Cambridge Assessment International Education

Cambridge O Level

BIOLOGY **5090/12**

Paper 1 Multiple Choice **October/November 2025**

1 hour

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.

This document has **16** pages. Any blank pages are indicated.

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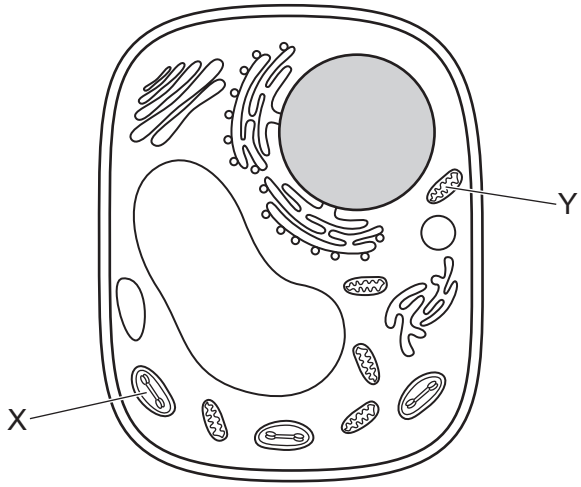
1 Which row identifies structures X and Y on the plant cell diagram?



	structure X	structure Y
A	chloroplast	mitochondrion
B	chloroplast	ribosome
C	nucleus	chloroplast
D	mitochondrion	ribosome

2 Viruses can only replicate inside cells.

A single *Herpes simplex* virus replicates rapidly inside a living cell and produces 4000 copies in 12 hours.

What is the maximum number of viruses that could be produced in 36 hours from a single *Herpes simplex* virus?

A 1.2×10^{3} **B** 16×10^{6} **C** 6.4×10^{10} **D** 2.6×10^{14}

3 Which statement about osmosis is correct?

A An animal cell immersed in distilled water will shrink.

B A plant cell immersed in distilled water will become flaccid.

C A plant cell immersed in a strong sodium chloride solution will become turgid.

D A plant cell immersed in a strong sodium chloride solution will become plasmolysed.

4 Globulin is a substance that can be detected by the biuret test.

Which type of substance is globulin?

A fat

B oil

C protein

D reducing sugar

5 Cellulose and glucose are carbohydrates.

Cellulose is a large molecule made from a long chain of smaller glucose molecules.

One cellulose molecule is 0.01 mm long. One glucose molecule is 0.001 μm long.

How many glucose molecules are found in this cellulose molecule?

A 1×10^2 **B** 1×10^3 **C** 1×10^4 **D** 1×10^5

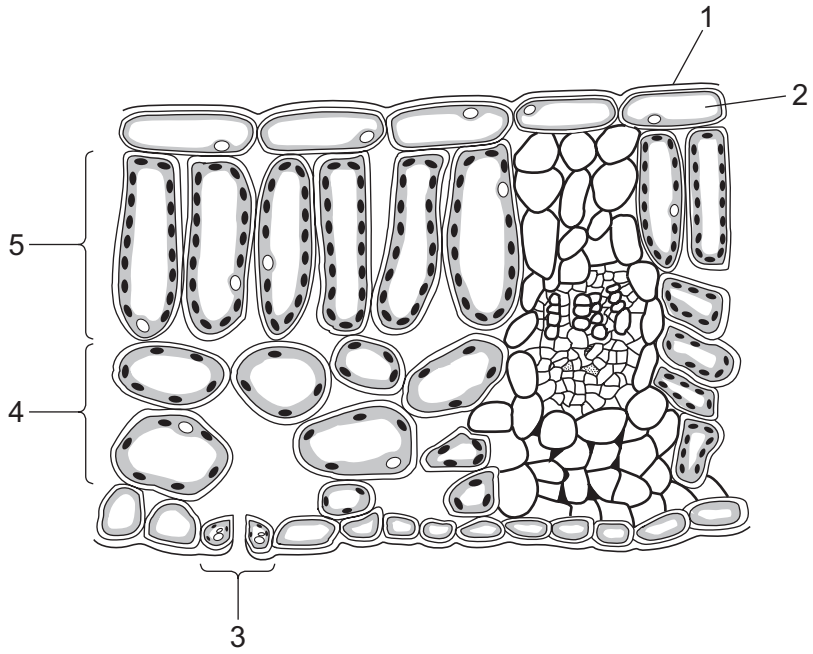
6 Four test-tubes contain starch solution and amylase. They are placed in water-baths at different temperatures and provided with different pHs, as shown in the table. All other conditions are kept the same.

After 30 minutes, iodine solution is added to each test-tube. The contents of three of the test-tubes turns blue-black.

In which test-tube are the contents yellow-brown?

	temperature / °C	pH
A	35	2.5
B	35	6.9
C	75	2.5
D	75	6.9

7 The diagram shows a section through a dicotyledonous leaf.



Which structures are almost transparent to help increase the rate of photosynthesis in the leaf?

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

8 Oxygen is produced in leaf cells during photosynthesis and diffuses out of the leaf.

By which pathway does the oxygen diffuse?

A through the upper epidermis and through the cuticle

B through the airspaces and through the stomata

C through the mesophyll and through the phloem

D through the mesophyll and through the xylem

9 Why do newly germinated seeds fail to grow into healthy plants if they lack magnesium ions?

A Magnesium ions are a necessary component of all proteins.

B Magnesium ions are needed to convert chlorophyll to starch.

C Magnesium ions are needed to form cell walls.

D Magnesium ions are needed to form chlorophyll molecules.

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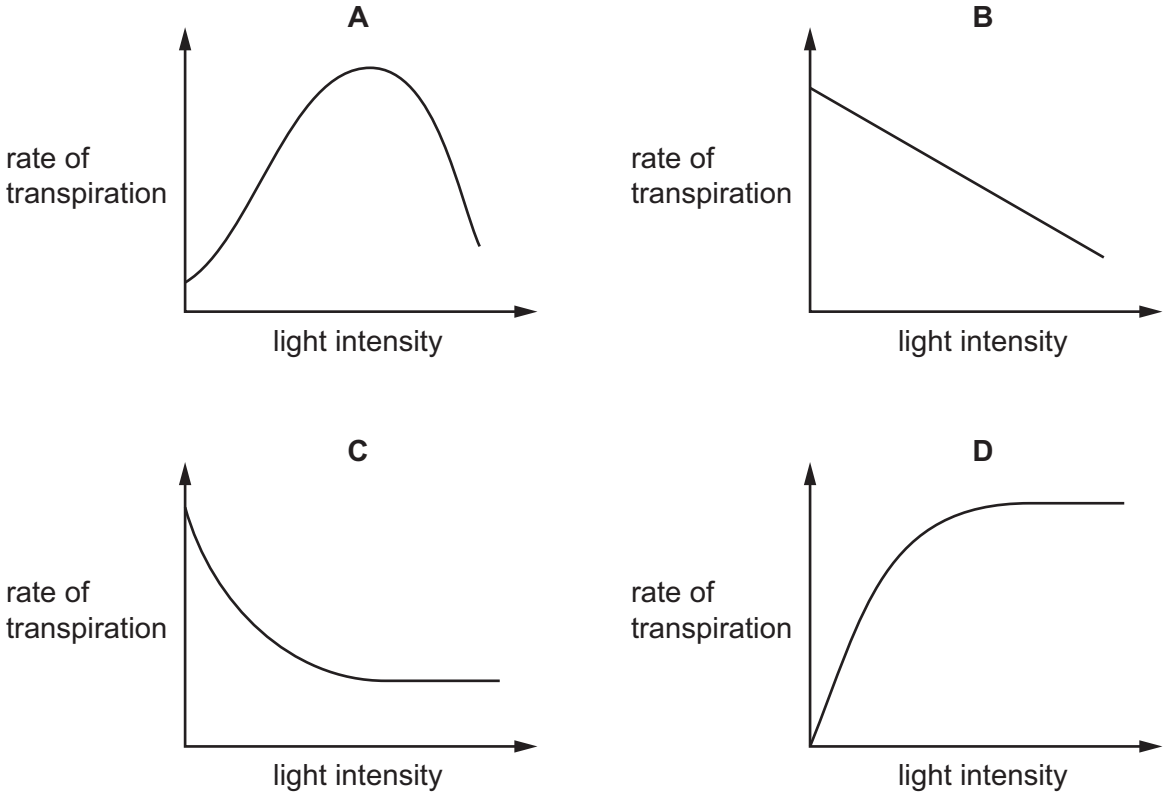
10 Which graph shows the effect of light intensity on the rate of transpiration?



11 A woman went to the doctor with the following symptoms:

- severe joint and leg pain
- swollen and bleeding gums
- skin that bruises easily.

What should the doctor test the woman's blood for?

A the concentration of vitamin C

B the concentration of vitamin D

C the concentration of iron

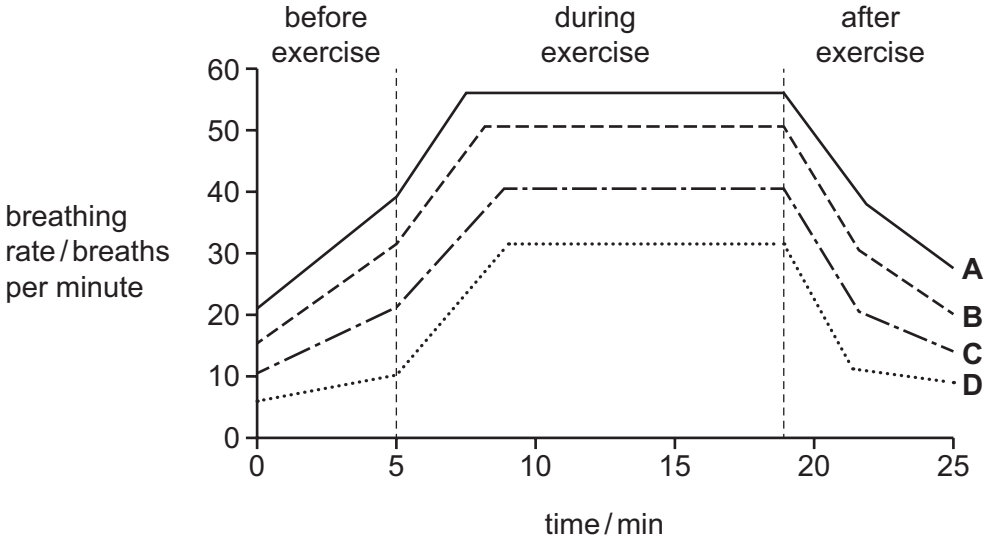
D the concentration of calcium

12 Four people do exactly the same physical exercise.

The graph shows their breathing rate in breaths per minute before, during and after the exercise.

One person is a professional athlete.

Which line shows the results for the professional athlete?



13 Villi and alveoli have certain common features.

What is **not** a feature of villi **and** alveoli?

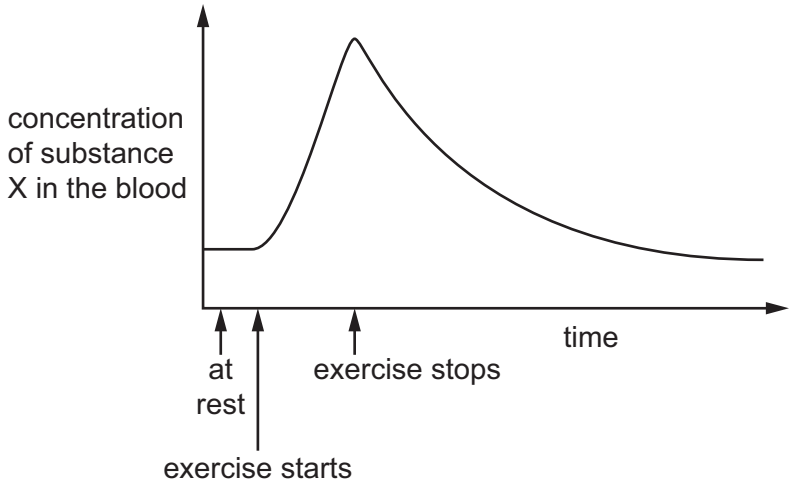
A a rich capillary network

B a single-celled layer of epithelium

C lacteals connected to the lymphatic system

D a very large total surface area

14 The graph shows the concentration of substance X in a person's blood before, during and after exercise.



What is substance X?

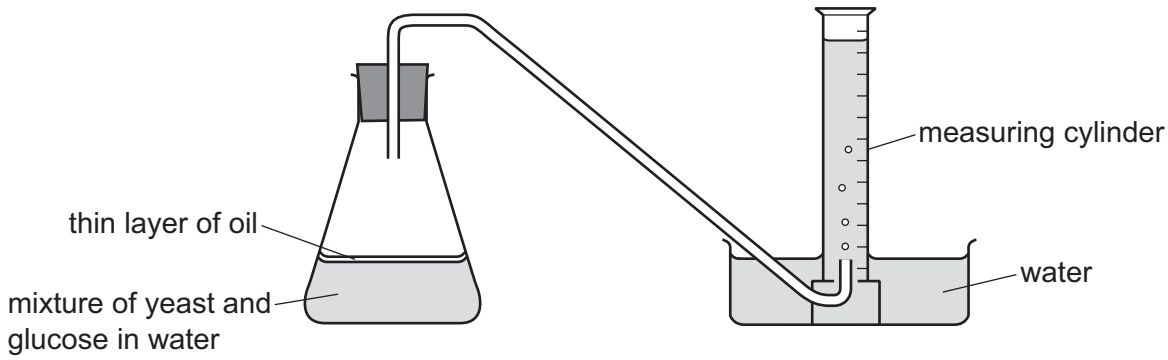
A alcohol

B glycogen

C lactic acid

D urea

15 The apparatus shown is used to investigate the volume of gas produced by yeast during anaerobic respiration.



Why is the yeast mixture covered with the thin layer of oil in this investigation?

A to provide energy for the yeast

B to prevent oxygen in the air from reaching the yeast

C to prevent heat loss from the mixture

D to prevent the yeast mixture from drying out

16 The equation shows aerobic respiration.

$$X + 6O_2 \rightarrow Y + 6CO_2 + \text{energy}$$

What do X and Y represent?

	X	Y
A	$6H_2O$	$C_6H_{12}O_6$
B	$C_6H_{12}O_6$	$6H_2O$
C	$C_{12}H_{22}O_{11}$	$11H_2O$
D	$C_6H_{12}O_6$	H_2O

17 What is the function of the hepatic vein?

A to transport blood from the intestine to the liver

B to transport blood from the liver to the vena cava

C to transport blood to the kidney from the aorta

D to transport blood to the liver from the aorta

18 A student measures the thickness of the walls of the four chambers of a heart.

The measurements are 15 mm, 9 mm, 3 mm and 3 mm.

Which row shows the correct measurements for the chambers of the heart?

	15 mm	9 mm	3 mm	3 mm
A	left ventricle	right ventricle	right atrium	left atrium
B	left ventricle	left atrium	right ventricle	right atrium
C	right ventricle	left ventricle	right atrium	left atrium
D	right ventricle	left atrium	left ventricle	right atrium

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19 There are approximately 5 million red blood cells in each mm^3 of blood.

The mean diameter of red blood cells is 0.007 mm.

Which row expresses this information correctly in standard form?

	number of red blood cells / mm^3 of blood	mean diameter of red blood cells / mm
A	5×10^6	7×10^3
B	5×10^{-6}	7×10^{-3}
C	5×10^6	7×10^{-3}
D	5×10^{-6}	7×10^3

20 What is the effect of regular excessive consumption of alcohol?

A acts as a stimulant making the person more alert

B increases the risk of liver damage

C decreases the time taken to respond to a stimulus

D makes the person less likely to be aggressive

21 What can reduce the risk of bacteria becoming resistant to antibiotics?

A allowing people to buy antibiotics without a prescription

B prescribing antibiotics for all infections: viral, bacterial and fungal

C prescribing regular doses of antibiotics to everyone

D only prescribing antibiotics for harmful bacterial infections

22 Which statement about active immunity is correct?

A A fetus develops active immunity when antibodies pass across the placenta.

B Active immunity develops after vaccination.

C Active immunity develops in babies when they drink breast milk containing antibodies.

D Active immunity develops after using antibiotics.

23 Which term can be used to describe the release of oxygen from plants?

A breathing

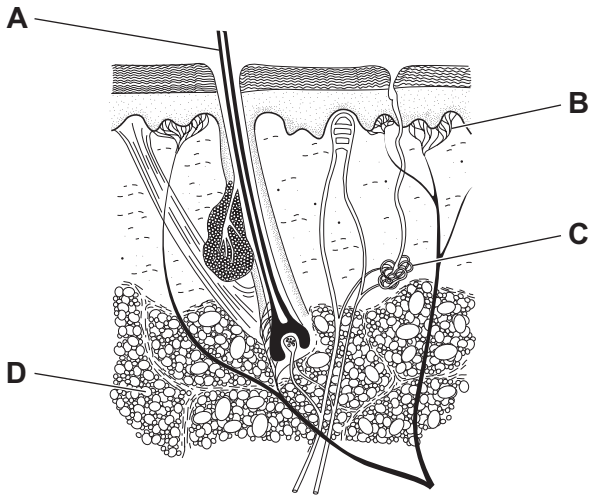
B excretion

C respiration

D transpiration

24 The diagram shows some structures in the skin.

Which structure increases its secretions when the body is too hot?



25 Which event happens when the blood glucose concentration rises?

A Less adrenaline is released.

B Less insulin is released.

C More adrenaline is released.

D More insulin is released.

26 What is **not** an example of homeostasis involving a negative feedback mechanism?

A maintaining the core body temperature at around 36.5 °C

B releasing adrenaline from the adrenal glands when frightened

C releasing glucose from liver cells into the blood after missing a meal

D releasing insulin from the pancreas after eating a meal

27 What is a correct example of phototropism?

A A stem grows away from gravity.

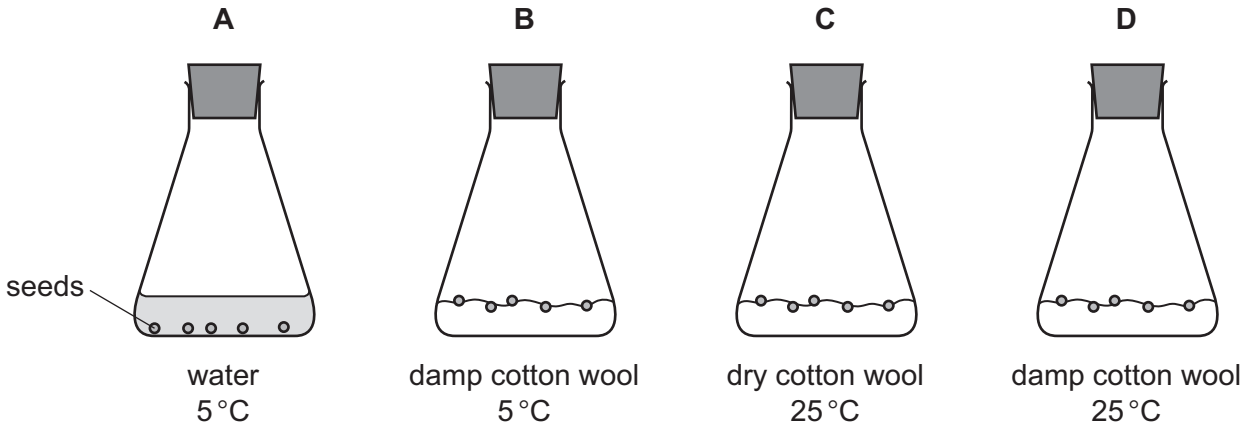
B A root grows towards light.

C A root grows towards gravity.

D A stem grows towards light.

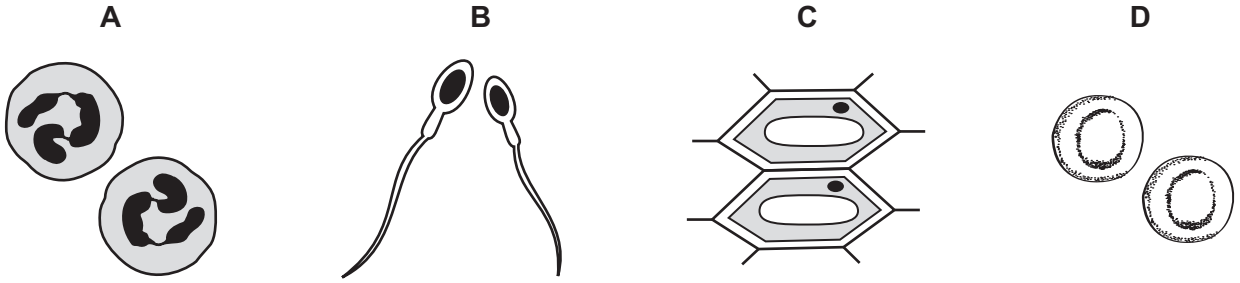
28 An experiment is set up to investigate the conditions necessary for seeds to germinate.

In which flask will the seeds germinate first?



29 The diagrams show some plant and animal cells. They are **not** drawn to the same scale.

Which cells contain haploid nuclei?



30 Which examples show continuous variation?

1 length of seedlings

2 mass of bananas

3 human skin colour

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

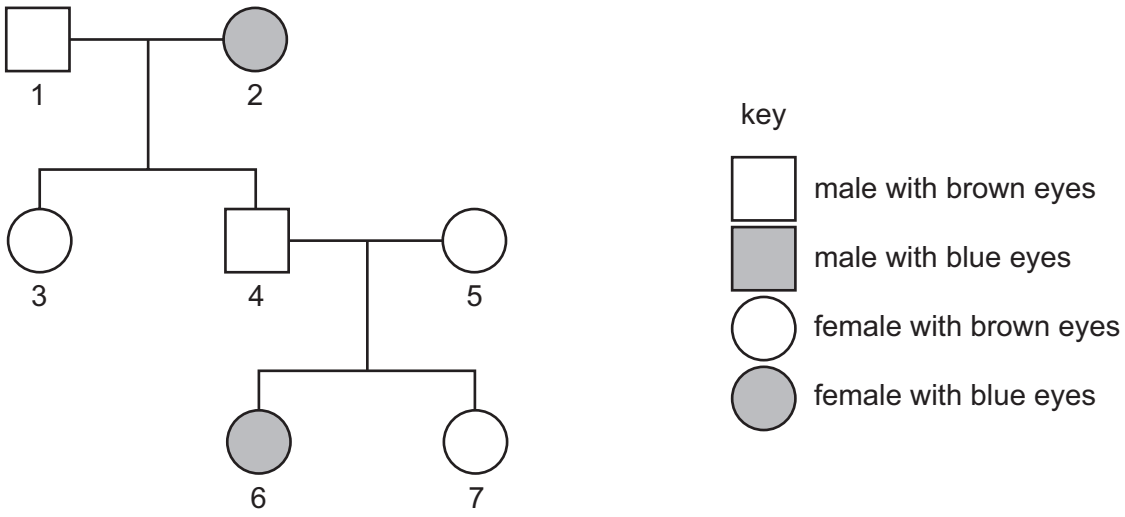
31 A man has six fingers on each hand and six toes on each foot. This genetically inherited condition is caused by a dominant allele. The man's genotype is heterozygous.

His wife does **not** have the condition.

What is the probability that a child of this couple will be born with the condition?

A 0.00 **B** 0.25 **C** 0.50 **D** 1.00

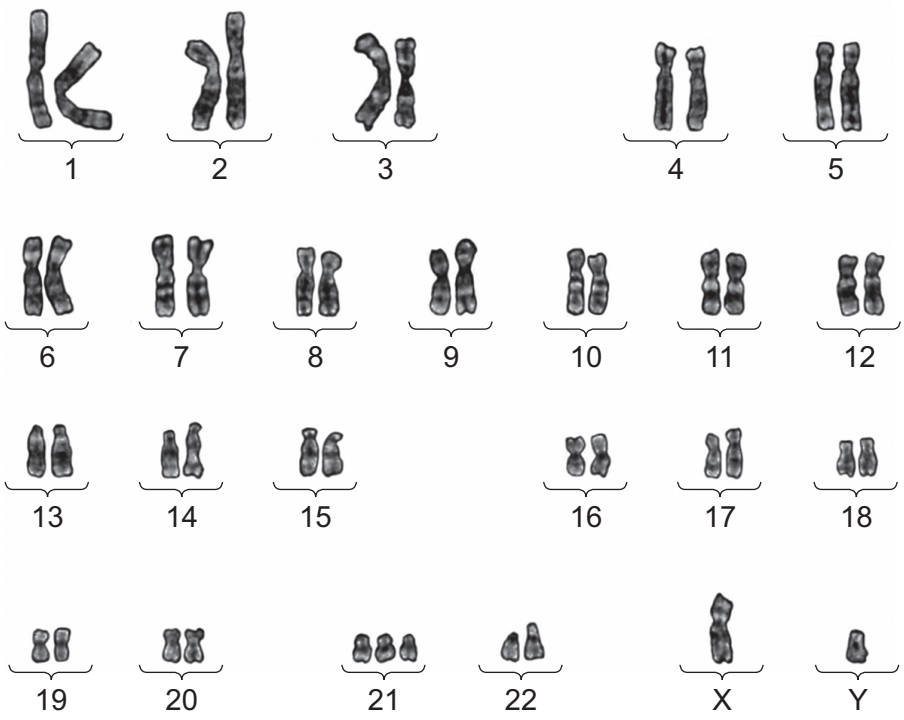
32 The diagram shows a family tree for the inheritance of eye colour. The allele for brown eyes is dominant and the allele for blue eyes is recessive.



Which people **must** be heterozygous for eye colour?

A 1, 3 and 7 **B** 2 and 6 **C** 3, 4 and 5 **D** 4 and 5 only

33 A karyotype is a photograph showing the chromosomes of an individual.



Which description matches an individual who has this karyotype?

A female without Down's syndrome

B male without Down's syndrome

C female with Down's syndrome

D male with Down's syndrome

34 Three statements about natural selection are listed.

1 An organism with an advantageous inherited feature does **not** always pass this to its offspring.

2 Many organisms in a population die before they interbreed and produce any offspring.

3 Organisms with more advantageous inherited features are more likely to survive and produce offspring.

Which statements are correct?

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

35 Bread is made from a mixture of flour, sugar, water and yeast.

The mixture is left in a warm place to allow it to rise before being baked.

Which process makes the bread rise?

A The yeast feeds on the flour and grows.

B The yeast reproduces to make the loaf bigger.

C The yeast uses sugar to respire and produces carbon dioxide.

D The yeast produces alcohol which it excretes.

36 Some stages in the production of human insulin are listed.

1 Genetically modified *E. coli* bacteria are grown in large fermenters.

2 The gene for human insulin is inserted into the DNA of an *E. coli* bacterium.

3 The gene for human insulin is obtained from human pancreas cells.

4 Human insulin is extracted and purified.

What is the correct sequence of these stages?

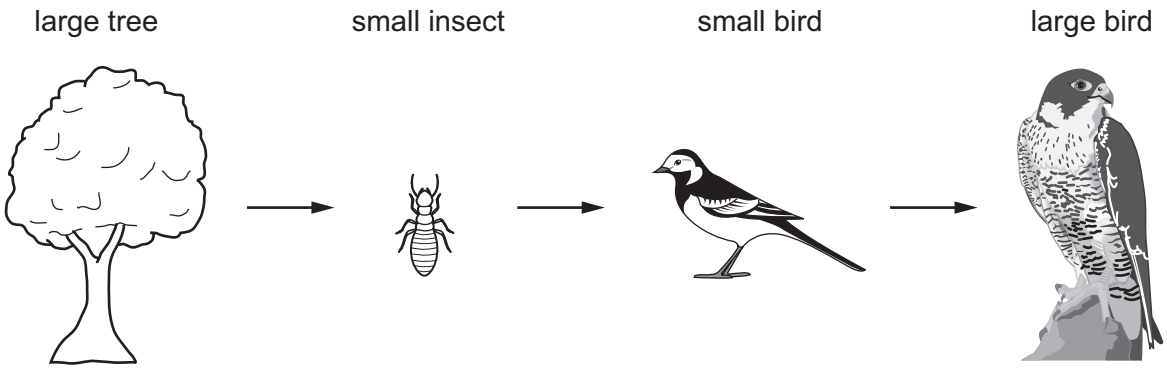
A $3 \rightarrow 1 \rightarrow 2 \rightarrow 4$

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

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

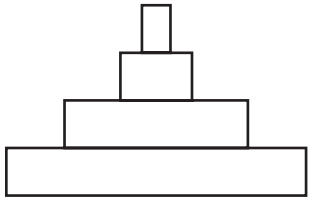
D $3 \rightarrow 2 \rightarrow 1 \rightarrow 4$

37 The diagram shows a food chain.

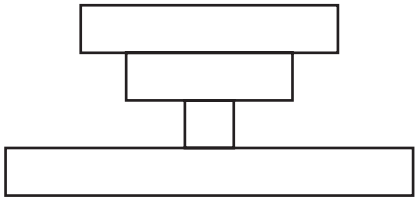


Which pyramid of numbers is based on the food chain shown?

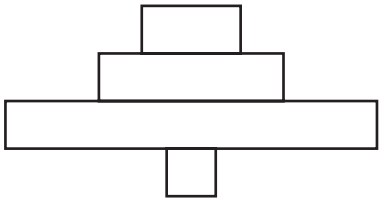
A



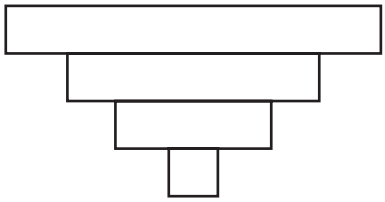
B



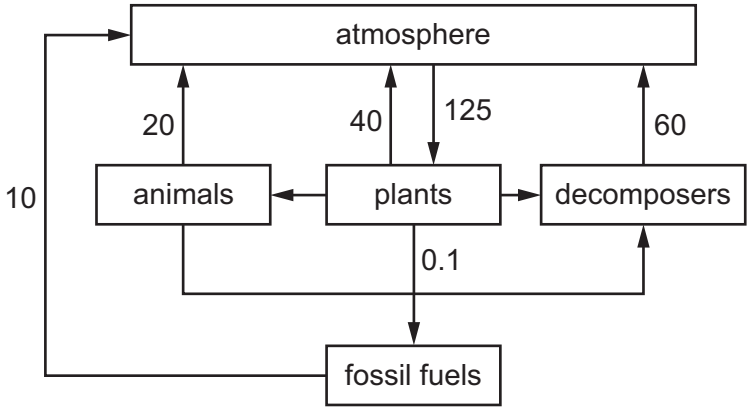
C



D



38 The diagram shows the movement of carbon in the carbon cycle in gigatonnes per year.



How many gigatonnes of carbon are moved by respiration each year?

A 120 **B** 125 **C** 130 **D** 255

39 Energy is lost from a food chain from one trophic level to the next.

How is energy lost from a food chain?

1 by egestion

2 by respiration

3 by photosynthesis

4 by excretion

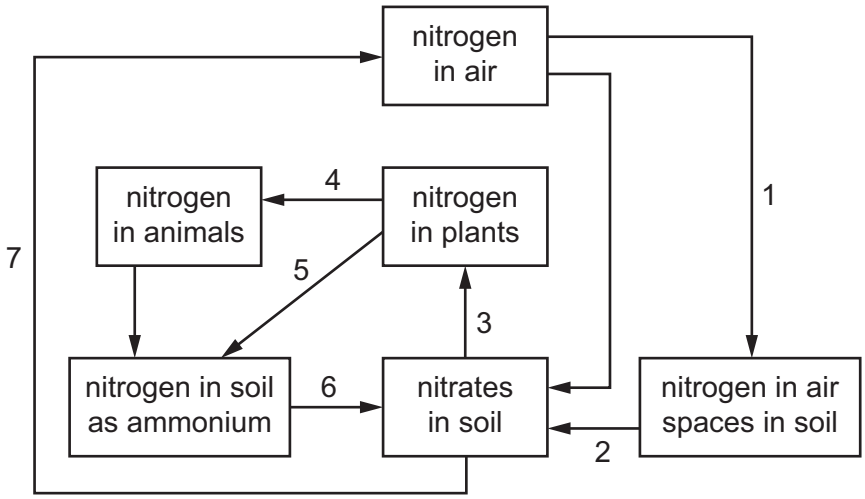
A 1, 2, 3 and 4

B 1, 2 and 4 only

C 1 and 2 only

D 3 only

40 The diagram shows the nitrogen cycle.



Which stages involve bacteria?

A 1, 2, 5 and 6

B 2, 5, 6 and 7

C 3, 5, 6 and 7

D 3, 4, 5 and 6

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