



# Cambridge O Level

**BIOLOGY**

**5090/01**

Paper 1 Multiple Choice

**For examination from 2023**

SPECIMEN PAPER

**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.

1 Which structures are found in animal cells **and** in plant cells?

1 mitochondria

2 cell wall

3 ribosomes

4 sap vacuole

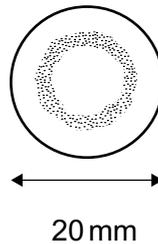
**A** 1 and 3

**B** 1 and 4

**C** 2 and 3

**D** 2 and 4

2 A student draws a red blood cell. The drawing is 20 mm in diameter.



This red blood cell is actually 0.008 mm in diameter.

What is the magnification of the cell shown in the drawing?

**A** ×40

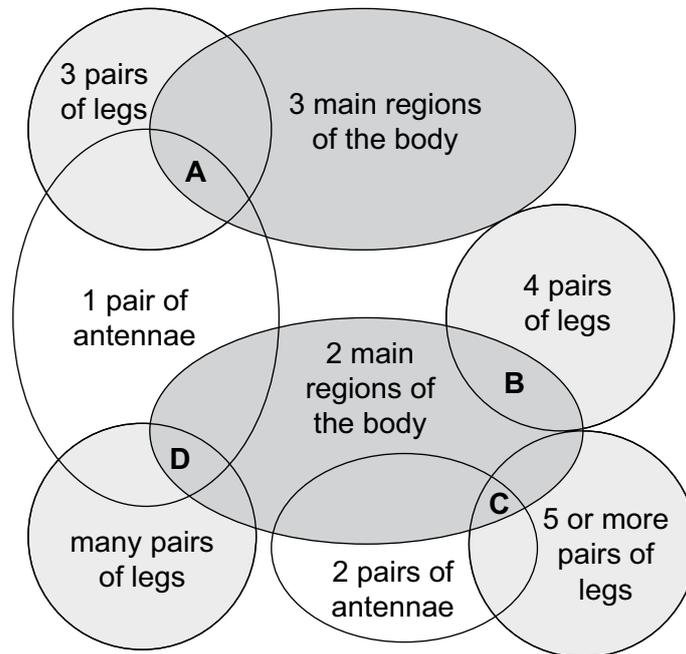
**B** ×250

**C** ×2500

**D** ×40 000

3 The diagram shows some of the features used to classify animals in the phylum arthropods.

In the diagram, which letter, **A**, **B**, **C** or **D**, could represent insects?



4 Which processes can **only** occur through a membrane?

	active transport	diffusion	osmosis
<b>A</b>	✓	✓	✓
<b>B</b>	✓	✓	✗
<b>C</b>	✓	✗	✓
<b>D</b>	✗	✗	✓

key:  
✓ = yes  
✗ = no

5 A student cuts four cylinders from a potato. Each cylinder is 30 mm long. The cylinders are all of the same diameter.

The potato cylinders are placed in sugar solutions of different concentrations. After one hour, the lengths of the cylinders are measured again. The results are shown in the table.

Which sugar solution has a water potential closest to that of the potato cells?

	concentration of sugar / g per dm <sup>3</sup>	starting length / mm	length after one hour / mm
<b>A</b>	35	30	33
<b>B</b>	105	30	31
<b>C</b>	135	30	27
<b>D</b>	170	30	26

- 6 An area of grass plants becomes flooded with sea water.

Sea water contains a higher concentration of salt than the root hair cells of the grass plants.

What is the effect of the sea water on the functions of the root hairs?

	uptake of ions by root hairs	uptake of water by root hairs
<b>A</b>	no longer occurs	no longer occurs
<b>B</b>	no longer occurs	still occurs
<b>C</b>	still occurs	no longer occurs
<b>D</b>	still occurs	still occurs

- 7 Large biological molecules are made from smaller molecules.

Which row shows the correct molecules?

	starch	protein	lipid	DNA
<b>A</b>	fatty acids and glycerol	nucleotides	glucose	amino acids
<b>B</b>	glucose	fatty acids and glycerol	nucleotides	amino acids
<b>C</b>	nucleotides	amino acids	fatty acids and glycerol	glucose
<b>D</b>	glucose	amino acids	fatty acids and glycerol	nucleotides

- 8 Enzyme action can be explained by the lock and key hypothesis.

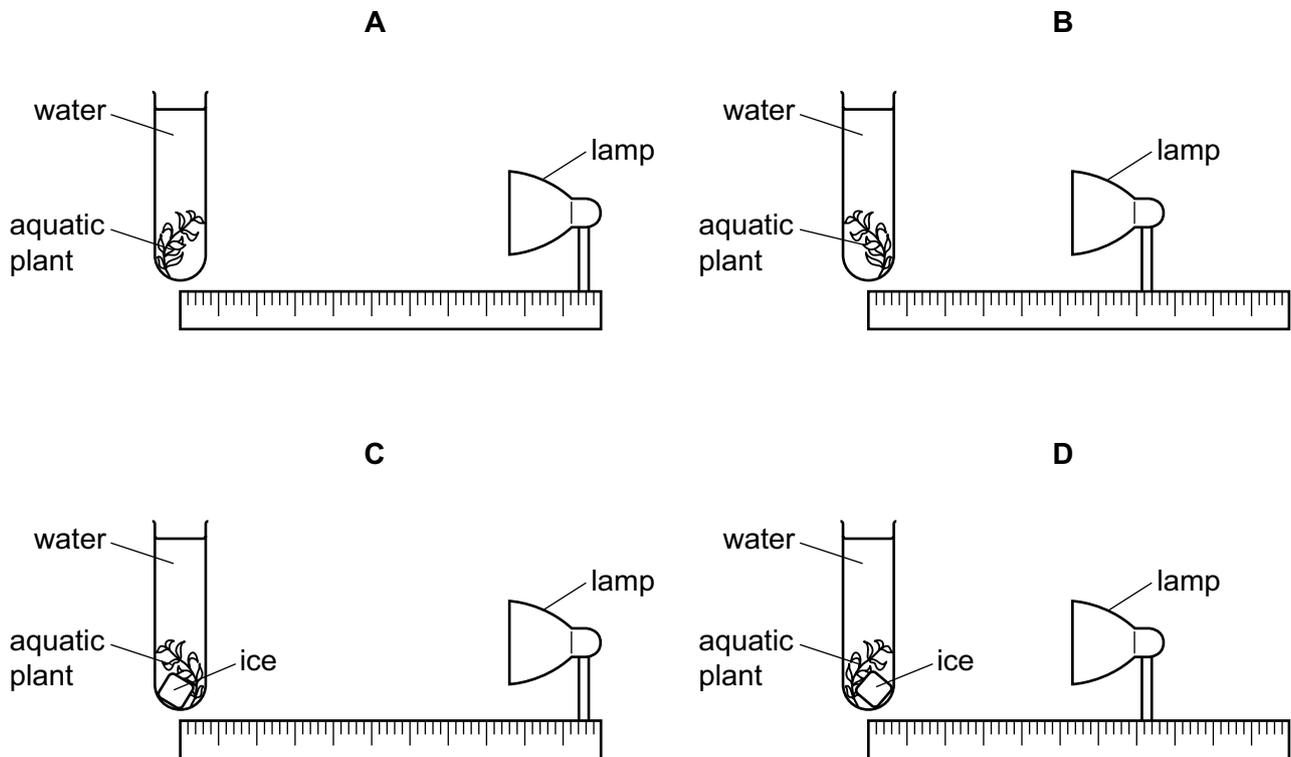
Which row is correct for the active site and for the substrate?

	active site is on the enzyme	active site is on the substrate	substrate is the lock	substrate is the key
<b>A</b>	✓	✗	✓	✗
<b>B</b>	✓	✗	✗	✓
<b>C</b>	✗	✓	✓	✗
<b>D</b>	✗	✓	✗	✓

✓ = yes  
✗ = no

- 9 The diagrams show an experiment to find the rate of photosynthesis in an aquatic plant in different conditions.

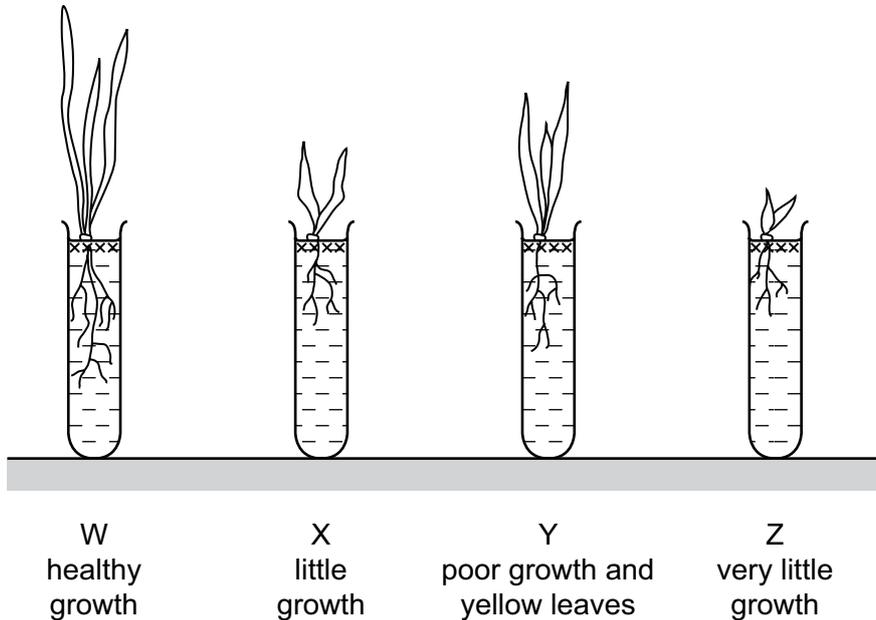
Which plant produces the most bubbles per minute?



10 A student grows young plants in four different test-tubes.

Tube W contains all the mineral ions needed for healthy plant growth.

The diagram shows the appearance of the plants after two weeks.



What do tubes X, Y and Z contain?

	X	Y	Z
<b>A</b>	all minerals except magnesium ions	all minerals except nitrate ions	water only
<b>B</b>	all minerals except magnesium ions	water only	all minerals except nitrate ions
<b>C</b>	all minerals except nitrate ions	all minerals except magnesium ions	water only
<b>D</b>	water only	all minerals except magnesium ions	all minerals except nitrate ions

11 Which row shows how the rate of transpiration changes when conditions in the atmosphere change?

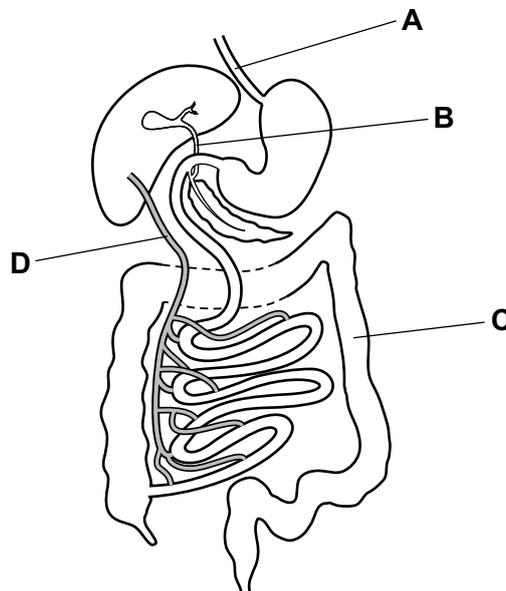
	reduced wind	increased humidity
<b>A</b>	decreases	decreases
<b>B</b>	decreases	increases
<b>C</b>	increases	decreases
<b>D</b>	increases	increases

12 Which foods can be eaten to prevent scurvy, anaemia and rickets?

	prevent scurvy	prevent anaemia	prevent rickets
<b>A</b>	cheese and milk	oranges and lemons	red meat
<b>B</b>	cheese and milk	red meat	oranges and lemons
<b>C</b>	oranges and lemons	cheese and milk	red meat
<b>D</b>	oranges and lemons	red meat	cheese and milk

13 The diagram shows parts of the human digestive system and associated organs.

Which part would contain high concentrations of glucose and amino acids, four hours after eating a meal?



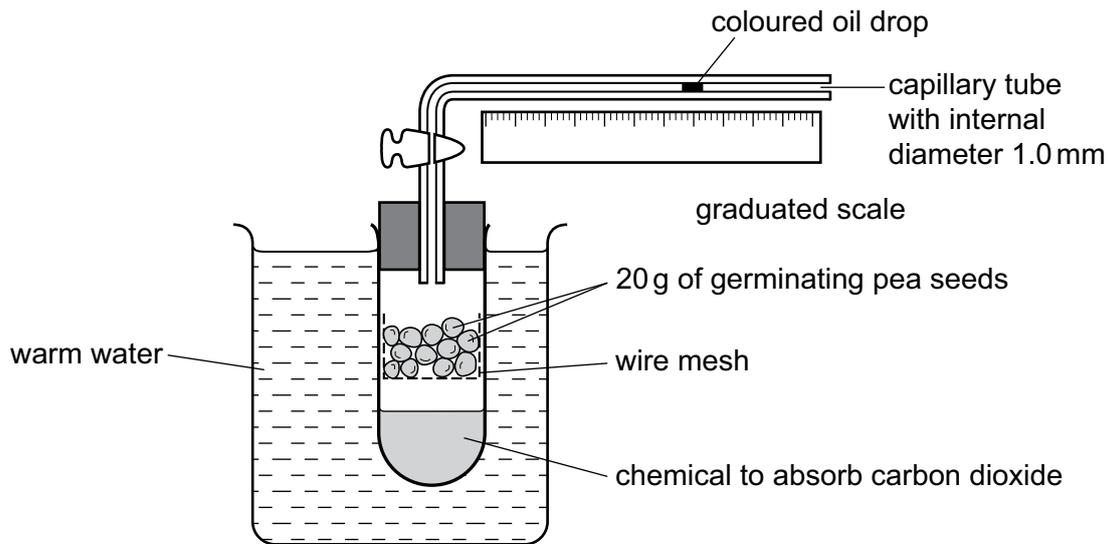
14 What is the approximate percentage of carbon dioxide in expired air released by a human?

- A 0.04%
- B 0.4%
- C 4.0%
- D 14%

15 What are the products of aerobic respiration in animals and plants?

- A carbon dioxide and glucose
- B carbon dioxide and water
- C glucose and oxygen
- D lactic acid

16 The diagram shows apparatus used to investigate the rate of respiration of germinating pea seeds.



In an experiment, the coloured oil drop moved 24 mm to the left in 30 minutes.

Calculate the rate of respiration of the pea seeds in:

$\text{mm}^3$  of oxygen, per gram of pea seeds, per minute.

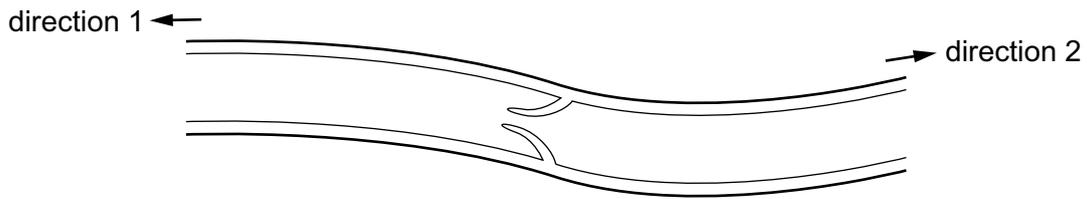
Assume  $\pi = 3.0$

- A  $0.03 \text{ mm}^3/\text{g}/\text{min}$
- B  $0.06 \text{ mm}^3/\text{g}/\text{min}$
- C  $0.12 \text{ mm}^3/\text{g}/\text{min}$
- D  $0.60 \text{ mm}^3/\text{g}/\text{min}$

17 What is the sequence of contractions in one heartbeat?

- A left atrium and left ventricle together, pause, right atrium and right ventricle together
- B left atrium, left ventricle, right atrium, right ventricle, pause
- C right atrium and left atrium together, right ventricle and left ventricle together, pause
- D right atrium, right ventricle, left atrium, left ventricle, pause

18 The diagram shows a section through part of a vein.



What could be the first organs found in directions 1 and 2 on the diagram?

	direction 1	direction 2
<b>A</b>	heart	brain
<b>B</b>	intestine	liver
<b>C</b>	liver	heart
<b>D</b>	lung	heart

19 What is a difference between the contents of plasma and the contents of tissue fluid?

	plasma	tissue fluid
<b>A</b>	dissolved glucose	no dissolved glucose
<b>B</b>	less dissolved glucose	more dissolved glucose
<b>C</b>	more protein molecules	fewer protein molecules
<b>D</b>	no white blood cells	white blood cells

20 Which statement describes an example of active immunity?

- A** Antibodies pass through the placenta from the blood of a mother to the blood of a fetus, giving the baby immunity to some diseases.
- B** A person is given an injection of antibiotics to kill bacteria which are causing a disease.
- C** A person is given an injection of antigens from pathogens that cause a disease and after this the body produces antibodies against these pathogens.
- D** The clotting of blood prevents disease-causing bacteria entering the circulatory system.

21 Which words **all** describe the organism that causes malaria?

- A** microscopic, parasite, sexually transmitted
- B** microscopic, parasite, pathogen
- C** mosquito, pathogen, vector
- D** parasite, sexually transmitted, vector

22 Which action can prevent the spread of the human immunodeficiency virus (HIV)?

- A keeping healthy by taking regular exercise
- B avoiding contact with saliva
- C breast-feeding babies
- D using condoms during sexual intercourse

23 Which row matches the parts of the urinary system to their functions?

	makes urine	carries urine	holds urine	removes urine from body
A	bladder	ureter	urethra	kidney
B	bladder	urethra	ureter	kidney
C	kidney	ureter	bladder	urethra
D	kidney	urethra	bladder	ureter

24 Which action is **not** an example of a simple reflex action?

- A blinking when sand blows in your eyes
- B jumping when hearing a loud noise
- C removing your hand from a hot object
- D stopping a car at a road junction

25 A person is reading a book in a room with low light intensity.

Which row shows the state of the eye muscles?

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

26 Which structures are **all** involved in controlling human body temperature?

- A blood vessels near the skin surface, pituitary gland and sweat glands
- B blood vessels near the skin surface, hypothalamus and muscles
- C kidneys, pituitary gland and sweat glands
- D kidneys, hypothalamus and muscles

27 Which row shows the effects of the hormones glucagon and insulin?

	effect of glucagon	effect of insulin
<b>A</b>	Glucose is converted into glycogen in the liver.	Glycogen in the liver is converted into glucose.
<b>B</b>	Glycogen in the liver is converted into glucose.	Glucose is converted into glycogen in the liver.
<b>C</b>	Glycogen in the liver is converted into glucose.	Glucose is converted into glycogen in the pancreas.
<b>D</b>	Glycogen in the pancreas is converted into glucose.	Glucose is converted into glycogen in the pancreas.

28 What is the role of auxin in the control of phototropism in the shoot of a plant?

- A** Auxin is only made on the shaded side of the shoot.  
This causes the cells on the shaded side to grow longer.
- B** More auxin is distributed on the shaded side of the shoot.  
This causes the cells on the shaded side to grow longer.
- C** The light side of the shoot contains more auxin and so grows less.  
This causes the shoot to bend towards the light.
- D** The light side of the shoot contains more auxin.  
This stimulates cell division and so the light side of the shoot grows more.

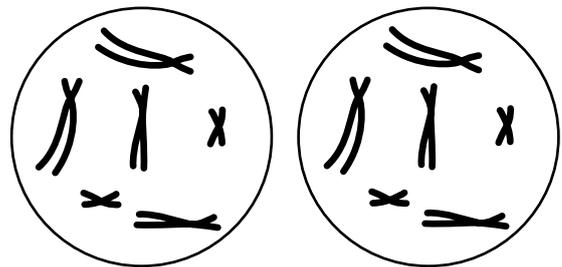
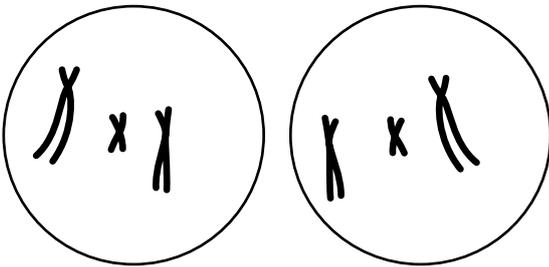
29 The diagram shows the chromosomes in a cell nucleus.



Which diagram shows the product of one division of the cell nucleus by mitosis?

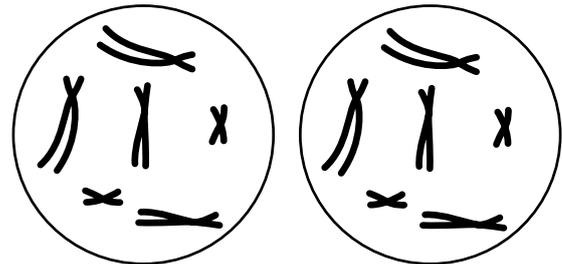
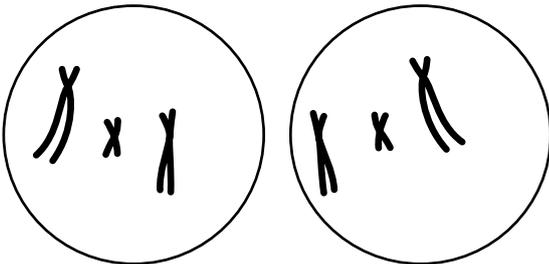
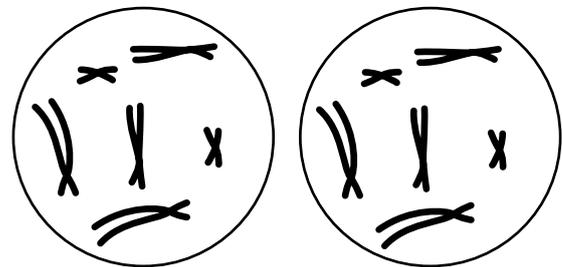
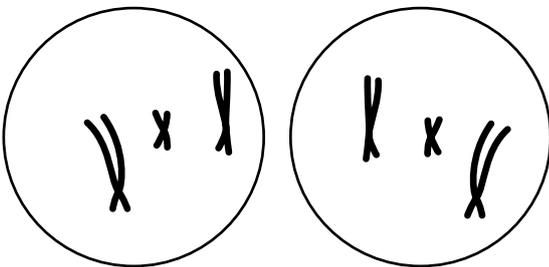
A

B



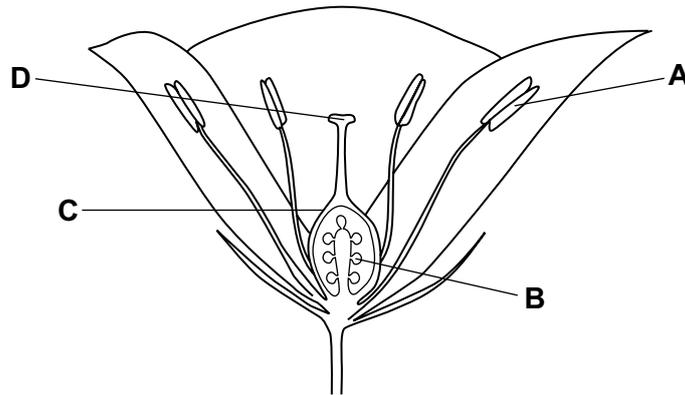
C

D



30 The diagram shows the parts of a flower.

Where must pollen land to pollinate the flower?



31 Which conditions are needed for the germination of most seeds?

	carbon dioxide	oxygen	water
<b>A</b>	✓	✓	x
<b>B</b>	x	✓	x
<b>C</b>	✓	x	✓
<b>D</b>	x	✓	✓

key:  
✓ = yes  
x = no

32 Which row correctly matches a hormone with its function in the menstrual cycle?

	hormone	function
<b>A</b>	FSH	stimulates release of eggs
<b>B</b>	LH	stimulates release of eggs
<b>C</b>	oestrogen	maintains uterus lining
<b>D</b>	progesterone	repairs uterus lining

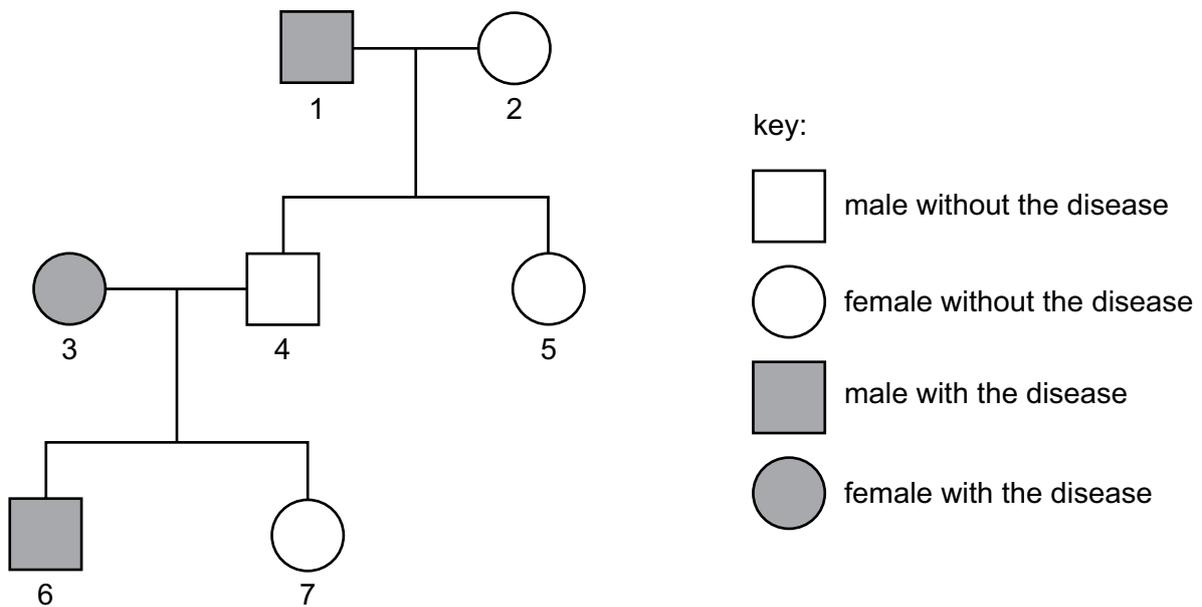
33 Which human feature shows discontinuous variation?

- A** blood group
- B** hair colour
- C** height
- D** foot length

34 Which statements about genes and chromosomes are correct?

	A chromosome contains DNA.	A gene is a section of DNA.
<b>A</b>	true	true
<b>B</b>	true	false
<b>C</b>	false	true
<b>D</b>	false	false

35 The diagram shows a family in which some members suffer from a disease caused by a recessive allele.

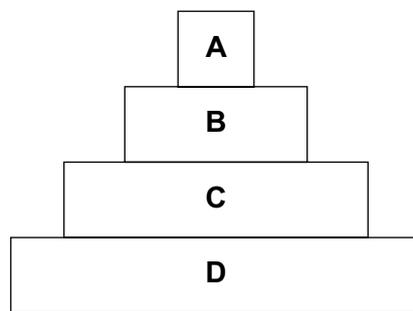


Identify two members of the family who **must** be heterozygous for the gene?

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

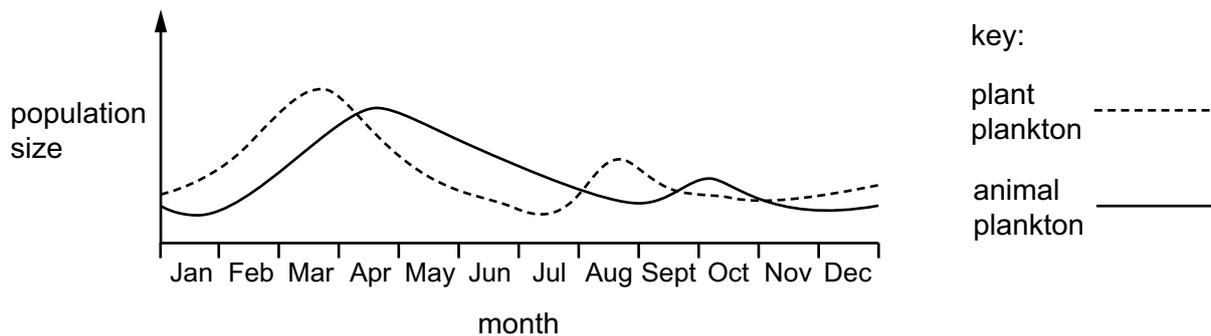
- 36 Which statement identifies a possible benefit of genetically modified crop plants?
- A Some crop plants can be genetically modified to give resistance to diseases.
  - B Cross-pollination of genetically modified crop plants with weeds could produce new varieties of weeds.
  - C The use of genetically modified crops may explain the increase in food allergies in children.
  - D There is more research needed on the long-term effects of genetically modified crops on the environment.
- 37 The diagram shows a pyramid of biomass for a food chain.

Which level represents the producers?



- 38 Which stage of the carbon cycle depends on the presence of bacteria and fungi in the soil?
- A combustion
  - B decomposition
  - C photosynthesis
  - D respiration

- 39 The graph shows changes in the populations of plant and animal plankton (microscopic organisms) in a lake.



Consider the following statement in relation to the data provided by the graph.

'Population changes in animal plankton occur after similar changes in plant plankton because the animals feed on the plants.'

Which description fits this statement?

- A** It is a **possible** interpretation of the data.
- B** The data do **not** support the statement.
- C** The data are too random to be interpreted.
- D** It is the **only** way to interpret the data.
- 40 When untreated sewage flows into a river, why does the oxygen concentration decrease?
- A** Less oxygen is absorbed from the air.
- B** There is a decrease in the number of plants.
- C** There is an increase in the number of bacteria.
- D** There is an increase in the number of fish.

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