Cambridge International AS & A Level

Cambridge International Examinations
Cambridge International Advanced Subsidiary and Advanced Level

BIOLOGY **9700/11**

Paper 1 Multiple Choice **October/November 2015**

1 hour

Additional Materials: Multiple Choice Answer Sheet
Soft clean eraser
Soft pencil (type B or HB is recommended)

9586539003

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.
Do not use staples, paper clips, glue or correction fluid.
Write your name, Centre number and candidate number on the Answer Sheet in the spaces provided unless this has been done for you.
DO **NOT** WRITE IN ANY BARCODES.

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 separate Answer Sheet.

Read the instructions on the Answer Sheet very carefully.

Each correct answer will score one mark. A mark will not be deducted for a wrong answer.
Any rough working should be done in this booklet.
Electronic calculators may be used.

This document consists of **16** printed pages.

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CAMBRIDGE International Examinations

1 Which size of ribosome is found in chloroplasts and typical prokaryotic cells?

A 60S **B** 70S **C** 80S **D** 90S

2 Pancreatic cells have a diameter of 35 μm.

Red blood cells have a diameter of 7000 nm.

Which statement is correct?

A Pancreatic cells are 5 times larger than red blood cells.

B Pancreatic cells are 50 times larger than red blood cells.

C Pancreatic cells are 5 times smaller than red blood cells.

D Pancreatic cells are 50 times smaller than red blood cells.

3 Which process occurs in a mature red blood cell?

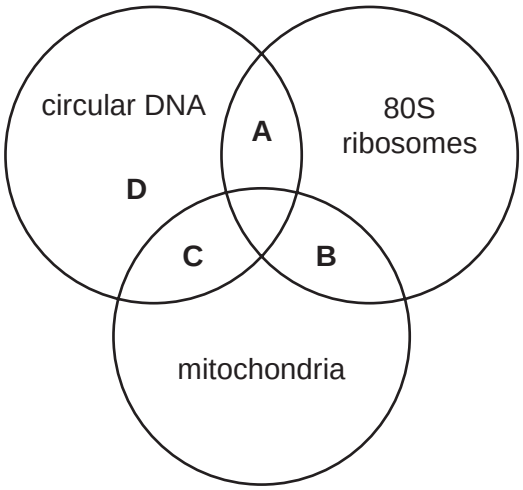
A active transport

B cell division

C transcription

D translation

4 Which structures are present in a *Vibrio cholerae* cell?



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5 Which features of microvilli and root hairs are correct?

	increase cell surface area	cannot be resolved with the light microscope	contain vacuoles	more than one present on a cell
A	microvilli	microvilli	root hairs	microvilli
B	microvilli	root hairs	microvilli	microvilli
C	root hairs	microvilli	root hairs	root hairs
D	root hairs	root hairs	microvilli	root hairs

6 Which order of organelles is correct when a protein is synthesised and secreted?

A Golgi body → lysosome → ribosome → nucleus

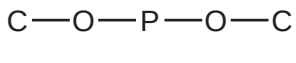
B nucleus → ribosome → Golgi body → vesicle

C ribosome → nucleus → lysosome → Golgi body

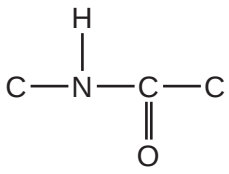
D vesicle → Golgi body → nucleus → ribosome

7 Which diagram shows the bond linking the individual units of both glycogen and amylose?

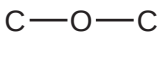
A



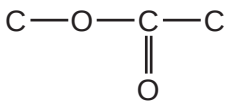
B



C



D



8 Tests for biological molecules were carried out on three solutions.

The observations were as follows.

solution 1 Benedict's test – blue to orange

solution 2 Benedict's test after acid hydrolysis – blue to red

solution 3 biuret test – blue to purple

Which observations would show the solutions that contained sucrose and amylase?

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

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9 Which row describes a triglyceride?

	hydrophilic	insoluble in alcohol
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

key

✓ = correct

✗ = not correct

10 A solution containing equal masses of amylose and amylopectin is completely hydrolysed.

Which molecules will be found after the hydrolysis?

A α-glucose only

B β-glucose only

C equal masses of α-glucose and β-glucose

D more α-glucose than β-glucose

11 When a lake begins to freeze, which properties of water are needed for fish to survive?

1 Water has a high surface tension.

2 Water has a high latent heat of vaporisation.

3 Water has a high thermal capacity.

4 Water has its maximum density at 4 °C.

	1	2	3	4
A	✓	✓	✓	✗
B	✓	✗	✓	✗
C	✗	✓	✗	✓
D	✗	✗	✓	✓

key

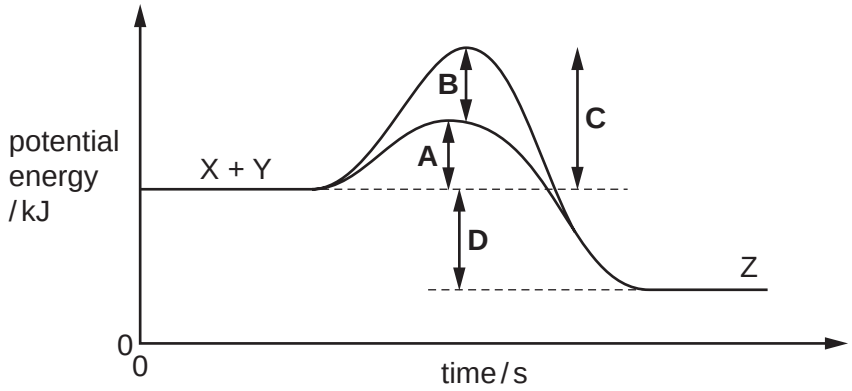
✓ = needed

✗ = not needed

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12 The graph shows the energy levels involved in an enzyme-catalysed reaction. Substrate molecules X and Y combine to give product Z.

Which arrow shows the reduction in activation energy due to the enzyme?



13 Which statements about enzyme inhibitors are correct?

1 Competitive inhibitors may be similar shapes to the substrate.

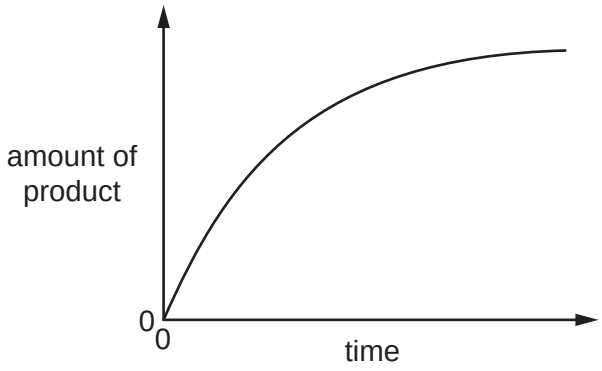
2 Competitive inhibitors bind to the active site.

3 Non-competitive inhibitors alter the shape of the enzyme.

4 Non-competitive inhibitors bind to the substrate.

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

14 A fixed volume of the enzyme catalase was added to a fixed volume of hydrogen peroxide solution. The diagram shows how the amount of product changed over the course of the reaction.



What explains the shape of this graph?

A The active sites become saturated.

B The enzyme was denatured.

C The hydrogen peroxide inhibited the reaction.

D The substrate molecules were used up.

15 Which descriptions are correct about transport across cell surface membranes?

	active processes	passive processes
A	endocytosis and exocytosis	diffusion and osmosis
B	exocytosis and facilitated diffusion	osmosis and endocytosis
C	facilitated diffusion	exocytosis and osmosis
D	facilitated diffusion and exocytosis	endocytosis and diffusion

16 The statements are comparisons of endocytosis and exocytosis.

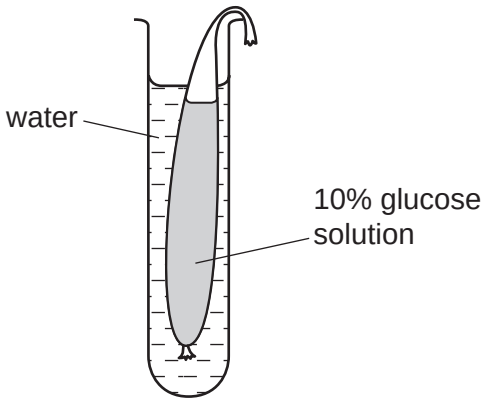
- Both are mechanisms that involve vesicles or vacuoles and the transport of materials across the cell surface membrane.
- Both mechanisms occur to allow bulk transport across the cell surface membrane.
- Endocytosis involves taking materials into the cell whereas exocytosis involves the release of materials from the cell.
- Some of the cell surface membrane is lost when endocytosis occurs and there is an increase in the cell surface membrane when exocytosis occurs.

How many of the statements are correct?

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

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17 The diagram shows apparatus set up to investigate the effect of putting a 10 % glucose solution in a selectively permeable bag (Visking tubing) and surrounding it with water.



Samples from the surrounding water were tested with Benedict's solution after 10 minutes and after 20 minutes. The change in volume of glucose solution was observed after 20 minutes.

Which row is correct?

	result of Benedict's test		volume of glucose solution in Visking tubing / cm^3
	after 10 minutes	after 20 minutes	
A	green	blue	increased
B	green	orange	increased
C	red	orange	decreased
D	yellow	green	decreased

18 The photomicrograph shows a cell during mitosis.



What is happening in this cell?

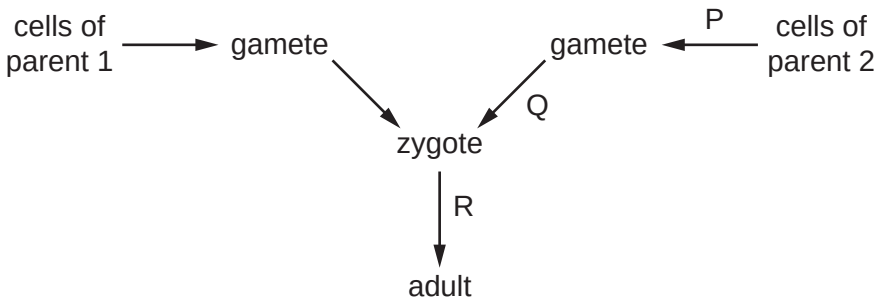
1 Centrioles are replicating.

2 Spindle microtubules are shortening.

3 Chromatin is condensing.

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

19 The diagram represents stages in the life cycle of an organism.



Which arrow represents a process that results in haploid cells and which represents mitosis?

	produces haploid cells	mitosis
A	P	Q
B	Q	R
C	R	Q
D	P	R

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20 The statements describe the features of some nucleic acids.

1 carry an amino acid to a ribosome

2 carry a genetic code sequence out of the nucleus

3 carry a genetic code sequence to a ribosome

Which functions are carried out **only** by mRNA?

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

21 The antibiotic chloramphenicol prevents prokayotes from reproducing by inhibiting the enzyme which catalyses the formation of peptide bonds during translation.

What will be prevented by the action of this antibiotic?

A binding of amino acids to tRNA

B condensation of amino acids

C pairing between codons and anticodons

D positioning of amino acids by tRNA

22 Which row shows two pairs of nucleotide bases in a molecule of DNA?

	first base pair		second base pair	
	bases present	number of hydrogen bonds	bases present	number of hydrogen bonds
A	AC	2	GT	3
B	AC	3	GT	2
C	AT	2	GC	3
D	AT	3	GC	2

23 By which process does sucrose move through phloem sieve tube elements?

A active transport

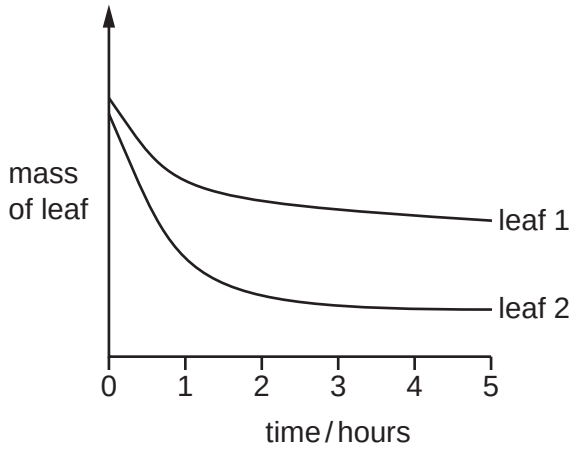
B diffusion

C facilitated diffusion

D mass flow

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24 The diagram shows the results of an experiment using leaves with the same surface area from two different species. Each leaf was left on a balance in daylight in a closed room and their mass recorded at 1 hour intervals.



What could explain these results?

A Leaf 1 has a thicker cuticle than leaf 2.

B Leaf 1 is thinner than leaf 2.

C Leaf 2 has stomata protected by hairs and leaf 1 does not.

D Leaf 2 has sunken stomata and leaf 1 does not.

25 Which description of the movement of water through a leaf is **not** correct?

A Water evaporates into an air space from the higher water potential in the cell wall of a mesophyll cell.

B Water moves from the higher water potential of the cytoplasm of a mesophyll cell to the lower water potential in its cell wall.

C Water moves from the lower water potential of a xylem vessel to the higher water potential of a mesophyll cell.

D Water vapour diffuses from an air space, through an open stoma, to the lower humidity of the surrounding air.

26 Which changes to the water potential and the volume of liquid in the phloem occur when carbohydrate is taken out of a root into phloem sieve tubes?

	water potential in a phloem sieve tube becomes	volume of liquid in phloem sieve tubes
A	less negative	decreased
B	less negative	increased
C	more negative	decreased
D	more negative	increased

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27 Which reactions take place in a capillary in the lungs?

1 carbonic acid is formed from carbon dioxide and water

2 carbaminohaemoglobin is formed from carbon dioxide and haemoglobin

3 haemoglobinic acid is formed from haemoglobin and hydrogen ions

4 carbon dioxide and water are formed from hydrogen carbonate ions and hydrogen ions

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

28 Red blood cells may contain a molecule known as 2,3-bisphophoglycerate (2,3BPG). When 2,3BPG binds to haemoglobin a higher partial pressure of oxygen is needed to bring about 50% saturation of haemoglobin with oxygen.

Which statements about the effect of 2,3BPG are correct?

1 2,3BPG in red blood cells causes the oxygen dissociation curve to shift to the left.

2 The binding of 2,3BPG to haemoglobin lowers the affinity of the haemoglobin for oxygen.

3 Binding of 2,3BPG to haemoglobin reduces the Bohr effect.

4 When 2,3BPG is absent, oxyhaemoglobin is less likely to unload oxygen.

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

29 Which statements about arteries are correct?

1 Artery walls can resist high pressure.

2 Arteries pump blood out of the heart.

3 Blood in arteries has the same flow rate as in veins.

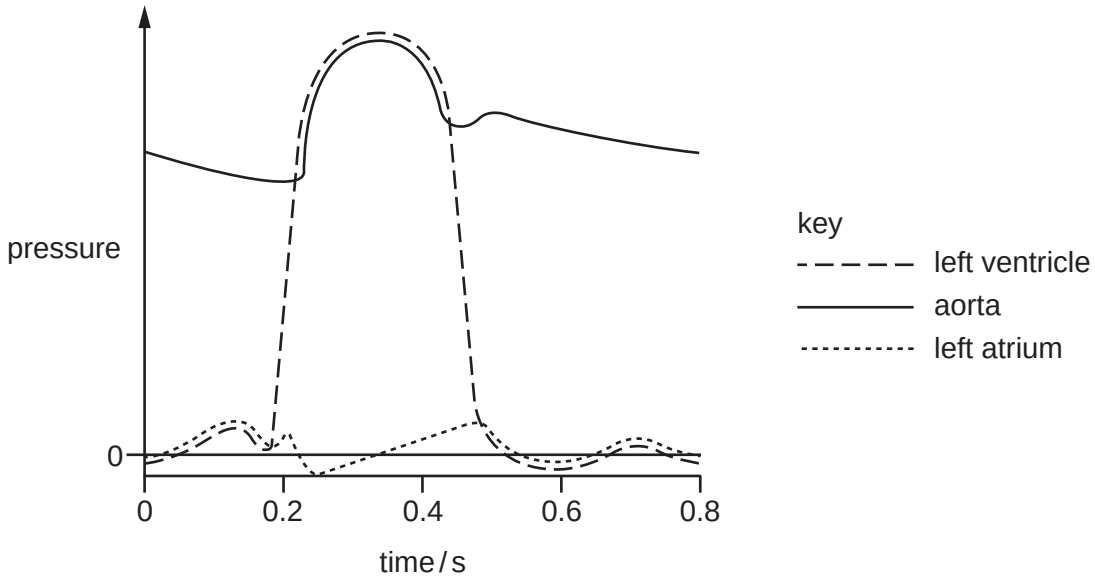
4 The pulse in arteries is the result of a surge in blood that causes expansion of the artery wall.

5 There are semilunar valves at the junction of arteries with the heart.

A 1, 2, and 4 **B** 1, 3 and 5 **C** 1, 4 and 5 **D** 2, 3 and 4

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30 The graph shows the changes in pressure that occur in the left side of the heart during one cardiac cycle.



What is the heart rate in beats per minute?

A 75 **B** 80 **C** 120 **D** 150

31 Which statements are correct?

1 Tissue fluid has less protein and no red blood cells compared to plasma.

2 Lymph may contain lipids, carbon dioxide and phagocytes.

3 Tissue fluid contains glucose, amino acids, urea and carbon dioxide.

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

32 What would be seen in a photomicrograph of the wall of the trachea?

	tissue		
	elastic fibres	epidermis	smooth muscle
A	✓	✓	✓
B	✓	✓	✗
C	✓	✗	✓
D	✗	✓	✗

key
✓ = present
✗ = absent

33 Which process leads to atherosclerosis?

A a blood clot forming in a coronary artery

B contraction of muscles in arteries caused by nicotine

C formation of plaques in an artery wall

D loss of elasticity in an artery wall causing it to burst

34 Some symptoms of chronic obstructive pulmonary disease (COPD) are listed.

1 bursting of alveoli

2 increase in secretion of mucus

3 loss of elastic fibres

4 narrowing of airways

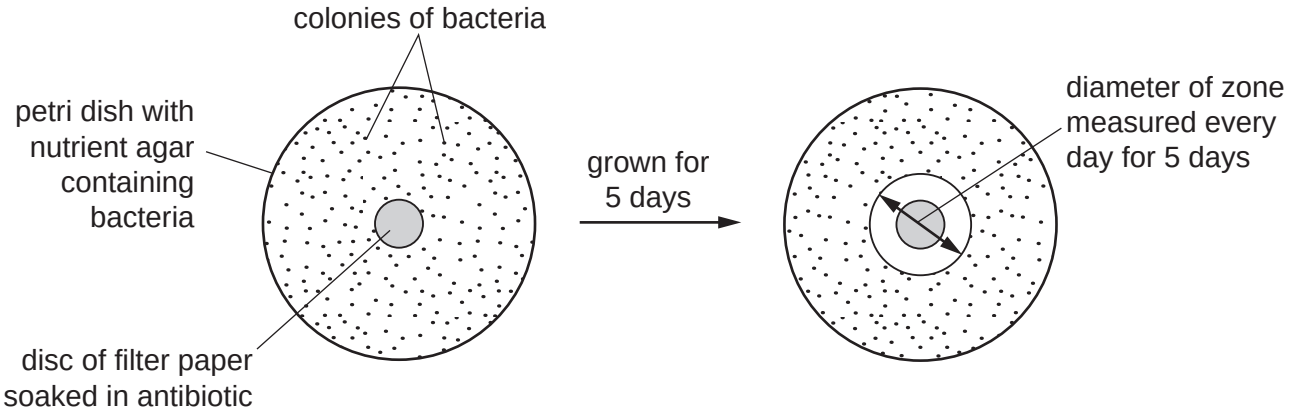
5 reduction in surface area for gaseous exchange

Which of these are also the symptoms of emphysema?

A 1, 2 and 4 **B** 1, 3 and 5 **C** 2, 3 and 4 **D** 2, 4 and 5

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35 The diagram shows one way of testing the effect of an antibiotic on bacteria.



The table shows the results of testing five different types of bacteria. Zones of less than 13 mm show the presence of resistant bacteria.

type of bacteria	diameter of zone / mm				
	day 1	day 2	day 3	day 4	day 5
1	24.10	21.90	19.00	17.60	14.30
2	18.60	15.40	12.20	9.00	0.00
3	17.90	12.80	12.40	11.10	10.90
4	19.40	15.30	13.20	8.10	0.00
5	22.00	21.00	20.50	20.40	20.40

Which statement can be supported by this data?

A All the types of bacteria become resistant to antibiotics over time.

B Only types 2, 3 and 4 of the bacteria show resistance to the antibiotic.

C The antibiotic can be used to treat types 1 and 3 only.

D Type 5 of the bacteria can never become resistant to the antibiotic.

36 What describes a function of a macrophage?

A They are found in tissues and secrete cytokines in response to infection.

B They can leave the blood and accumulate at sites of inflammation.

C They can leave the blood and secrete cytotoxins when exposed to damaged cells.

D They circulate in the blood and produce antigens in response to infection.

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37 There has been an increase in the number of cases of the disease whooping cough.

A pregnant woman is vaccinated against whooping cough to protect the new born baby from this disease.

How does the immune response of the mother help to protect a new born baby from whooping cough?

	before birth, baby receives from mother	type of protection gained by baby
A	antibodies	natural passive
B	antigens	artificial active
C	memory cells	artificial passive
D	pathogens	natural active

38 A tree carries out photosynthesis and provides organic compounds for other organisms in a forest.

It takes carbon dioxide from the atmosphere and returns oxygen to the atmosphere.

It takes water from the soil into its roots and its leaves lose water to the atmosphere.

Many other organisms live in the tree.

Which term describes the tree?

A population

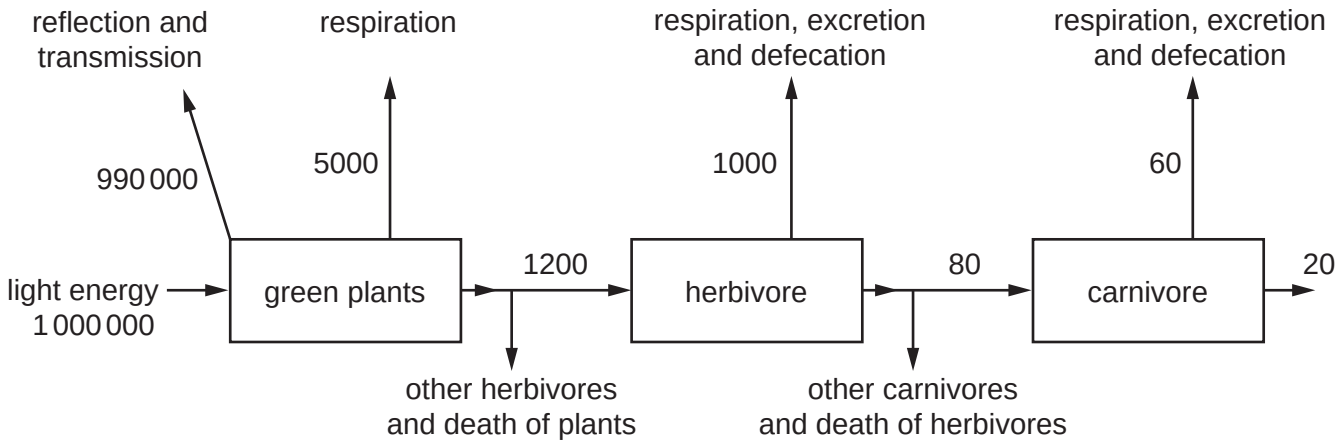
B community

C ecosystem

D trophic level

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39 The diagram shows the flow of energy through a food chain. Figures are in kJ m^{-2} $year^{-1}$.



What percentage of light energy is available to the herbivore?

A 0.12 % **B** 0.38 % **C** 0.50 % **D** 1.00 %

40 Why does the application of nitrate fertilisers cause an increase in crop production?

A Green plants manufacture more protein.

B More nitrogen is fixed in leguminous plants.

C The fertiliser adds energy to the ecosystem.

D The number of denitrifying bacteria decreases.

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