National
Qualifications
2026

X807/76/12

Biology
Paper 1 — Multiple choice

TUESDAY, 28 APRIL
9:00 AM – 9:40 AM

Total marks — 25

Attempt ALL questions.

You may use a calculator.

Instructions for the completion of Paper 1 are given on *page 02* of your answer booklet X807/76/02.

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

Space for rough work is provided at the end of this booklet.

You must leave your answer booklet on your desk; if you do not, you could lose all the marks for this paper.

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Total marks — 25 marks

Attempt ALL questions

1. Which row in the table identifies the type of chromosome in the nucleus, chloroplasts and mitochondria of a plant cell?

	Nucleus	**Chloroplasts**	**Mitochondria**
A	linear	circular	circular
B	linear	linear	linear
C	circular	linear	linear
D	circular	circular	circular

2. The statements refer to mutations.

1. A gene is added to the DNA strand.
2. A nucleotide is added to the DNA strand.
3. Only one amino acid in the protein is changed.
4. It has a major effect on the protein produced.

Which statements about insertion mutations are correct?

A 1 and 3 only

B 1 and 4 only

C 2 and 3 only

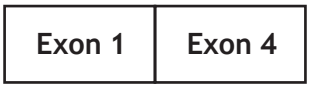
D 2 and 4 only

3. A primary mRNA transcript is shown in the diagram.



After alternative RNA splicing, which of the following mature transcripts could be produced?

1. 

2. 

3. 

4. 

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

4. Oysters are a species of small mollusc and live on the seabed. Their shell colour ranges from light to dark. Oysters with light coloured shells are camouflaged on sandy seabeds in shallow water. Oysters with dark coloured shells are difficult to see in the low light intensities in deeper water. Oysters with intermediate coloured shells are more easily seen in both areas, so are more commonly eaten by predators.

The populations of light and dark coloured oysters are increasing as a result of

A directional selection
B disruptive selection
C stabilising selection
D random selection.

5. Why can evolution by natural selection be more rapid in prokaryotes than in eukaryotes?

A Prokaryotes do not exchange genetic material.
B Eukaryotes can exchange genetic material vertically.
C Eukaryotes can exchange genetic material horizontally.
D Prokaryotes can exchange genetic material horizontally.

[Turn over

6. Which of the following is a description of phylogenetics?

A The changes in organisms over generations as a result of genomic variations.

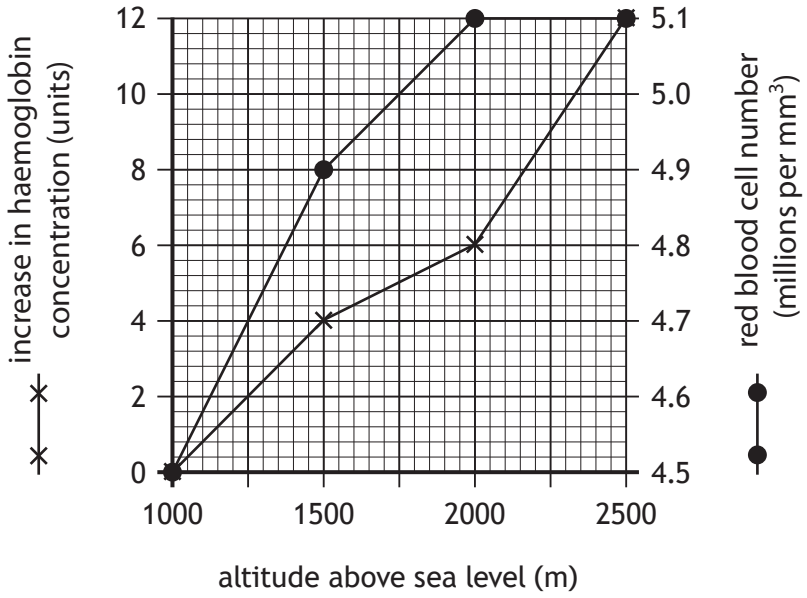
B The use of computers and statistical analysis to compare sequence data.

C The study of evolutionary history and relationships.

D The analysis of genomes to predict the likelihood of developing certain diseases.

7. An investigation was carried out to determine the effect of altitude on the number of red blood cells and the increase in haemoglobin concentration of human blood.

The results are shown in the graph.



What is the red blood cell number when the increase in haemoglobin concentration is 50% of its maximum?

A 4.8 million per mm^3

B 5.1 million per mm^3

C 6.0 million per mm^3

D 12.0 million per mm^3

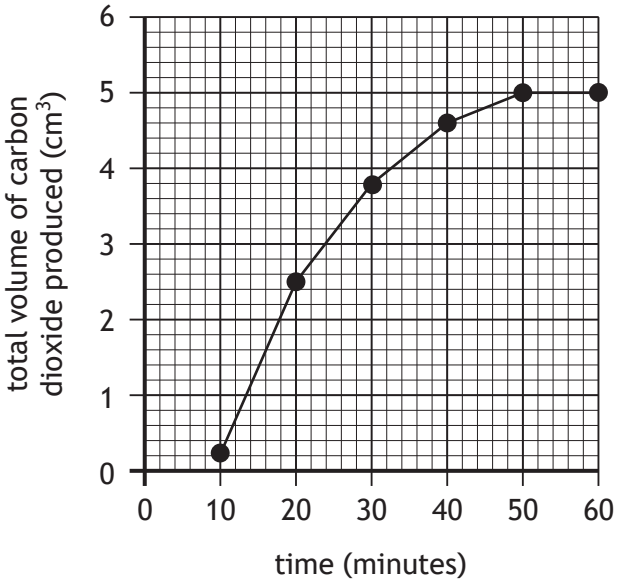
8. Which row in the table identifies the location and the number of ATP molecules used and produced during the fermentation of one molecule of glucose?

	Location	Number of ATP used	Number of ATP produced
A	cytoplasm	4	2
B	cytoplasm	2	4
C	mitochondria	2	4
D	mitochondria	4	2

9. An experiment was carried out into the rate of fermentation in yeast.

5 g of yeast was added to a glucose solution, and the total volume of carbon dioxide produced was recorded every 10 minutes for 1 hour.

The results are shown in the graph.



Based on the trend shown, predict the volume of carbon dioxide collected, **per gram of yeast added**, if the experiment had been allowed to run for another 10 minutes.

A 0.1 cm^3

B 1.0 cm^3

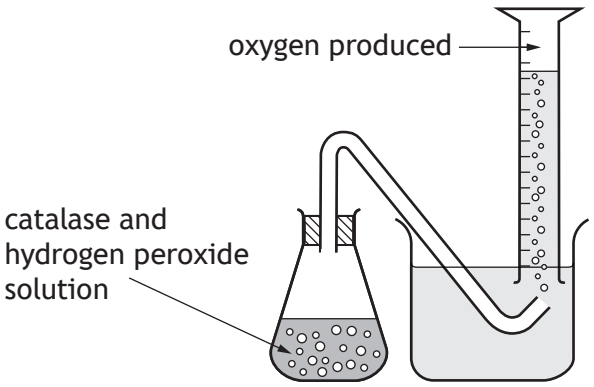
C 4.5 cm^3

D 5.0 cm^3

[Turn over

10. Catalase breaks down hydrogen peroxide into oxygen and water.

The diagram shows an experiment set up to investigate the effect of catalase concentration on the rate of breakdown of hydrogen peroxide. The experiment was repeated with different catalase concentrations.



The dependent variable for this experiment is

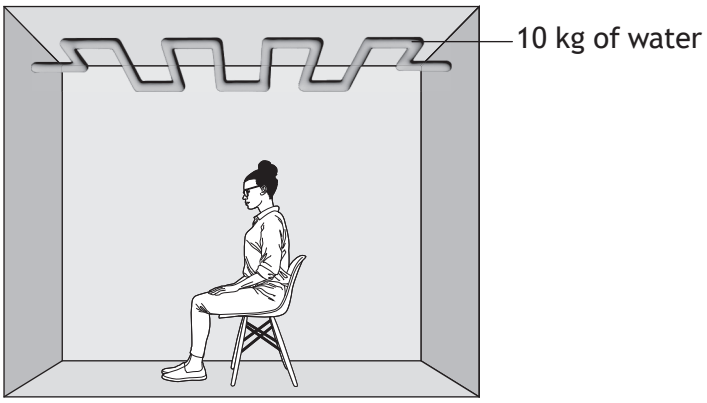
A the rate of breakdown of hydrogen peroxide

B the concentration of catalase

C the volume of hydrogen peroxide

D the concentration of hydrogen peroxide.

11. The metabolic rate of humans can be measured using a calorimeter as shown in the diagram.



human in calorimeter

The heat generated by the human caused a rise in the temperature of water in the pipe. The difference in water temperature over a 2-hour period was recorded and used to calculate metabolic rate.

Energy used can be calculated using the formula:

$$\text{energy (kJ)} = 4.2 \times \text{mass of water (kg)} \times \text{change in temperature (°C)}$$

If the water temperature increased by 12 °C over 2 hours, calculate the metabolic rate of a 50 kg human.

A 5.04 kJ/kg/hour

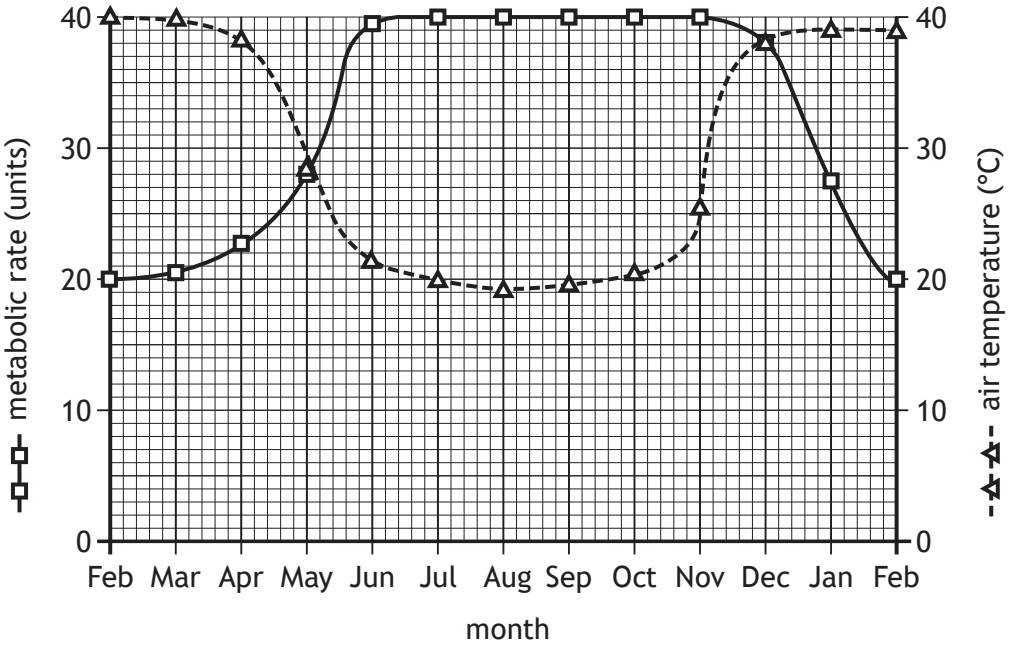
B 10.08 kJ/kg/hour

C 252.00 kJ/kg/hour

D 504.00 kJ/kg/hour

[Turn over

12. The graph shows the metabolic rate of an Australian green striped burrowing frog and the air temperature during one year.



Identify the type of dormancy and behaviour displayed by the frog.

	Type of dormancy	Type of behaviour
A	predictive	aestivation
B	consequential	aestivation
C	predictive	hibernation
D	consequential	hibernation

13. Which behaviour do animals use to avoid metabolic adversity?

A Daily torpor
B Hibernation
C Migration
D Aestivation

14. In which of the following domains of life are microorganisms found?

A Bacteria only
B Archaea only
C Bacteria and archaea only
D Bacteria, archaea and eukaryotes

15. Many bacteria produce secondary metabolites during their growth.

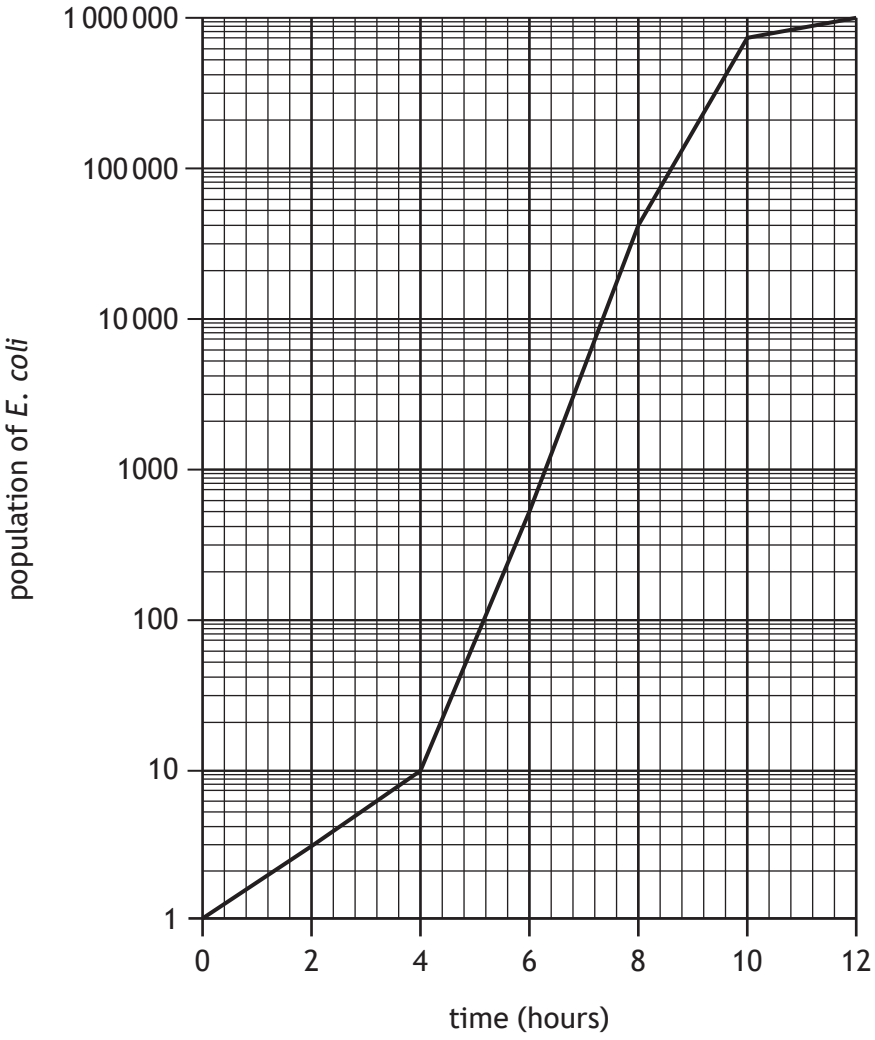
Which row in the table identifies the phase of growth when secondary metabolites are produced and a possible advantage to the bacteria?

	Growth phase	**Advantage**
A	log phase	reduced toxic metabolites
B	log phase	reduced competition from other bacteria
C	stationary phase	reduced toxic metabolites
D	stationary phase	reduced competition from other bacteria

[Turn over

16. *E. coli* bacteria can be grown in culture in the lab. The number of *E. coli* cells growing in culture was recorded every two hours over a 12-hour period.

The results are shown in the graph.



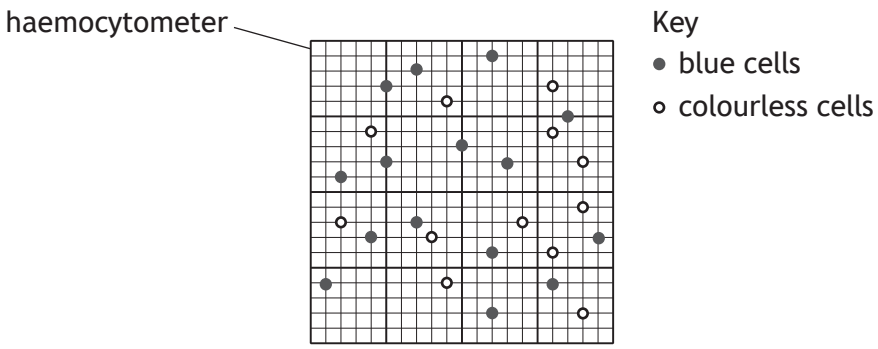
Which row in the table identifies the increase in population between 6 and 8 hours and the growth phase in which this increase occurs?

	Increase in population	Growth phase
A	12 860	lag
B	12 860	log
C	39 500	log
D	39 500	lag

17. A sample of cultured cells was treated with a blue dye to determine if the cells were alive or dead. The dead cells appeared blue and living cells were colourless.

A sample of the culture was added to a haemocytometer as shown.

The total volume of the sample in this haemocytometer was 0.04 cm^3.



The viable cell count for this sample in cells per cm^3 is

A 12

B 15

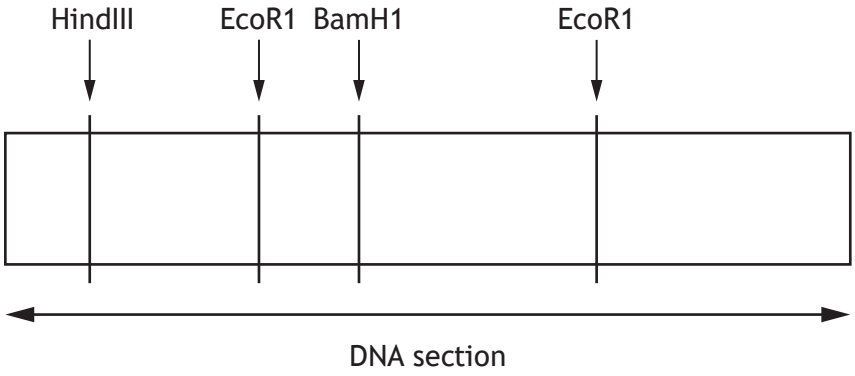
C 300

D 375.

18. Restriction endonucleases can be used to produce fragments of DNA by cutting at specific restriction sites.

A section of DNA was cut into fragments using three different restriction endonucleases, HindIII, EcoR1 and BamH1.

The restriction sites for each enzyme are shown in the diagram.



Which combination of the restriction endonucleases would result in only three fragments being produced?

A EcoR1 and BamH1 only

B EcoR1 and HindIII only

C HindIII and BamH1 only

D HindIII, EcoR1 and BamH1

19. Which statement relating to food production is **not** correct?

A Livestock produce less food per unit area than crop plants.

B Livestock production is often possible in habitats unsuitable for growing crops.

C Less energy is lost in food chains with more trophic levels.

D Breeding of higher yielding cultivars can increase crop production.

20. Sheep were divided into two groups. Each group contained 20 newborn lambs and their mothers. Group 1 was fed grass only while group 2 was fed grass and a wheat-based supplement.

The mass of each lamb was recorded over a 14-week period and the average mass in each group is shown in the table.

Age (weeks)	Average mass (kg)	
	Group 1	Group 2
0	5.2	5.1
4	14.1	15.8
8	25.7	27.3
14	34.6	39.4

Over the 14-week period the difference in the average increase in mass between group 1 and group 2 was

A 0.35 kg per week

B 2.00 kg per week

C 4.90 kg per week

D 107.16 kg per week.

21. The following behaviours of chimpanzees in a zoo were observed.

1. Grooming
2. Stereotypy
3. Sexual presentation
4. Misdirected behaviour

Which behaviours indicate poor animal welfare?

A 1 and 3 only

B 1 and 4 only

C 2 and 3 only

D 2 and 4 only

22. Musk oxen are large herbivores that are preyed on by wolves. When threatened by wolves, the adults form a protective circle with their young in the centre.

This is **not** an example of

A social defence

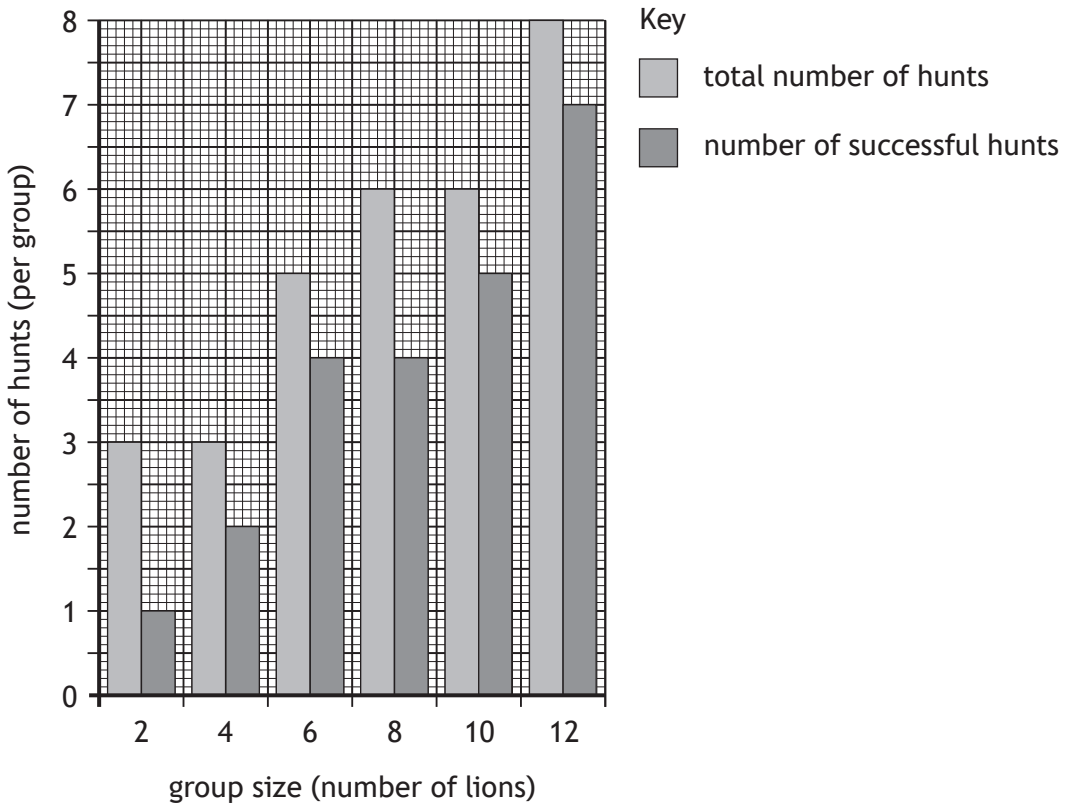
B kin selection

C mutualism

D altruistic behaviour.

23. Lions are predators that live in social groups and use co-operative hunting.

The bar chart shows the relationship between group size, number of hunts and number of successful hunts.



Which of the following statements is supported by the data shown?

A As group size increases the total number of hunts increases.

B Between group size 8 and 10 the number of successful hunts remain the same.

C The percentage of hunts that were successful is greatest when the group size is 12.

D Group size of 4 has the most successful hunts per lion.

[Turn over

24. An investigation was carried out into the frequency of feeding on the growth of chickens on a farm.

The table shows the feeding frequency for each group.

Group	Feeding frequency (meals per day)
1	2
2	4
3	6
4	8

Each group was fed the same total mass of corn per day. The chickens were weighed at the start of the investigation and reweighed after four weeks. Their growth rates were then calculated.

Which aspect of this investigation would increase its validity?

A Feeding the same mass of corn in each meal

B Carrying out the investigation across more farms

C Increasing the number of chickens in each group

D Using the same breed of chicken in all groups

25. The species diversity in four different sample sites in a moorland ecosystem was studied. The number of plants of each species present in each sample site was counted.

Which sample site has the highest species diversity?

Sample site	Number of plants of each species			
	Cross-leaved heath	Common ling	Bell heather	Purple moor grass
A	0	52	63	48
B	24	57	17	17
C	8	58	12	62
D	22	19	16	17

[END OF QUESTION PAPER]

SPACE FOR ROUGH WORK

SPACE FOR ROUGH WORK