Cambridge Assessment International Education

Cambridge IGCSE™

BIOLOGY **0610/22**

Paper 2 Multiple Choice (Extended) **October/November 2024**

45 minutes

You must answer on the multiple choice answer sheet.

You will need: Multiple choice answer sheet
Soft clean eraser
Soft pencil (type B or HB is recommended)

INSTRUCTIONS

- There are **forty** questions on this paper. Answer **all** questions.
- For each question there are four possible answers **A**, **B**, **C** and **D**. Choose the **one** you consider correct and record your choice in soft pencil on the multiple choice answer sheet.
- Follow the instructions on the multiple choice answer sheet.
- Write in soft pencil.
- Write your name, centre number and candidate number on the multiple choice answer sheet in the spaces provided unless this has been done for you.
- Do **not** use correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.

INFORMATION

- The total mark for this paper is 40.
- Each correct answer will score one mark.
- Any rough working should be done on this question paper.

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1 Which organisms carry out respiration, growth, movement and excretion?

A all animals and all plants

B animals only

C arthropods and flowering plants only

D plants only

2 The chimpanzee belongs to the species *Pan troglodytes*.

What is the genus of this species?

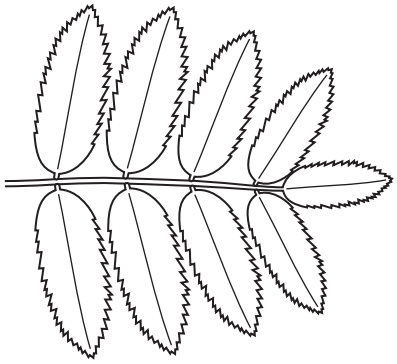
A chimpanzee

B *Pan*

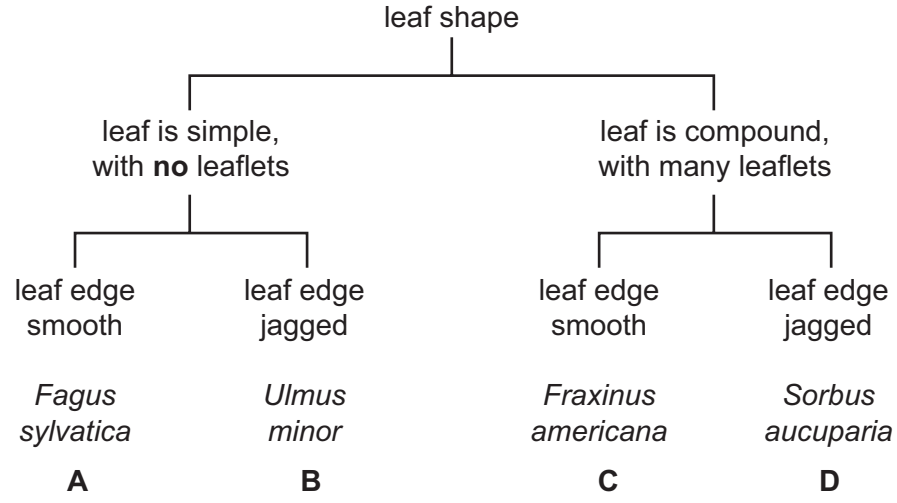
C *Pan troglodytes*

D *troglodytes*

3 The diagram shows a tree leaf.



Use the key to identify the tree species to which the leaf belongs.



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4 What is the function of mitochondria in cells?

A to absorb light energy

B to produce glucose

C to release energy

D to transport oxygen

5 Which row shows a function of the cell membrane and a function of the cell wall in a palisade cell?

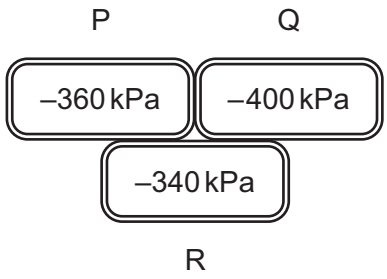
	cell membrane	cell wall
A	active transport	active transport
B	active transport	support
C	support	active transport
D	support	support

6 A specimen is viewed under a microscope with a ×10 magnification. The specimen image measures 30 mm.

What is the actual size of the specimen?

A 3 μm **B** 30 μm **C** 300 μm **D** 3000 μm

7 The diagram shows the water potential of three plant cells. The more negative the value, the higher the solute concentration.



What is the immediate movement of water that will occur between the three cells?

A from P to Q, and from R to P and Q

B from Q to P and R only

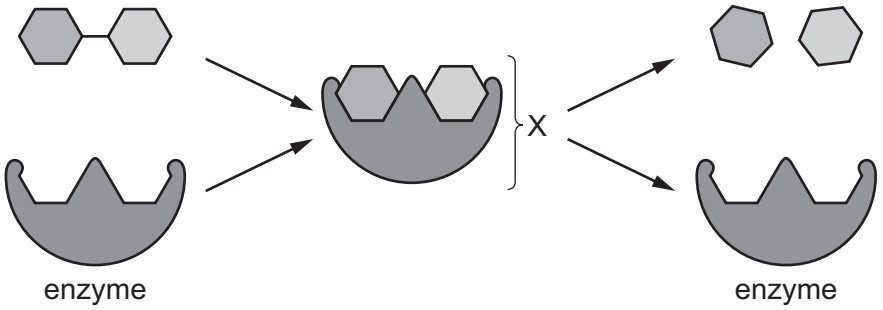
C from Q to P and R, and from P to R

D from R to Q only

8 Which base in a DNA molecule always pairs with a G base?

A A **B** G **C** C **D** T

9 The diagram shows the steps in an enzyme-controlled reaction.



What describes the part labelled X?

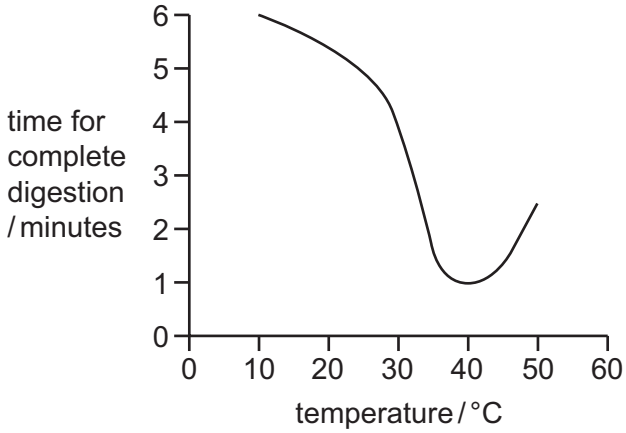
A active site

B enzyme–substrate complex

C product

D substrate

10 The graph shows the effect of temperature on the time taken for the complete digestion of starch.



At which temperature is the rate of digestion of starch the greatest?

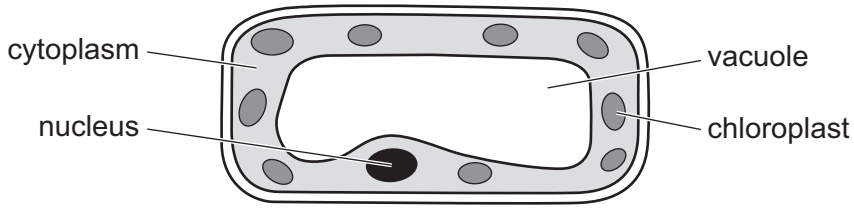
A 10 °C **B** 30 °C **C** 40 °C **D** 50 °C

11 Which substance is needed to make chlorophyll and which part of the plant absorbs the substance?

	substance	part of the plant where the substance is absorbed
A	calcium	root hairs
B	calcium	stomata
C	magnesium	root hairs
D	magnesium	stomata

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12 The diagram shows a type of plant cell.



In which tissue is this cell found?

A leaf epidermis

B palisade mesophyll

C root epidermis

D xylem

13 Which components of a balanced diet are needed to make haemoglobin and to prevent scurvy and rickets?

A carbohydrates and mineral ions

B carbohydrates and proteins

C mineral ions and vitamins

D vitamins and fibre

14 Which group of organs belongs to the same organ system?

A diaphragm, oesophagus, trachea

B heart, liver, lungs

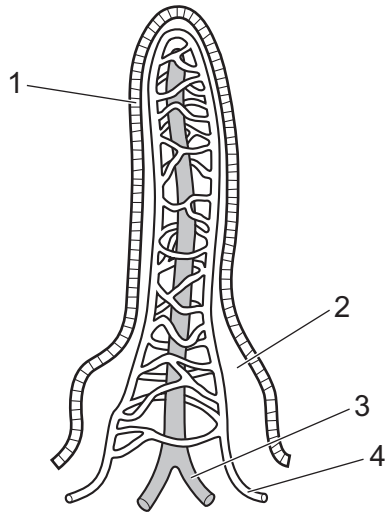
C heart, stomach, trachea

D oesophagus, intestine, stomach

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15 The diagram shows a villus.



Which parts transport glucose and fatty acids away from the villus?

	glucose	fatty acids
A	3	1
B	3	2
C	4	3
D	4	4

16 Which conditions lead to the lowest rate of transpiration in a plant?

A cool and high humidity

B cool and windy

C warm and low humidity

D warm and windy

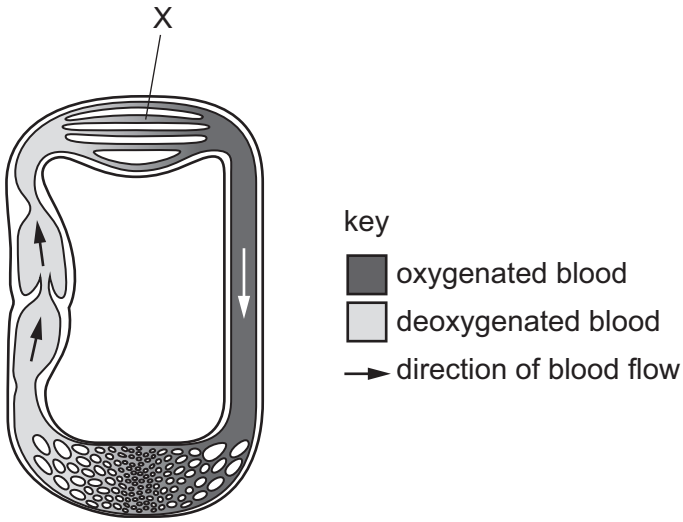
17 The table shows the transport tissues of plants and some substances that may or may **not** travel through these tissues.

Which row is correct for translocation?

	plant tissue	substance transported
A	phloem	maltose
B	phloem	sucrose
C	xylem	amino acids
D	xylem	water

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18 The diagram shows the circulatory system of a fish.



What is the structure labelled X?

A aorta

B gills

C heart

D vena cava

19 Which factors increase the risk of developing coronary heart disease?

1 increased age

2 regular exercise

3 smoking

4 stress

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

20 Which features of the human body protect against pathogens in food?

	red blood cells	stomach acid	white blood cells
A	yes	yes	no
B	yes	no	no
C	no	yes	yes
D	no	no	yes

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21 What causes air to enter the lungs?

	external intercostal muscles	volume of thorax	air pressure in thorax
A	contract	decreases	decreases
B	relax	decreases	increases
C	contract	increases	decreases
D	relax	increases	increases

22 The symbol equation for aerobic respiration is shown.

$$C_6H_xO_y + 6O_2 \rightarrow 6CO_z + 6H_2O$$

Which numbers represent the letters shown in the equation as x, y and z?

	x	y	z
A	2	12	6
B	6	2	12
C	6	12	2
D	12	6	2

23 A student investigates the rate of anaerobic respiration in yeast.

The total volume of carbon dioxide produced is measured every 10 minutes for 40 minutes. The table shows the results.

time / minutes	total volume of carbon dioxide produced / cm^3
0	6
10	30
20	37
30	40
40	41

Between which times is the rate of anaerobic respiration fastest?

A 0–10 minutes

B 10–20 minutes

C 20–30 minutes

D 30–40 minutes

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24 Which part of an amino acid is removed during deamination?

A the carbon-containing part

B the nitrogen-containing part

C the oxygen-containing part

D the iron-containing part

25 Which process happens in a glomerulus in the kidney?

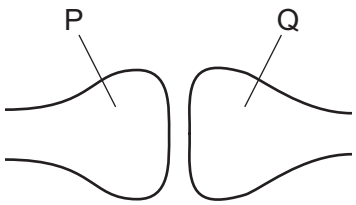
A assimilation

B deamination

C filtration

D reabsorption

26 The diagram shows a synapse in a reflex arc.



What are the identities of the two neurones and in which direction does the neurotransmitter pass?

	neurone P	neurone Q	direction of passage of the neurotransmitter
A	motor	relay	P → Q
B	motor	sensory	P → Q
C	relay	motor	Q → P
D	relay	sensory	Q → P

27 Which responses occur in the iris of the eye when a person walks from a brightly lit area to a dimly lit area?

	circular muscles	radial muscles
A	contract	contract
B	contract	relax
C	relax	contract
D	relax	relax

28 Which statements about hormones are correct?

1 Adrenaline decreases pupil diameter.

2 Adrenaline increases pupil diameter.

3 Insulin decreases blood glucose concentration.

4 Insulin increases blood glucose concentration.

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

29 Bacteria such as MRSA are resistant to antibiotics.

These processes can occur in bacteria.

1 artificial selection

2 genetic variation

3 mutation

4 natural selection

Which processes lead to the development of antibiotic resistance?

A 1, 2, 3 and 4

B 1, 2 and 3 only

C 2, 3 and 4 only

D 2 and 4 only

30 A farmer grows hot pepper plants and sweet pepper plants in different fields on his farm.

Each year, the farmer saves seeds from the pepper plants to grow the next crop of peppers.

One year, the farmer notices that some of the seeds from the sweet pepper plants have grown into plants which produce hot and sweet peppers.

What is the most likely explanation?

A Self-pollination has occurred and pollen has been transferred from the anther of a hot pepper plant to the stigma of a sweet pepper plant.

B Cross-pollination has occurred and pollen has been transferred from the stigma of a hot pepper plant to the anther of a sweet pepper plant.

C Self-pollination has occurred and pollen has been transferred from the stigma of a hot pepper plant to the anther of a sweet pepper plant.

D Cross-pollination has occurred and pollen has been transferred from the anther of a hot pepper plant to the stigma of a sweet pepper plant.

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31 Why do different cells in a human body produce different proteins?

A Alleles can be dominant or recessive.

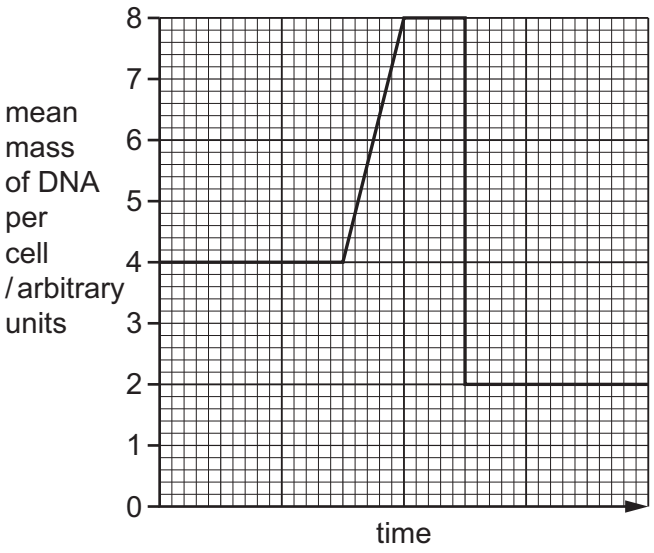
B Only particular genes are expressed.

C Cells have different genes.

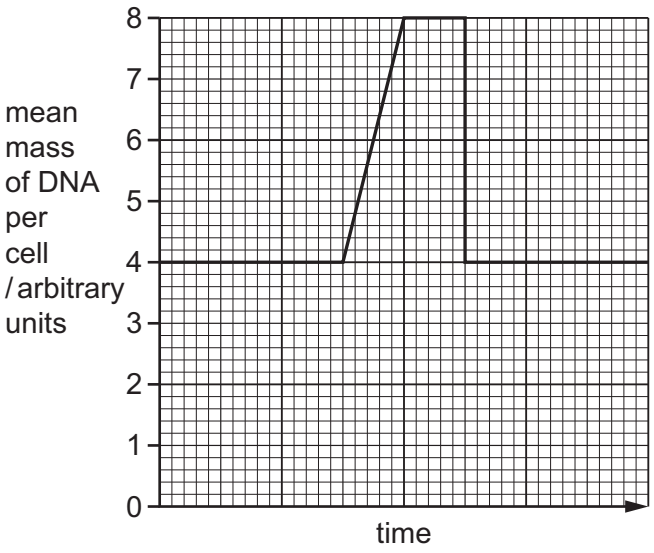
D The sequence of bases in the DNA varies between different cells.

32 Which graph shows the mean mass of DNA per cell before, during and after mitosis?

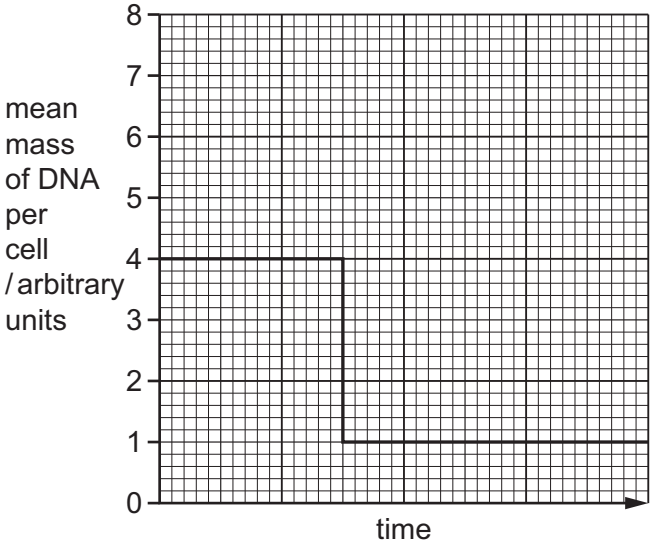
A



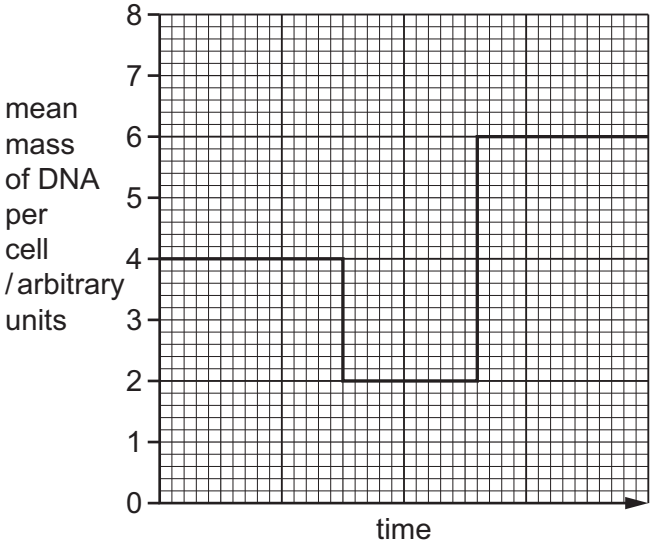
B



C



D



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33 Which statement about gene mutations is correct?

A A mutation is a change in the amino acid sequence of DNA.

B Mutations are a source of genetic variation.

C Mutations are caused by random mating.

D Mutations happen during random fertilisation.

34 The diagram shows the amount of energy in $kJ\,m^{-2}\,yr^{-1}$ at each trophic level of a food chain.

producers	→	primary consumers	→	secondary consumers
88 000		14 000		2000

Approximately how much energy is lost between the producers and the secondary consumers?

A 0.2% **B** 2.0% **C** 84% **D** 98%

35 Which process in the nitrogen cycle removes nitrogen gas from the atmosphere?

A decomposition

B denitrification

C nitrification

D nitrogen fixation

36 What is a population?

A a group of different organisms living in different areas at the same time

B a group of organisms of different species living in the same area

C a group of organisms of one species living in the same area at different times

D a group of organisms of one species living in the same area at the same time

37 A farmer has a small pond on their farm land.

One year, most of the organisms in the pond die.

The next year, the farmer decreases their use of nitrate fertilisers and fewer organisms in the pond die.

Which statement explains why this will help **increase** the number of organisms living in the pond?

A There is a decrease in dissolved oxygen due to an increase in decomposition.

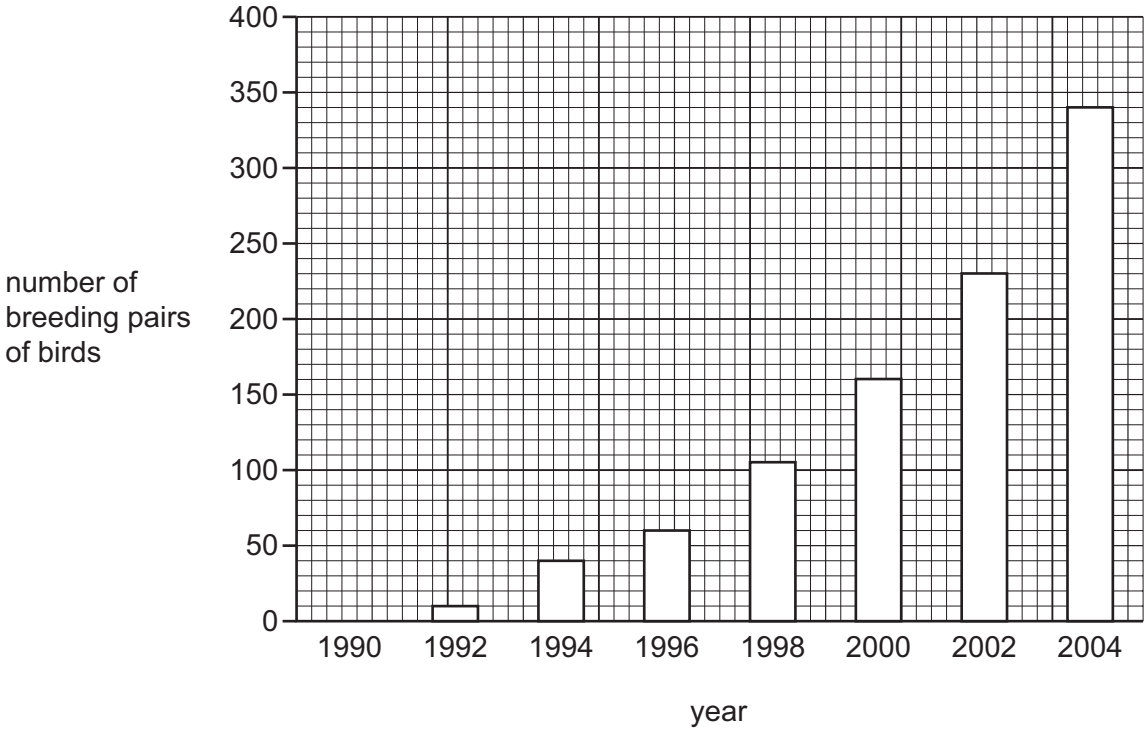
B There is a decrease in dissolved oxygen due to an increase in photosynthesis.

C There is an increase in dissolved oxygen due to a decrease in decomposition.

D There is an increase in dissolved oxygen due to a decrease in photosynthesis.

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38 The graph shows how the population of a species of bird has increased following a conservation programme.

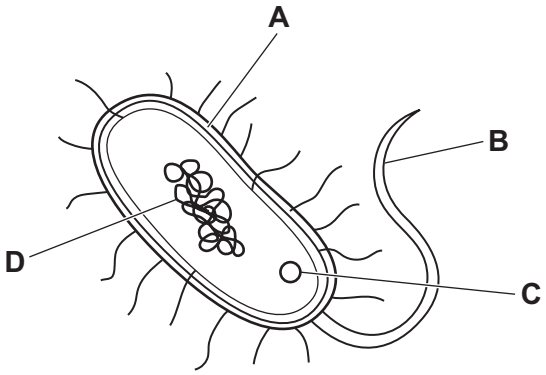


What is the percentage increase in the number of breeding pairs of birds from 1996 to 2002, to the nearest whole number?

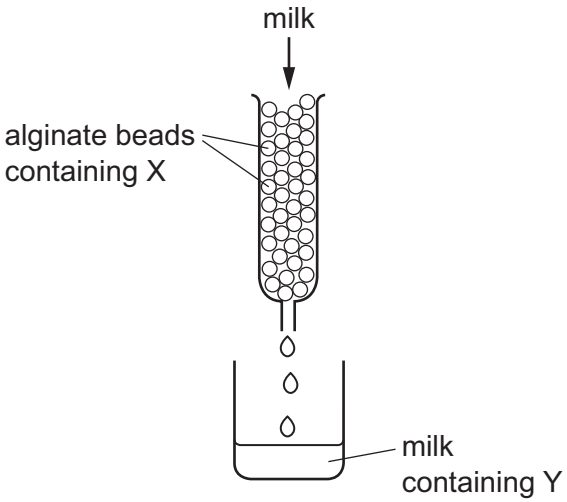
A 35% **B** 74% **C** 170% **D** 283%

39 The diagram shows a bacterial cell that is used in genetic modification.

Which labelled structure makes the bacterium useful for genetic modification?



40 The diagram shows some apparatus that was used to produce lactose-free milk.



The alginate beads do not react with any of the substances. X is an enzyme that catalyses a reaction involving one of the substances found in milk.

What are X and Y?

	X	Y
A	amylase	glucose
B	amylase	starch
C	lactase	glucose
D	lactase	starch

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