Cambridge Assessment International Education

Cambridge IGCSE™ (9–1)

BIOLOGY **0970/21**

Paper 2 Multiple Choice (Extended) **May/June 2021**

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.

IB21 06_0970_21/FP

1 What is a characteristic of all living organisms?

A breathing

B circulation

C egestion

D sensitivity

2 The table shows a section of DNA taken from four different organisms.

organism	base sequence									
W	C	A	C	A	A	T	C	G	A	A
X	G	T	C	A	A	T	G	G	T	G
Y	C	T	C	A	A	T	C	G	T	A
Z	C	T	C	A	T	T	C	G	T	A

Which two organisms are the most distantly related to each other?

A W and X **B** W and Z **C** X and Y **D** X and Z

3 Scientists discover a new species of animal.

It has a segmented body with two pairs of legs on each segment.

To which group of animals does this new species belong?

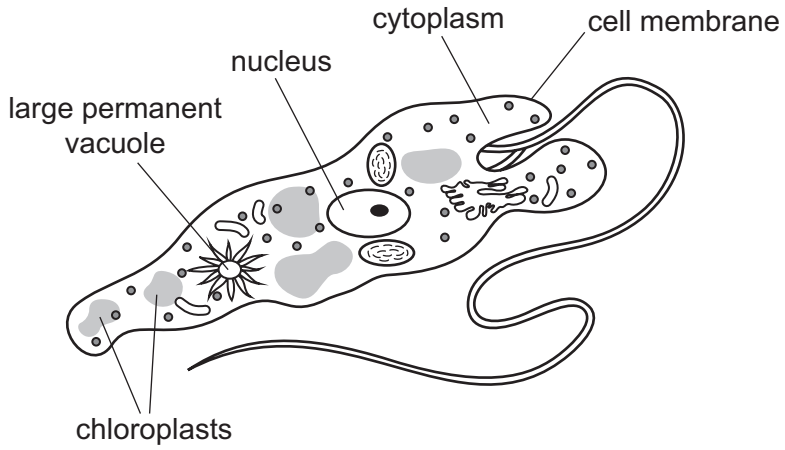
A arachnids

B crustaceans

C insects

D myriapods

4 The diagram shows a single-celled organism called *Euglena*.



Which labelled structures would also be found in an animal cell?

A cell membrane, chloroplast, nucleus

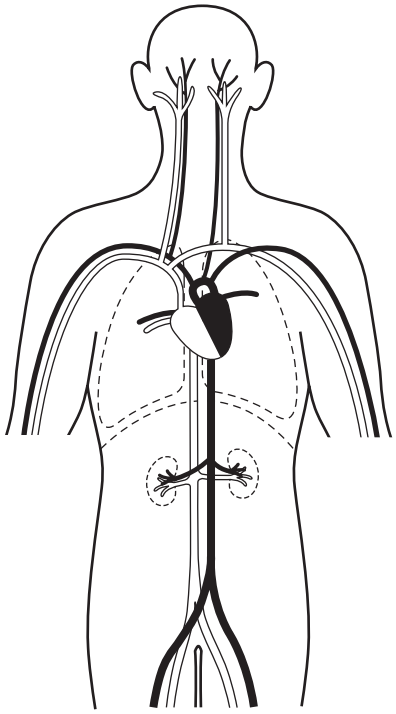
B chloroplast, cytoplasm, nucleus

C cell membrane, cytoplasm, nucleus

D cell membrane, cytoplasm, large permanent vacuole

[Turn over

5 The diagram shows some of the blood vessels and other structures in the human body.



The blood vessels shown are all parts of the same

A cell.

B organ.

C organ system.

D tissue.

6 A photograph shows a plant cell nucleus measuring 2 mm across.

If the magnification of the cell is ×500, what is the actual size of the nucleus?

A 0.00002 mm **B** 0.004 mm **C** 0.04 mm **D** 250 mm

7 By which process do oxygen and carbon dioxide move between cells and capillaries?

A breathing

B diffusion

C excretion

D respiration

8 Which process is involved in the uptake of glucose by the epithelial cells of kidney tubules?

A active transport

B osmosis

C translocation

D transpiration

9 Which element is found in proteins but **not** carbohydrates?

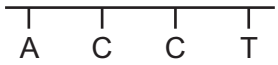
A carbon

B hydrogen

C nitrogen

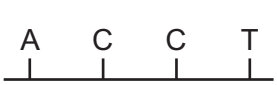
D oxygen

10 The diagram shows a short section of a single strand of DNA.

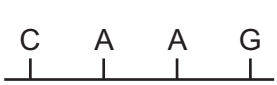


Which strand of DNA will combine with this strand to form part of a double helix?

A

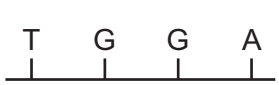


B



C

D



11 Starch is digested by amylase in the mouth, but it is not digested in the stomach.

What is the reason for this?

A All starch digestion is completed in the mouth.

B The pH in the stomach is not suitable for the amylase to work.

C The starch does not stay in the stomach long enough to be digested.

D The temperature in the stomach is not suitable for the amylase to work.

12 Which statement describes a catalyst?

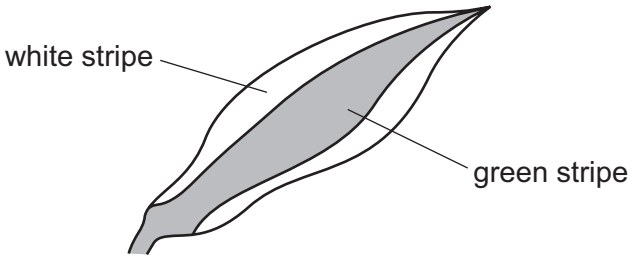
A a substance that decreases the rate of a chemical reaction and is not changed by the reaction

B a substance that decreases the rate of a chemical reaction and is changed by the reaction

C a substance that increases the rate of a chemical reaction and is changed by the reaction

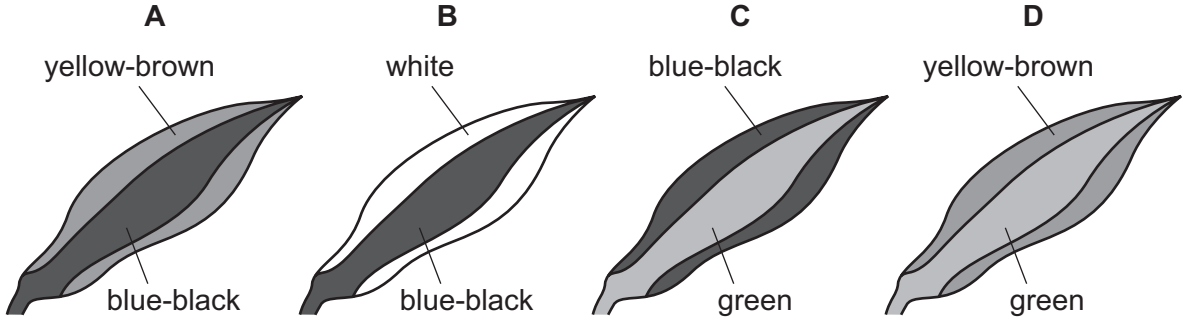
D a substance that increases the rate of a chemical reaction and is not changed by the reaction

13 A plant with striped leaves was kept in bright light for six hours.



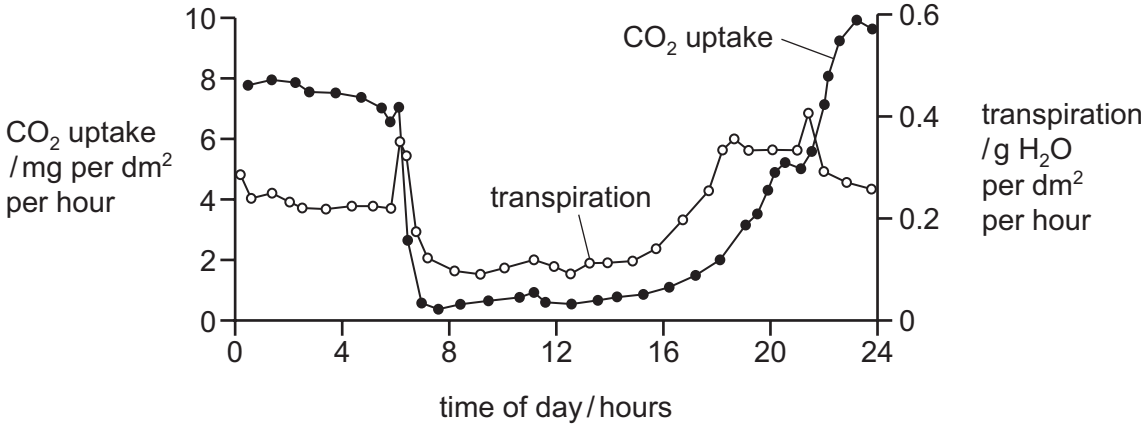
A leaf was taken from the plant and the chlorophyll was removed. The leaf was then tested for starch using iodine solution.

Which diagram shows the result of the test?



14 The graph shows daily carbon dioxide uptake and transpiration by the plant *Agave americana*.

The plant is adapted to live in very dry conditions.



What can be concluded from this graph?

A More stomata are closed during dark periods.

B More stomata are closed during light periods.

C There is no carbon dioxide uptake during dark periods.

D There is no water uptake during light periods.

15 Statements 1 to 4 describe stages in the development of cholera.

1 Chloride ions are secreted into the gut.

2 Osmosis causes water to move into the gut.

3 The infected person becomes dehydrated.

4 Toxins are produced by the pathogenic bacteria.

What is the correct sequence of the four stages?

A $1 \rightarrow 2 \rightarrow 3 \rightarrow 4$

B $1 \rightarrow 4 \rightarrow 3 \rightarrow 2$

C $4 \rightarrow 1 \rightarrow 2 \rightarrow 3$

D $4 \rightarrow 1 \rightarrow 3 \rightarrow 2$

16 What are the products when proteins are broken down?

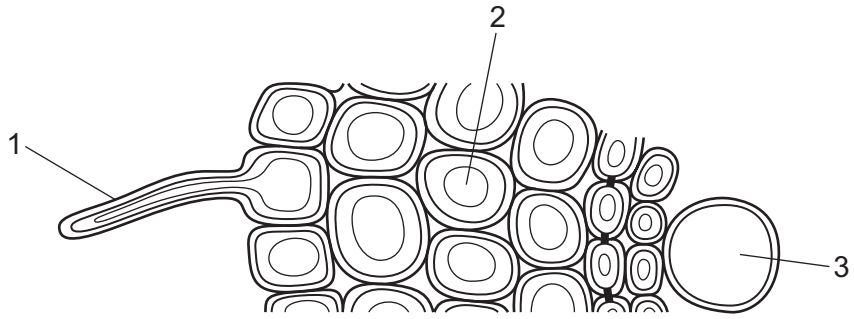
A amino acids

B fatty acids

C glycerol

D simple sugars

17 The diagram shows part of a cross-section of a root.

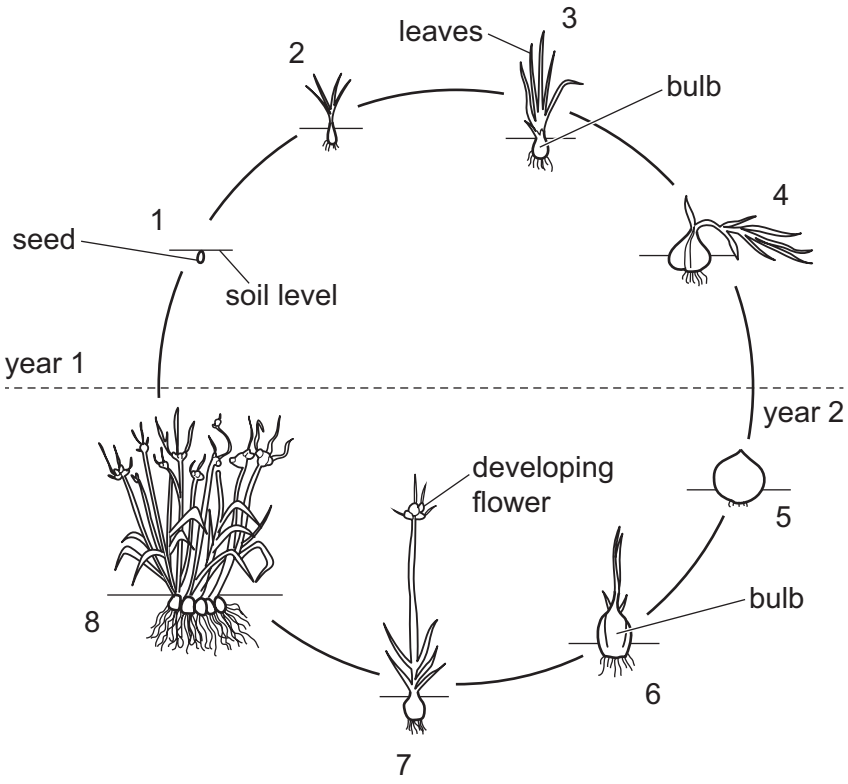


What are cells 1, 2 and 3?

	1	2	3
A	root cortex cell	root hair cell	mesophyll cell
B	root hair cell	root cortex cell	xylem
C	root hair cell	root cortex cell	mesophyll cell
D	root cortex cell	root hair cell	xylem

[Turn over

18 The diagram shows an onion plant that has been grown from a seed. Each onion plant takes two years to flower and produce more seeds.



What is the onion bulb acting as in stage 3 and in stage 6?

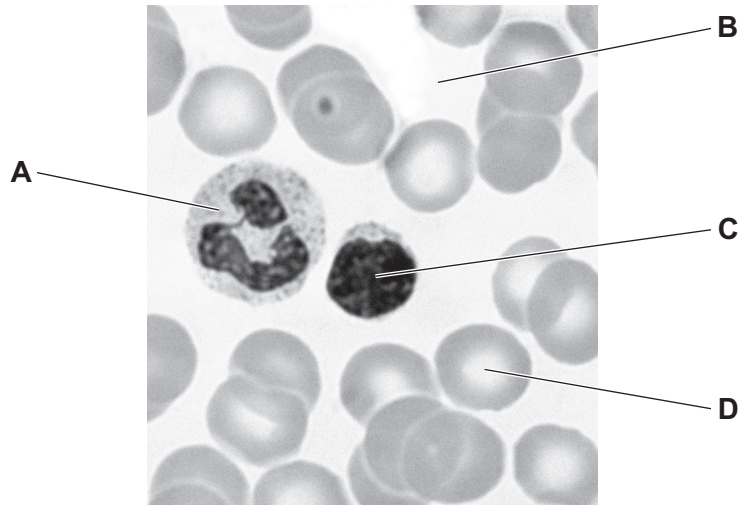
	stage 3	stage 6
A	sink	sink
B	sink	source
C	source	sink
D	source	source

19 What are the main vessels carrying blood to and from the kidney?

	to kidney	from kidney
A	pulmonary artery	pulmonary vein
B	pulmonary vein	pulmonary artery
C	renal artery	renal vein
D	renal vein	renal artery

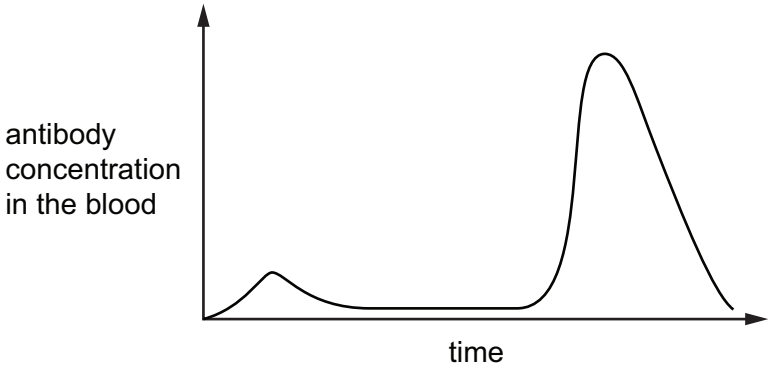
20 The photomicrograph shows human blood.

Which blood component makes antibodies?



21 A child is vaccinated against measles. After a period of time the child is infected with the measles virus.

The graph shows the concentration of measles antibodies in the child's bloodstream during this time.



Which statement is consistent with the information in the graph?

A After the vaccination, the child produced memory cells.

B The child had passive immunity against measles.

C The measles virus contains antibodies.

D The vaccination failed to protect the child against measles.

22 Which sequence of changes takes place when we breathe in?

A diaphragm contracts → volume of thorax increases → pressure in lungs decreases

B diaphragm contracts → volume of thorax increases → pressure in lungs increases

C diaphragm relaxes → volume of thorax increases → pressure in lungs decreases

D diaphragm relaxes → volume of thorax increases → pressure in lungs increases

23 The list shows some processes that take place in a human body.

1 production of new red blood cells

2 transmission of nerve impulses from the eyes to the brain

3 diffusion of gases into and out of the lungs

Which processes use energy released by respiration?

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

24 Which equation is aerobic respiration?

A $6CO_2 + 6H_2O \rightarrow 6C_6H_{12}O_6 + 6O_2$

B $6O_2 + 6CO_2 \rightarrow 6H_2O + C_6H_{12}O_6$

C $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$

D $C_6H_{12}O_6 \rightarrow 2C_2H_5OH + 2CO_2$

25 Which statement about urea is correct?

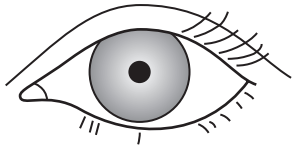
A Urea is formed from excess amino acids in the kidneys and excreted by the liver.

B Urea is formed from excess glucose in the liver and egested by the kidneys.

C Urea is formed from excess glucose in the kidneys and egested by the liver.

D Urea is formed from excess amino acids in the liver and excreted by the kidneys.

26 The diagram shows the appearance of an eye when in bright light.



bright light

Which row gives the correct states of the iris muscles in bright light?

	radial muscles	circular muscles
A	contracted	contracted
B	contracted	relaxed
C	relaxed	contracted
D	relaxed	relaxed

27 What is the effect of adrenaline on pulse rate and blood glucose concentration?

	pulse rate	blood glucose
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

28 Which statements about auxin are correct?

1 Auxin is made in all cells in plants.

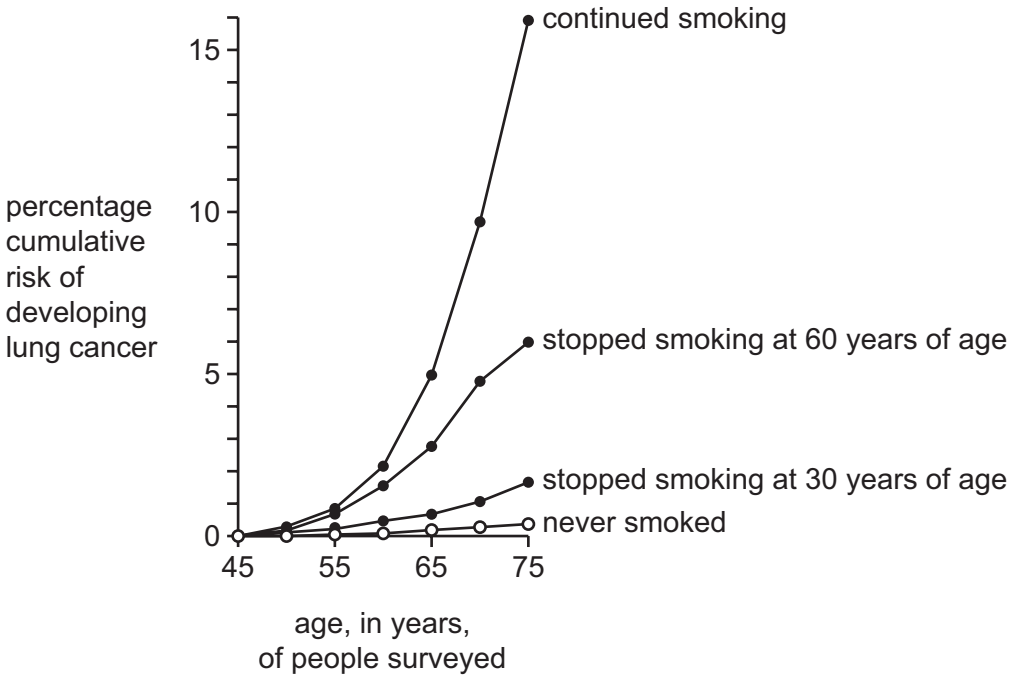
2 Auxin causes cells to elongate.

3 Auxin moves between the cells by osmosis.

4 Auxin is unequally distributed.

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

29 Scientists carried out a survey on the effect of giving up smoking on the risk of developing lung cancer. The results are shown in the graph.



The scientists made three conclusions:

1 Stopping smoking reduces the risk of developing lung cancer.

2 Age increases the risk of lung cancer for smokers and non-smokers.

3 The earlier people stop smoking, the lower the risk.

Which conclusions are correct?

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

30 A zygote has ten chromosomes in its nucleus.

Which row shows the number of chromosomes in the cells of this species?

	body cells	sperm cells	embryo cells
A	5	5	10
B	5	10	20
C	10	5	10
D	10	10	20

31 How will the composition of a pregnant woman's blood change as it passes through the placenta?

	concentration of dissolved oxygen	concentration of urea
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

32 What carries a copy of the gene to the cytoplasm to make a protein?

A alleles

B DNA molecules

C ribosomes

D mRNA molecules

33 Which statement about meiosis is correct?

A Daughter cells are genetically identical.

B The chromosome number changes from haploid to diploid.

C It is used to produce body cells.

D It allows the formation of new combinations of chromosomes.

34 Colour blindness is a characteristic that is sex-linked.

Which statement about colour blindness is correct?

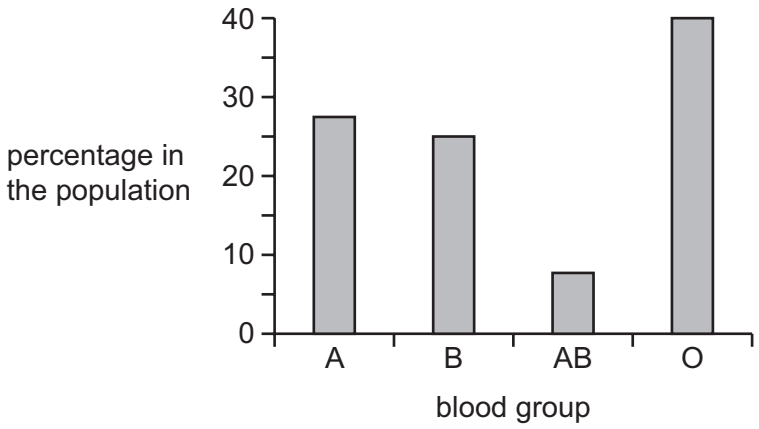
A The gene for colour blindness is located on the Y chromosome and colour blindness is more common in males than in females.

B The gene for colour blindness is located on the X chromosome and colour blindness is more common in males than in females.

C The gene for colour blindness is located on the X chromosome and colour blindness is more common in females than in males.

D The gene for colour blindness is located on the Y chromosome and colour blindness is more common in females than in males.

35 The graph shows the percentage of different blood groups in a human population.



Which type of variation is shown by human blood groups?

A continuous variation caused by genetic and environmental factors

B continuous variation caused by genetic factors only

C discontinuous variation caused by genetic and environmental factors

D discontinuous variation caused by genetic factors only

36 New strains of the crop plant wheat can be produced by cross-breeding disease resistant plants with those that give high yields of grain.

What is this an example of?

A natural selection

B artificial selection

C genetic engineering

D asexual reproduction

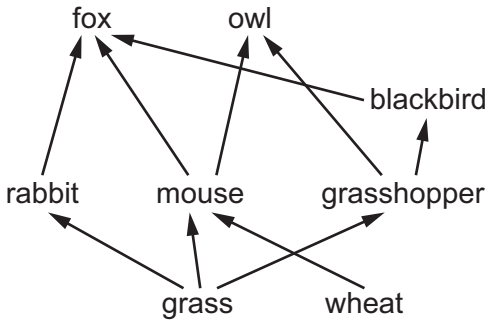
37 The diagram shows the flow of energy.

$$\text{Sun} \xrightarrow{1} \text{grass} \longrightarrow \text{rabbit} \xrightarrow{3} \text{fox}$$

Which form of energy is transferred at points 1 and 3 in the diagram?

	1	3
A	chemical	chemical
B	heat	light
C	light	chemical
D	light	heat

38 The diagram shows the feeding relationships in a food web.



Which organism may feed as both a secondary and a tertiary consumer?

A fox

B owl

C blackbird

D rabbit

39 Why are bacteria useful in genetic engineering?

A Their genetic code is different to other organisms.

B They have cell walls.

C They have plasmids.

D They reproduce sexually.

40 Which hormones can cause the feminisation of male fish?

A adrenaline and progesterone

B adrenaline and testosterone

C oestrogen and progesterone

D oestrogen and testosterone

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