National Qualifications 2024

X807/75/02

Biology
Section 1 — Questions

WEDNESDAY, 15 MAY

1:00 PM – 3:30 PM

Instructions for the completion of Section 1 are given on *page 02* of your question and answer booklet X807/75/01.

Record your answers on the answer grid on *page 03* of your question and answer booklet.

Before leaving the examination room you must give your question and answer booklet to the Invigilator; if you do not, you may lose all the marks for this paper.

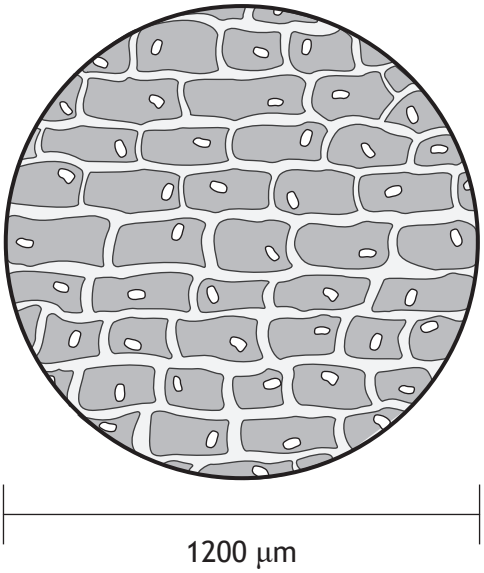
SECTION 1 — 25 marks

Attempt ALL questions

1. Cells in the stomach produce enzymes to help digest food.
Identify the structure where these enzymes are produced.

A Mitochondrion
B Nucleus
C Ribosome
D Cell membrane

2. The diagram shows cells viewed under a microscope at a magnification of ×100.

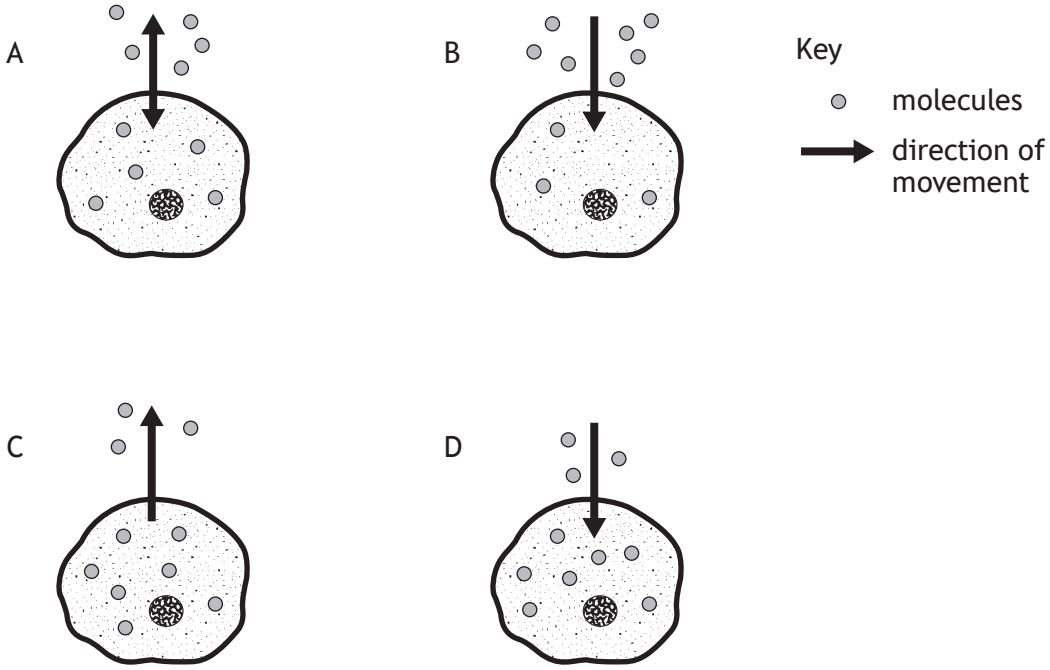


What is the average length, in μm, of the cells shown?

A 2.4
B 12
C 240
D 24 000

3. The diagrams represent the movement of molecules across a cell membrane.

Which cell would require the greatest number of mitochondria to allow the movement shown?



4. A section of DNA contains a total of 6400 bases of which 32% are guanine.

The number of adenine bases in this section of DNA is

A 1152

B 2048

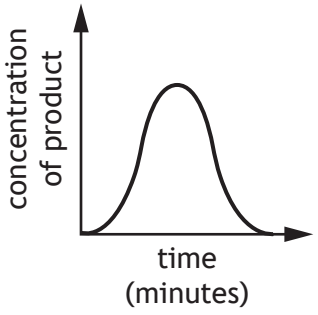
C 2304

D 4352

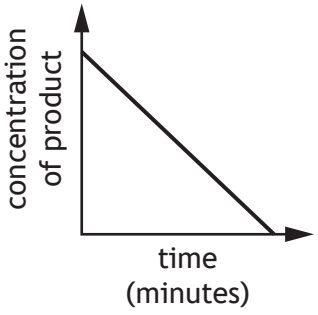
[Turn over

5. Which diagram shows the concentration of product during a degradation reaction?

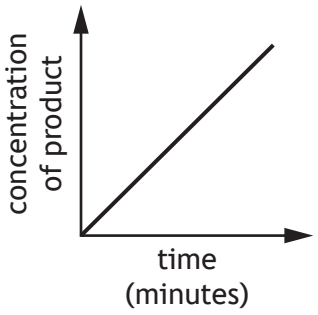
A



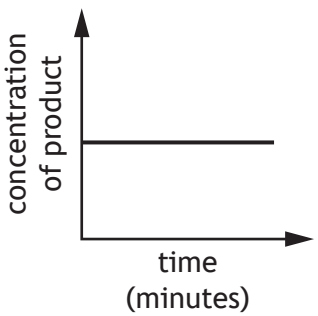
B



C



D



6. The following stages occur during the process of genetic engineering:

1. gene inserted into plasmid
2. plasmid cut open
3. plasmid extracted from bacterial cell
4. gene extracted from chromosome.

Which of the following shows the stages in the order they occur?

A 2 → 4 → 1 → 3

B 2 → 1 → 3 → 4

C 4 → 2 → 1 → 3

D 4 → 3 → 2 → 1

7. A group of scientists investigated the effect of temperature on the growth of genetically modified (GM) cells. The GM cells were grown in a nutrient solution at 20 °C. This was repeated at 30 °C and 40 °C using fresh nutrient solutions at each temperature.

Which of the following would improve the reliability of the results?

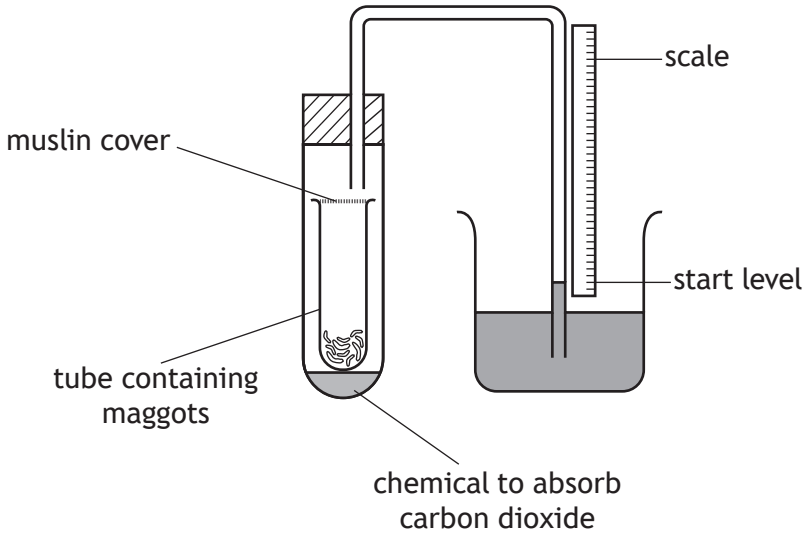
A Set up nutrient solutions containing GM cells at 25 °C and 35 °C.

B Set up 10 nutrient solutions containing GM cells at each temperature.

C Use the same concentration of nutrient solution at each temperature.

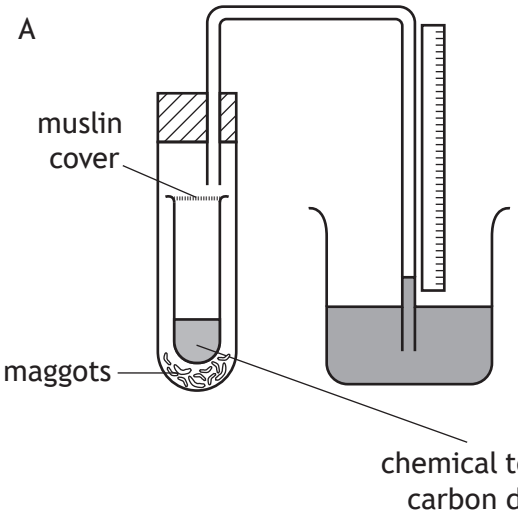
D Use the same types of GM cell at each temperature.

8. A respirometer was set up as shown to investigate respiration in maggots.

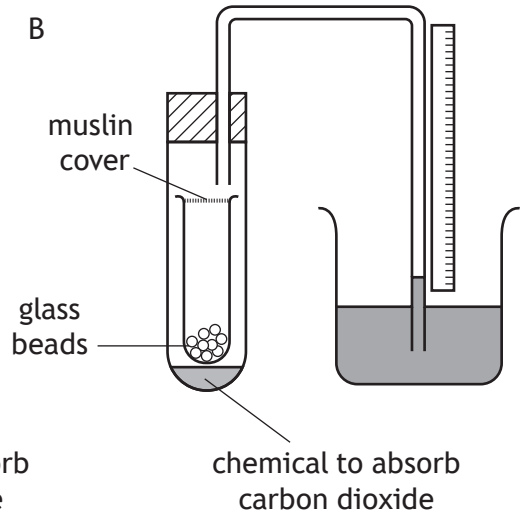


Which of the following would be a suitable control for this investigation?

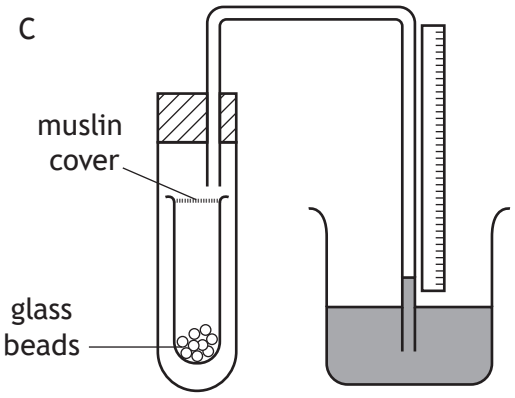
A



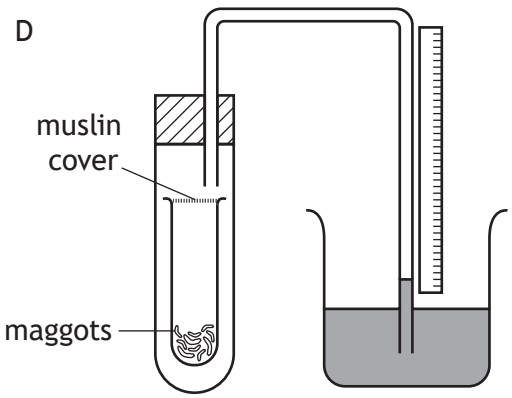
B



C



D



9. A chemical called colchicine stops cells from producing spindle fibres during mitosis, which prevents further stages occurring.

Which stage of mitosis would still occur when colchicine is present?

A Chromosomes move to opposite poles of the cell.

B Chromatids are pulled apart.

C Chromosomes shorten and thicken.

D Two diploid cells produced.

10. Which statement describes a function of the cerebrum?

A Remembering the rules of rugby.

B Increasing heart rate during a sprint.

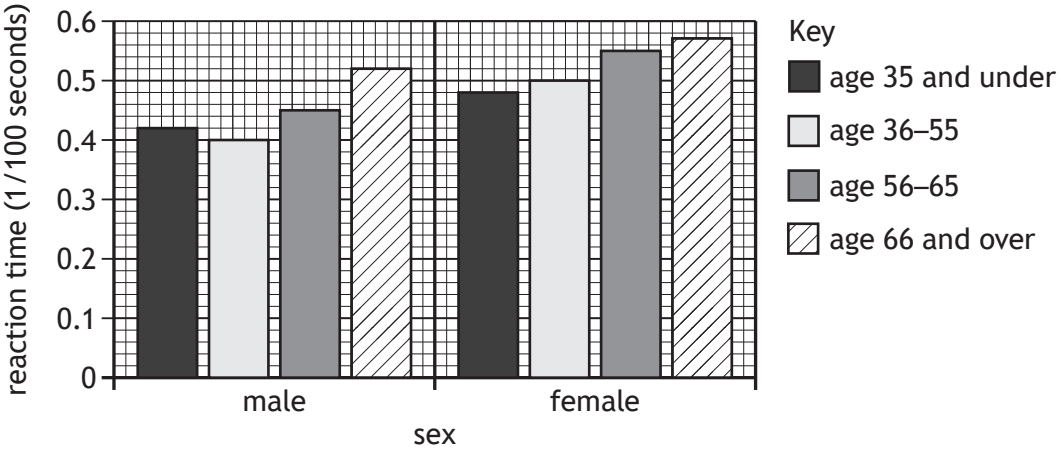
C Co-ordinating movement of muscles when playing football.

D Maintaining balance during yoga.

11. Which row in the table identifies a hormone, its site of production and its target tissue?

	Hormone	**Site of hormone production**	**Target tissue**
A	insulin	liver	pancreas
B	glycogen	pancreas	liver
C	glucose	liver	pancreas
D	glucagon	pancreas	liver

12. A study was carried out to investigate the relationship between age and reaction time.
The results are shown in the graph.



Which of the following conclusions is correct for these results?

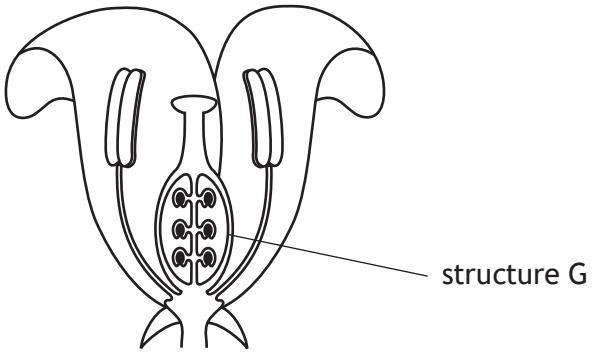
A Reaction time always increases with age for both males and females.

B Reaction time always decreases with age for both males and females.

C Females have a lower reaction time than males in each age group.

D Males have a lower reaction time than females in each age group.

13. The diagram shows the main parts of a flower.



Which row in the table identifies structure G and the chromosome complement of the cells it produces?

	Structure G	**Chromosome complement of cells produced**
A	ovary	haploid
B	ovary	diploid
C	ovule	haploid
D	ovule	diploid

14. The height of some cattle was measured, and the presence or absence of horns was noted. Which row in the table is correct?

	Feature	Type of variation	Type of inheritance
A	horns	continuous	single gene
B	height	continuous	polygenic
C	height	discrete	single gene
D	horns	discrete	polygenic

15. In which part of a leaf are stomata found?

A Lower epidermis
B Palisade mesophyll
C Spongy mesophyll
D Leaf vein

16. The following factors can affect the rate of transpiration:

1. increasing humidity
2. decreasing humidity
3. increasing surface area
4. decreasing wind speed.

Which of these factors would cause a decrease in the rate of transpiration in a leafy shoot?

A 1 and 3
B 2 and 3
C 2 and 4
D 1 and 4

17. Haemoglobin's ability to bind to oxygen is affected by the pH of the blood.

The table shows the percentage of haemoglobin bound to oxygen at different pH levels.

pH of blood	Percentage of haemoglobin bound to oxygen
7.1	
7.2	60.0
7.4	69.0
7.5	73.5

The percentage of haemoglobin bound to oxygen when the pH of blood is 7.1 is likely to be

A 42.0

B 51.0

C 55.5

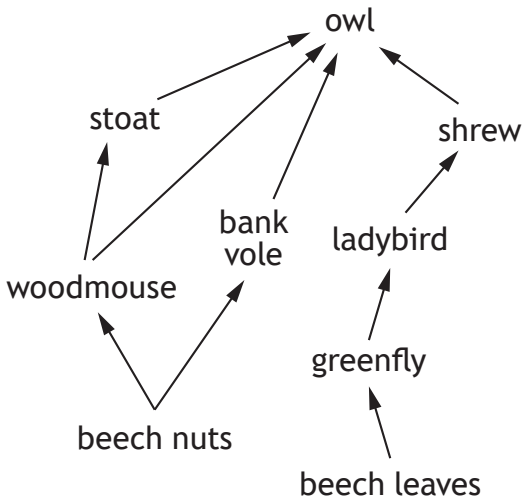
D 59.9

18. Which row in the table identifies the substances absorbed into a structure found in the villus?

	Structure	Substances
A	capillaries	fatty acids and glucose
B	capillaries	amino acids and glycerol
C	lacteal	amino acids and glucose
D	lacteal	fatty acids and glycerol

[Turn over

19. The diagram represents part of a woodland food web.



Which statement is true for the organisms in the food web?

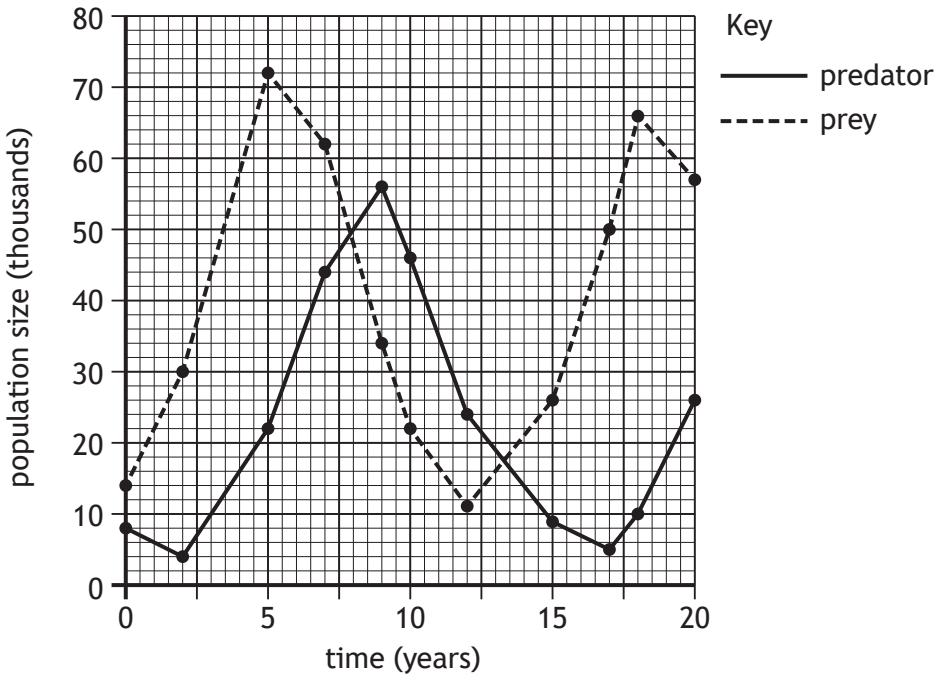
A Owl and stoat are in intraspecific competition.

B Bank vole and shrew are in interspecific competition.

C Ladybird is both predator and prey.

D Greenfly is a producer.

20. The graph shows the changes in population size of a predator and its prey over 20 years.



The difference in the population sizes of the predator and its prey when each population was at its maximum is

A 6000

B 16 000

C 22 000

D 50 000

21. Which of the following is a biotic factor which could affect biodiversity?

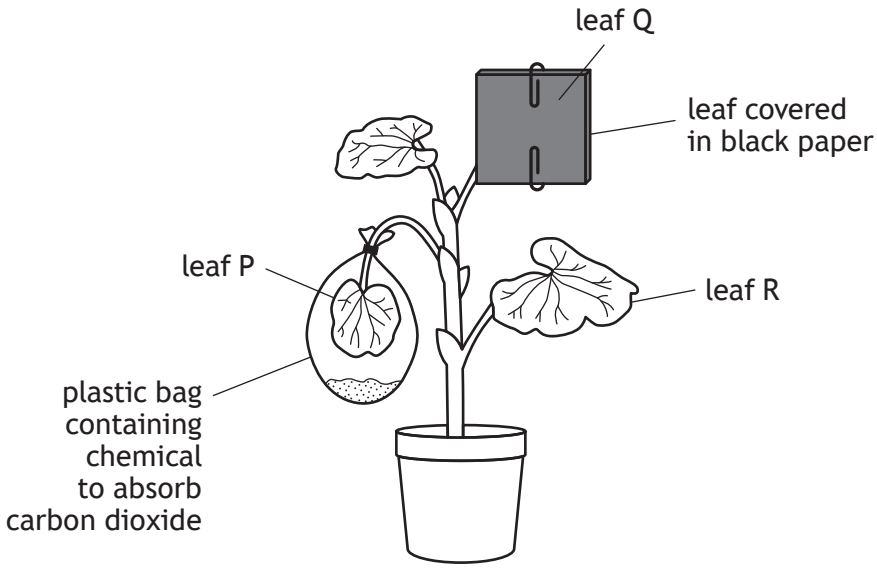
A Soil moisture

B Temperature

C Grazing

D Carbon dioxide concentration

22. In an investigation into photosynthesis, a green plant was set up as shown and left in the light for 2 days.



Leaves P, Q and R were then tested for the presence of starch.

In which of the leaves was starch present?

A Leaf P only

B Leaf R only

C Leaves P and R only

D Leaves P, Q and R

[Turn over

23. The table shows the results of an investigation into the effect of temperature on egg laying mites.

Feature	Temperature (°C)		
	20 °C	**25 °C**	**30 °C**
Average length of egg laying period (days)	36	27	18
Average number of eggs laid per female during egg laying period	108	108	108

As the temperature increases, the average number of eggs laid per female **per day**

A increases

B decreases

C stays the same

D halves.

24. Which row in the table describes the changes that take place when fertiliser leaches into a river?

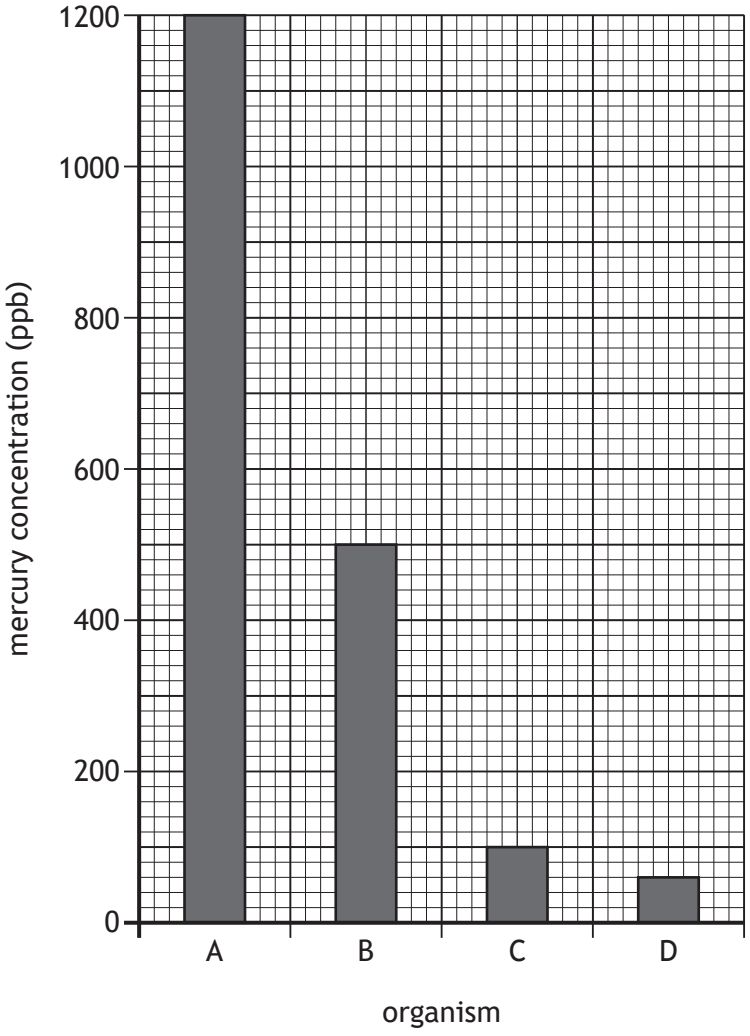
	Algal population	**Light levels**	**Bacteria numbers**	**Oxygen concentration**
A	increases	decrease	increase	decreases
B	increases	decrease	decrease	increases
C	decreases	increase	increase	decreases
D	decreases	increase	decrease	increases

25. Paints containing toxic mercury compounds were used to paint ships. As a result, mercury entered marine food chains.

The concentration of mercury compounds in the tissues of the organisms in the following marine food chain was measured.

plankton → aquatic insects → small fish → large fish

Which bar on the graph represents the mercury concentration of the small fish?



[END OF SECTION 1. NOW ATTEMPT THE QUESTIONS IN SECTION 2 OF YOUR QUESTION AND ANSWER BOOKLET.]

[BLANK PAGE]

DO NOT WRITE ON THIS PAGE

[BLANK PAGE]

DO NOT WRITE ON THIS PAGE

[BLANK PAGE]

DO NOT WRITE ON THIS PAGE