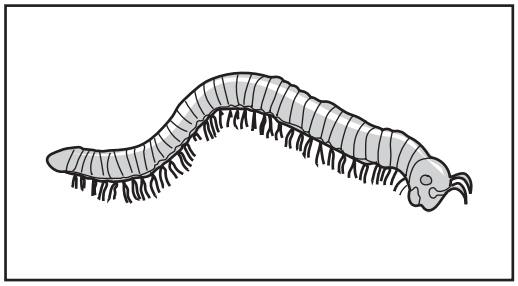
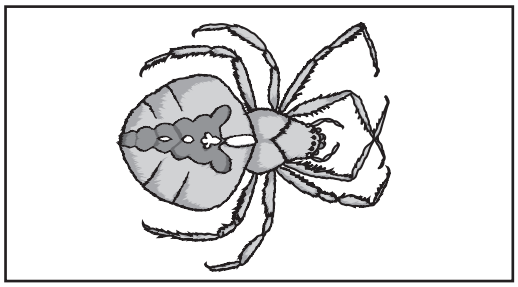
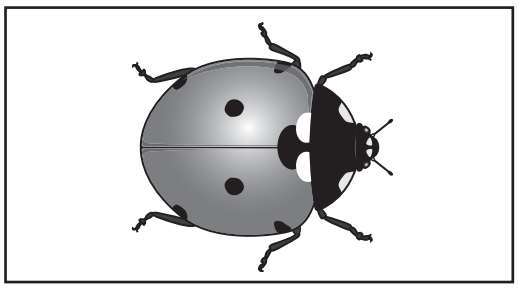
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(c) The boxes on the left show some images of arthropods.

The boxes on the right show some names of arthropod groups.

Draw a line from each box on the left to the box showing the correct arthropod group for the image.

Draw a total of **four** lines.

image	**arthropod group**
	arachnids
	insects
	myriapods
	

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[4]

[Total: 13]

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2 **(a)** All carbohydrates contain the element carbon.

State **two** other elements that are found in all carbohydrates.

1 .....

2 .....

[2]

(b) For each small molecule listed, state **one** example of a large molecule that contains the small molecule.

amino acid .....

glycerol .....

glucose. .....

[3]

(c) **(i)** Describe what is meant by the term balanced diet.

.....

.....

.....

.....

..... [2]

(ii) Describe the importance of vitamins and minerals in a balanced diet.

vitamins .....

.....

.....

.....

minerals .....

.....

.....

.....

[4]

[Total: 11]

3 Fig. 3.1 is a diagram of an animal cell.

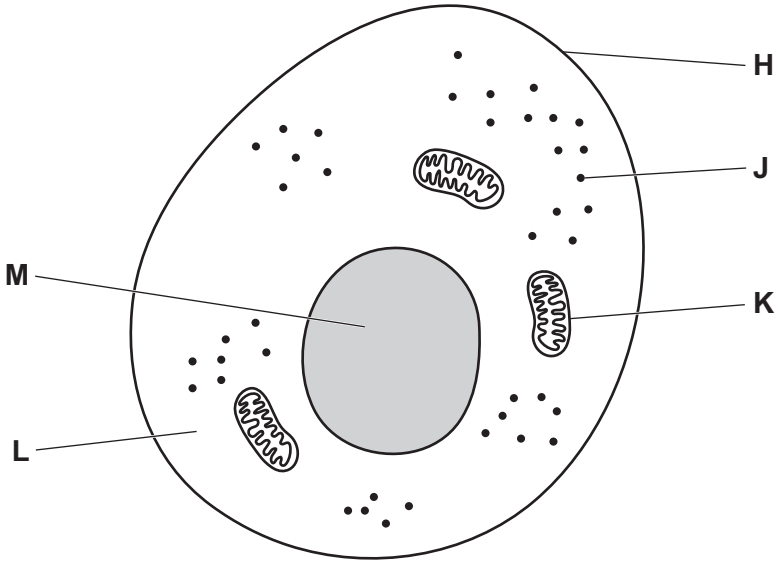


Fig. 3.1

(a) (i) State the letter in Fig. 3.1 that identifies:

the cytoplasm .....

a ribosome .....

the structure that controls the activities of the cell. .....

[3]

(ii) State the name of structure **K** in Fig. 3.1.

..... [1]

(b) State **one** structure that is present in plant cells but absent in animal cells.

..... [1]

(c) State the word equation for aerobic respiration.

..... [2]

[Total: 7]

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4 **(a)** **(i)** Describe **three** ways the structure of a vein differs from the structure of an artery.

1 .....

2 .....

3 .....

[3]

(ii) State **one** function of capillaries.

..... [1]

(iii) State the name of the blood vessel that takes blood from the body to the right atrium.

..... [1]

(b) Blockages in the coronary arteries can lead to coronary heart disease.

State **three** risk factors for coronary heart disease.

1 .....

2 .....

3 .....

[3]

[Total: 8]

5 **(a)** State **one** role of the nervous system.

..... [1]

(b) Fig. 5.1 shows a diagram of part of the nervous system involved in a reflex action.

This reflex action was caused by a person touching a spiky cactus plant.

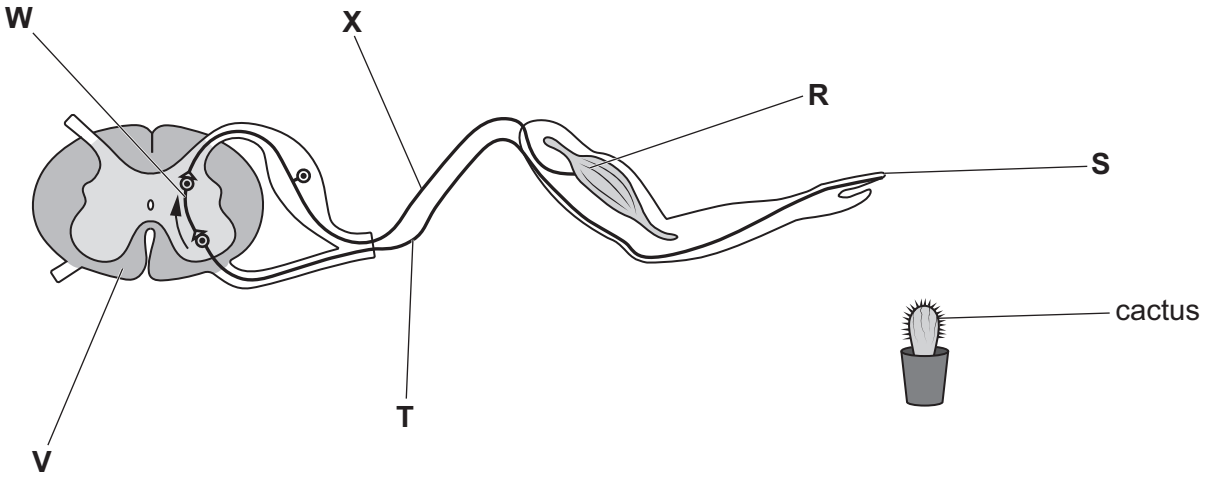


Fig. 5.1

(i) State the letters of **two** structures in Fig. 5.1 that are part of the peripheral nervous system.

1 .....

2 .....

[2]

(ii) Write the correct **letters** from Fig. 5.1 in the gaps to complete the statements about the reflex arc.

A painful stimulus such as a cactus spine is detected by ..... in the skin.

An impulse passes along ..... until it reaches the spinal cord.

The impulse is passed to ..... and then passes out of the spinal cord in ..... .

The impulse causes ..... to produce a response.

[5]

(iii) State the name of the junction between two neurones.

..... [1]

[Total: 9]

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6 **(a)** Aquatic ecosystems can be polluted by excess fertiliser.

Fertiliser contains nitrate ions.

(i) State **one** substance that plants make, using nitrate ions.

..... [1]

(ii) Describe the effects of excess fertiliser on aquatic ecosystems.

.....

.....

.....

.....

.....

.....

..... [3]

(b) Students investigated the populations of three species in two rivers, **A** and **B**.

River **B** was contaminated with untreated sewage.

The students took samples from the rivers, and counted the numbers of each species in each sample.

Table 6.1 shows the results.

Table 6.1

species	numbers of each species in the samples	
	river **A**	river **B**
freshwater shrimp	97	1
bloodworm	15	27
sludge worm	2	74

(i) Describe the differences in the populations of the species in river **A** and in river **B** in Table 6.1.

.....

.....

.....

.....

.....

.....

..... [3]

(ii) Suggest which species in Table 6.1 is the least tolerant of pollution.

..... [1]

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(c) Fig. 6.1 shows the population of red king crabs in an area of ocean between 1995 and 2010.

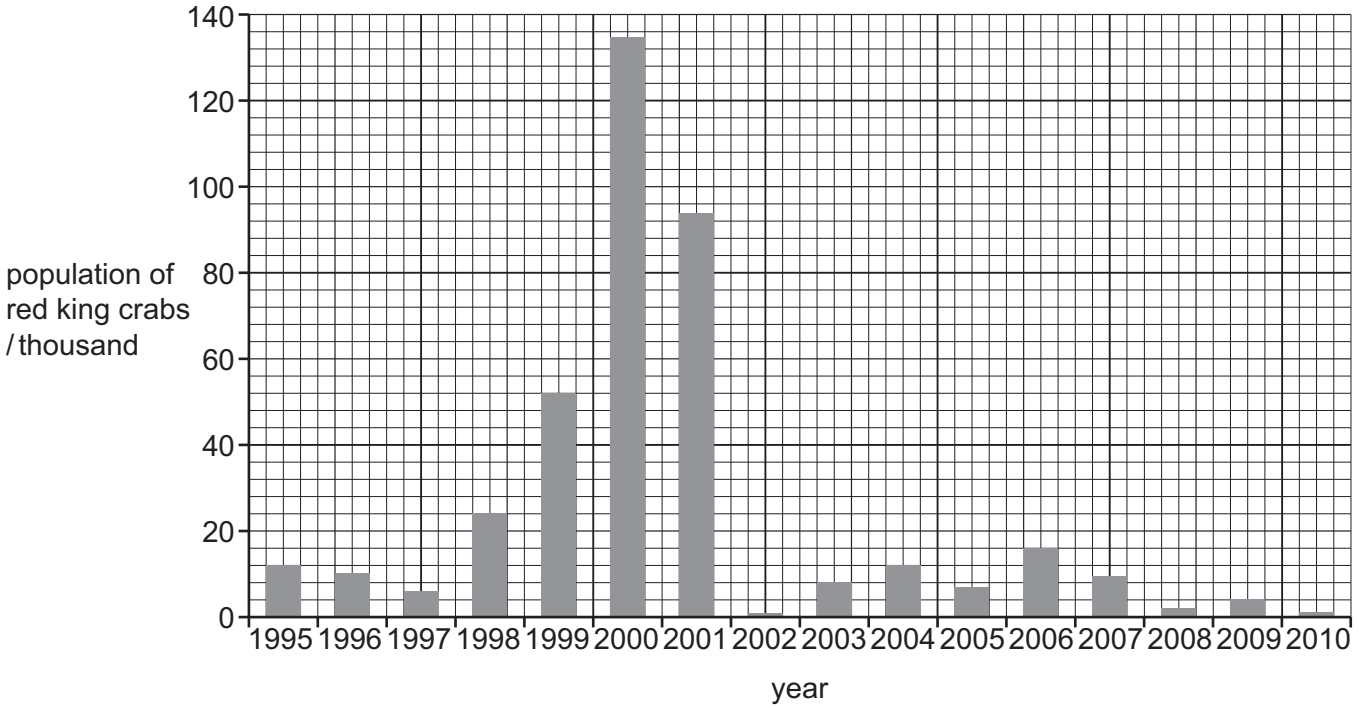


Fig. 6.1

(i) Complete the sentences to describe the data shown in Fig. 6.1.

Overall the population size increased and then decreased.

In 1998, the population size of red king crabs was ..... .

The largest population size of red king crabs was in the year

..... .

The population size in 1995 was the same as the population size in the year

..... .

[3]

(ii) Using the data in Fig. 6.1, calculate the percentage increase in the red king crab population between 1995 and 1999.

Give your answer to the nearest whole number.

..... % [3]

[Total: 14]

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7 **(a)** **(i)** State **two** reasons why bacteria are useful in genetic modification and biotechnology.

1 .....

2 .....

[2]

(ii) Describe the ways in which genetic modification can improve crop plants.

.....

.....

.....

.....

.....

.....

..... [3]

(b) Scientists investigated two enzymes that could be used in washing powders.

The activity of each enzyme was measured at pH values between 2 and 10.

Fig. 7.1 shows the results of the investigation.

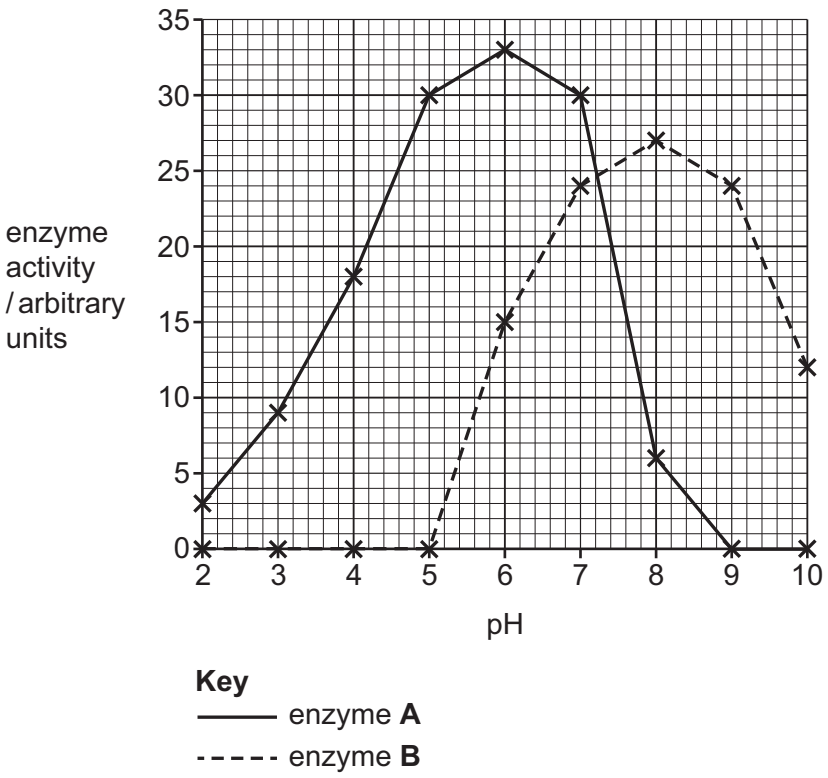


Fig. 7.1

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(i) The list shows six conclusions.

Tick (✓) the conclusions that can be made from the data shown in Fig. 7.1.

At pH 10, enzyme **B** is more active than enzyme **A**.	
Enzyme **A** and enzyme **B** are **not** active at pH 4.	
Enzyme **B** has a greater maximum activity than enzyme **A**.	
Enzyme **A** has a maximum activity of 33 arbitrary units.	
Enzyme **A** shows activity over a pH range of 6 to 10.	
The largest difference in activity between enzyme **A** and enzyme **B** is at pH 5.	

[3]

(ii) Many washing powders have a pH of approximately 9.

Identify the best enzyme, **A** or **B**, to use in these washing powders.

Give **one** reason for your choice.

enzyme .....

reason .....

.....

.....

[1]

[Total: 9]

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8 (a) (i) Table 8.1 describes ways carbon is transferred in the carbon cycle.

Complete Table 8.1 to show how carbon is transferred in the carbon cycle, and the names of the processes.

Table 8.1

transfer of carbon	name of the process
from animals or plants to the atmosphere	.....
from the atmosphere to plants	.....
from ..... to fossil fuel	fossil fuel formation
from plants to animals	.....

[4]

(ii) State the name of the process that involves microorganisms transferring carbon in dead organisms to the atmosphere.

..... [1]

(b) Complete the sentences about the atmosphere.

Combustion of fossil fuels ..... the concentration of carbon dioxide in the atmosphere.

This causes an ..... greenhouse effect and leads to ..... .

Another gas that has a similar effect on the atmosphere to carbon dioxide is ..... .

[4]

[Total: 9]

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