



Cambridge O Level

BIOLOGY

5090/12

Paper 1 Multiple Choice

October/November 2024

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.

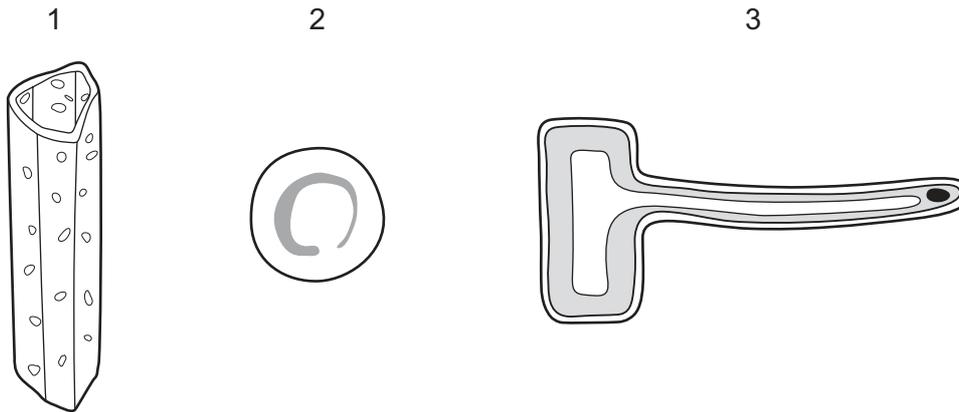
INFORMATION

- 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 **20** pages. Any blank pages are indicated.



1 The diagram shows three different types of microscopic structure.



What are these structures?

	1	2	3
A	xylem vessel	root hair cell	red blood cell
B	red blood cell	xylem vessel	root hair cell
C	root hair cell	red blood cell	xylem vessel
D	xylem vessel	red blood cell	root hair cell

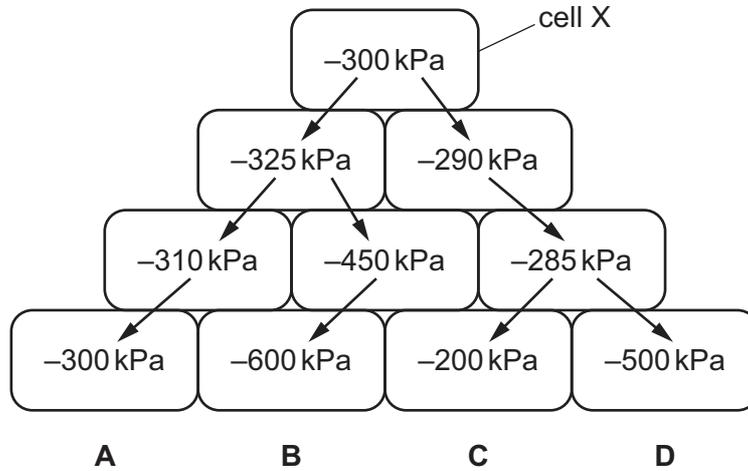
2 Species of organisms have scientific names made up of two parts.

What is the system used to name species?

- A** the classification system
- B** the genus system
- C** the binomial system
- D** the dichotomous key system

- 3 The diagram shows the water potentials measured in units of kPa in a group of plant cells. A larger negative number indicates a lower water potential.

Which sequence of arrows shows the net movement of water from cell X?



- 4 Which statements about active transport are correct?

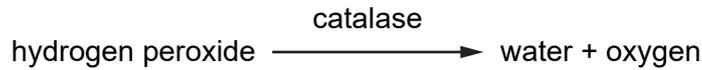
- 1 Ions move from a region of high concentration to a region of low concentration.
- 2 Ions move across the cell membrane.
- 3 Energy released during respiration is used to move ions into or out of a cell.

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

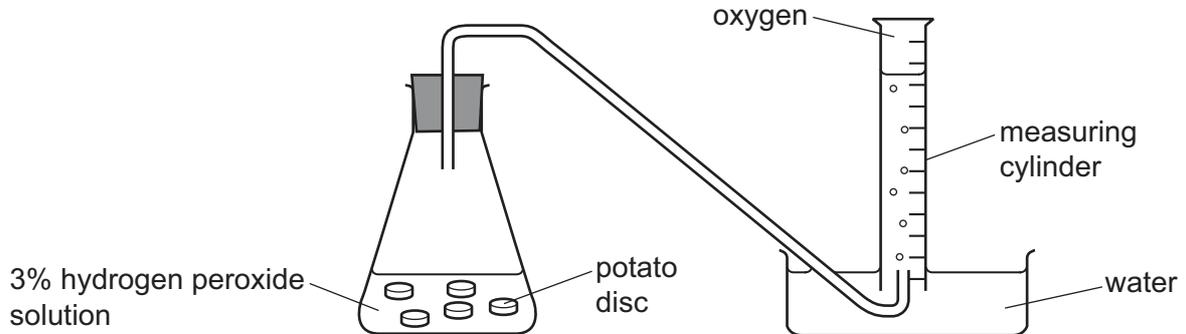
- 5 Which biological molecule contains the chemical elements carbon, hydrogen, nitrogen and phosphorus?

- A DNA
- B cellulose
- C lipid
- D starch

- 6 Catalase is an enzyme found in potato tissue. It catalyses the breakdown of hydrogen peroxide into water and oxygen.



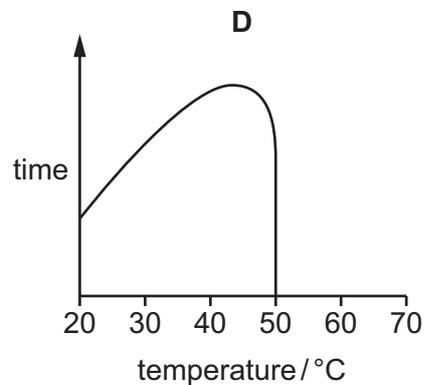
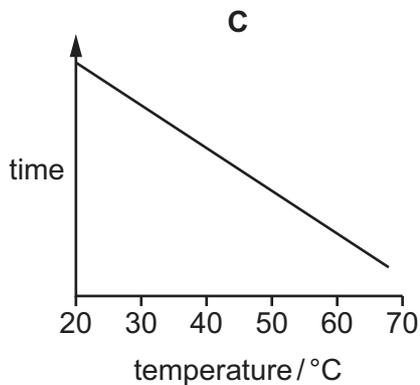
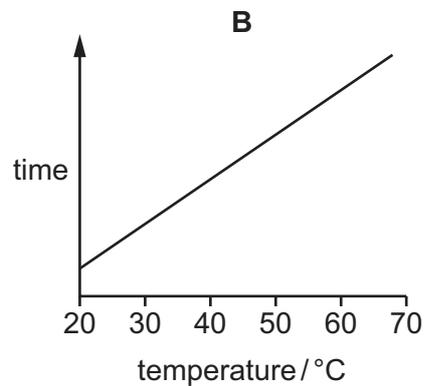
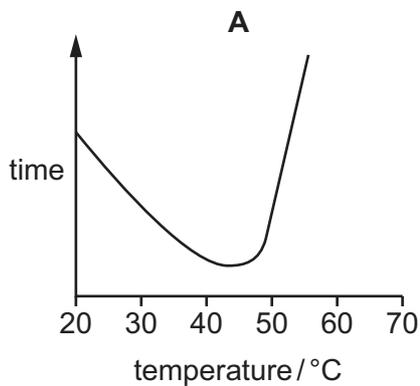
The apparatus shown was used to investigate the activity of catalase.



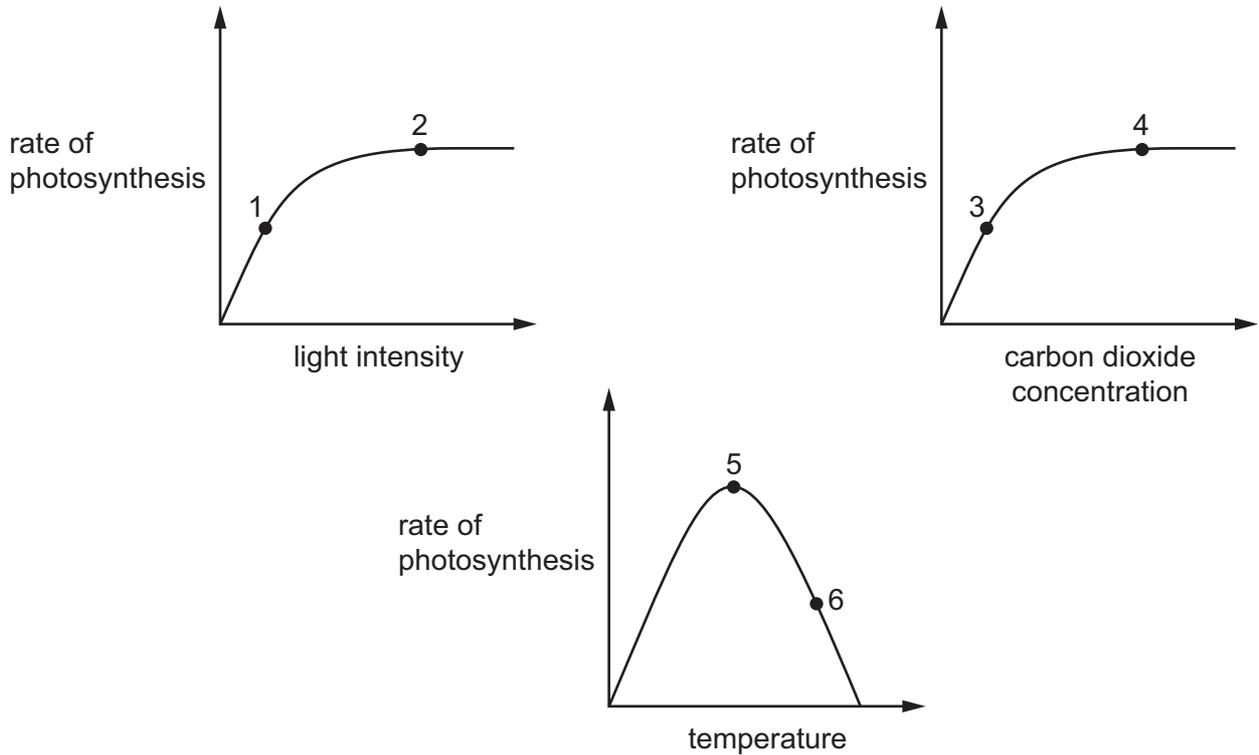
Five identical potato discs were dropped into 15 cm³ of a 3% hydrogen peroxide solution at a temperature of 20 °C. The time taken for 5 cm³ of oxygen to be produced was recorded.

This procedure was repeated at each of the following temperatures: 30 °C, 40 °C, 50 °C, 60 °C and 70 °C.

Which graph shows the results of the investigation?



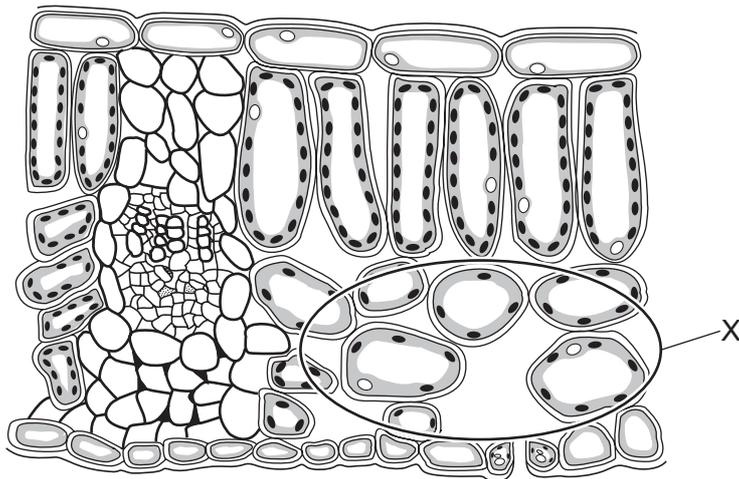
7 The graphs show factors affecting the rate of photosynthesis.



At which points on the graphs could the rate of photosynthesis be limited by the carbon dioxide concentration?

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

8 The diagram shows a section through a leaf.



What is the main function of the region labelled X?

- A** conduction and support
B gaseous exchange
C photosynthesis
D prevention of water loss

- 9 Root hair cells take in water and ions from the soil.

Which row shows how water and ions are taken into root hair cells?

	water	ions
A	active transport	active transport
B	active transport	osmosis
C	osmosis	osmosis
D	osmosis	active transport

- 10 Four leafy shoots cut from the same plant were put into beakers of coloured water and left in rooms with different temperatures. In two rooms, electric fans were set up to blow air over the stems.

The time taken for the coloured water to reach the leaves was measured for each stem.

In which stem will the coloured water reach the leaves the fastest?

	room conditions
A	10 °C
B	10 °C with a fan
C	30 °C
D	30 °C with a fan

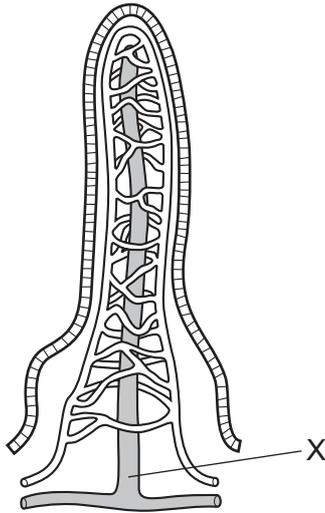
- 11 Cubes of boiled egg white are placed in test-tubes containing 5 cm³ of water. Boiled egg white contains protein. Other substances are added to each test-tube as shown in the table. The test-tubes are left for eight hours and then tested for amino acids.

test-tube	solution added	results of test for amino acids
1	pepsin	absent
2	pepsin + alkali	absent
3	none	absent
4	pepsin + acid	large amounts
5	boiled pepsin + acid	traces
6	acid	traces
7	alkali	absent

Which test-tubes show that pepsin is an enzyme?

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

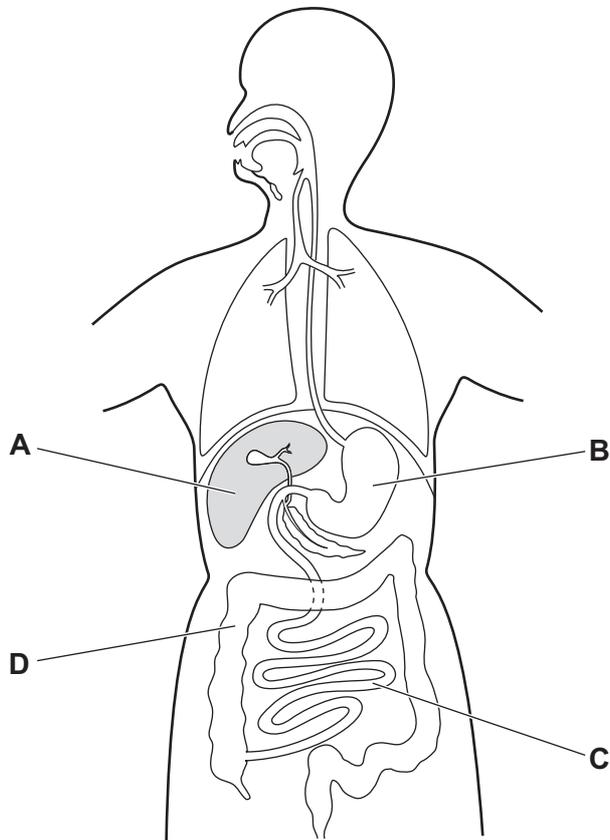
12 The diagram shows a section through a villus.



What is the main role of vessel X?

- A to carry amino acids to the liver for protein formation
- B to deliver deoxygenated blood to the heart
- C to supply oxygen to the cells of the villus
- D to transfer fatty acids and glycerol to the lymph system

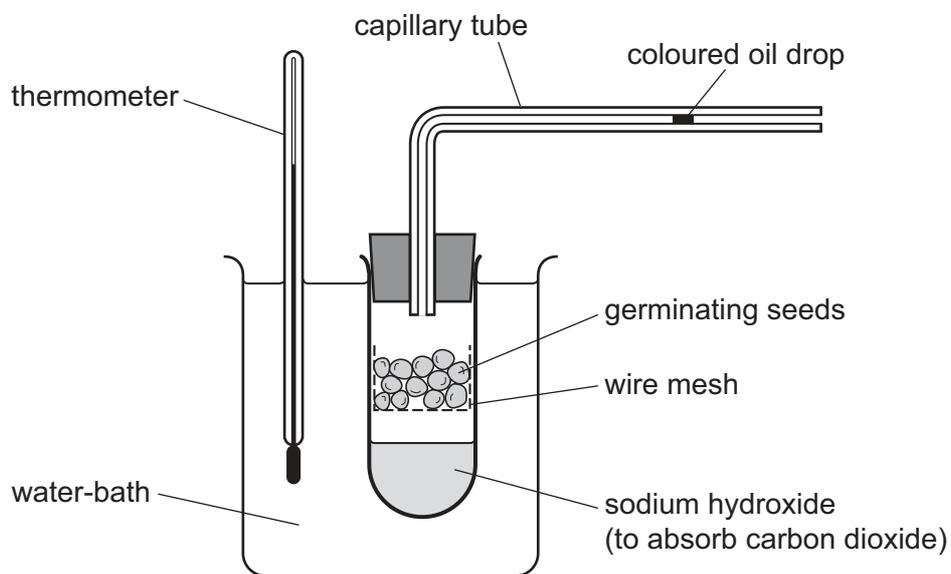
13 Which part of the human digestive system is a major region for assimilation of amino acids?



- 14** When the volume of the thorax increases, the pressure in the thorax is lowered. This results in air being taken into the body.

How is the volume of the thorax increased so that air is breathed in?

- A** by the diaphragm and the external intercostal muscles contracting
B by the diaphragm relaxing and the external intercostal muscles contracting
C by the diaphragm and the internal intercostal muscles contracting
D by the diaphragm relaxing and the internal intercostal muscles contracting
- 15** The diagram shows how some apparatus is set up to investigate respiration in germinating seeds.



The coloured oil drop moves along the capillary tube.

What causes the movement of the coloured oil drop?

- A** carbon dioxide released
B heat released
C oxygen used
D water used

- 16** A ventricular septal defect is a hole in the septum between the left and right ventricles of the heart.

Which statement describes the effect on blood flow through the heart in a person with a ventricular septal defect?

- A** Some deoxygenated blood flows into the pulmonary vein.
- B** Some oxygenated blood flows into the right atrium.
- C** Some oxygenated blood flows through the pulmonary artery.
- D** Some deoxygenated blood flows into the left atrium.

- 17** Human blood is composed of plasma, red blood cells, white blood cells and platelets.

Which row states a function of each of these components?

	plasma	red blood cells	white blood cells	platelets
A	clotting	transporting carbon dioxide	transporting oxygen	producing antibodies
B	transporting carbon dioxide	transporting oxygen	producing antibodies	clotting
C	transporting carbon dioxide	transporting oxygen	clotting	producing antibodies
D	transporting oxygen	transporting carbon dioxide	producing antibodies	clotting

- 18** How is malaria normally transmitted from person to person?

- A** airborne droplets
- B** contaminated needles
- C** infected mosquitoes
- D** sexual intercourse

- 19** Carbon monoxide is a poisonous gas that combines with haemoglobin to form carboxyhaemoglobin.

Which function of the blood will be affected if a person inhales carbon monoxide?

- A** the ability of the blood to form clots
- B** the carriage of oxygen to the body's organs
- C** the formation of antibodies by lymphocytes
- D** the transport of adrenaline in the blood

20 Which diseases can be cured with antibiotics?

	lung cancer	HIV infection	cholera
A	✓	✓	✓
B	✓	x	✓
C	x	✓	x
D	x	x	✓

key

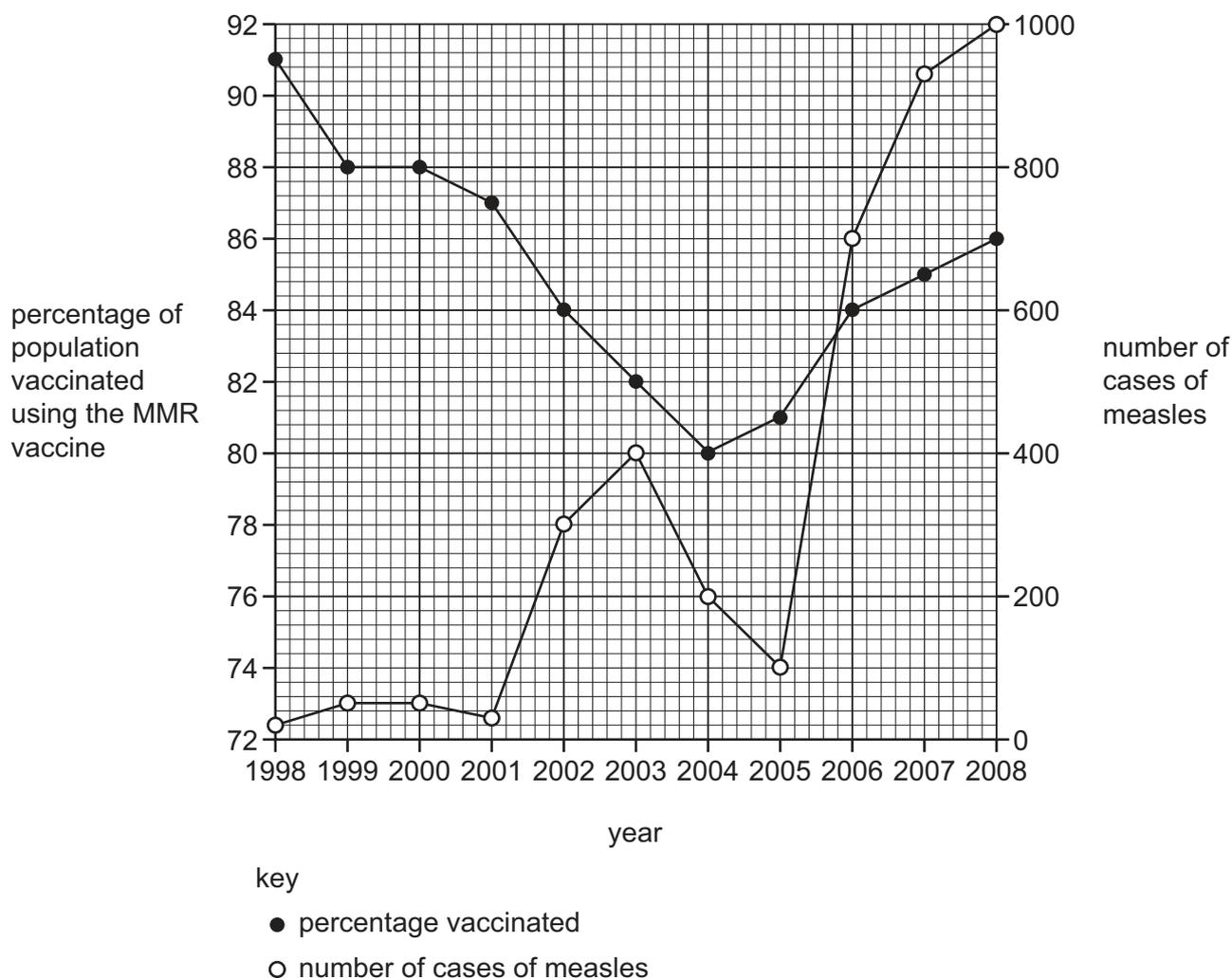
✓ = can be cured with antibiotics

x = cannot be cured with antibiotics

21 Vaccination helps to control the spread of transmissible diseases.

The MMR vaccine is given to young children and provides immunity against a disease called measles.

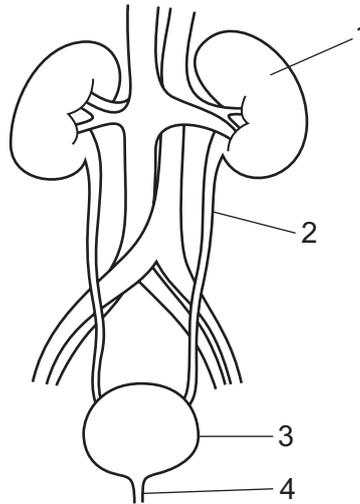
The graph shows the percentage of the population of a country vaccinated using the MMR vaccine and the number of cases of measles over time.



Which statement matches the data?

- A** Each year, the percentage of the population vaccinated using the MMR vaccine decreases and the number of measles cases increases.
- B** The percentage of the population vaccinated against MMR decreased from 91% in 1998 to 80% in 2004. This may have led to the increase in the number of measles cases from 2001 to 2003 and from 2005 to 2008.
- C** The number of measles cases decreased from 80 in 2003 to 76 in 2005.
- D** The MMR vaccine does not give protection against measles because there is an increase in the vaccination rate from 2004 to 2008 and the number of measles cases increased from 2005 to 2008.

22 The diagram shows the excretory system.

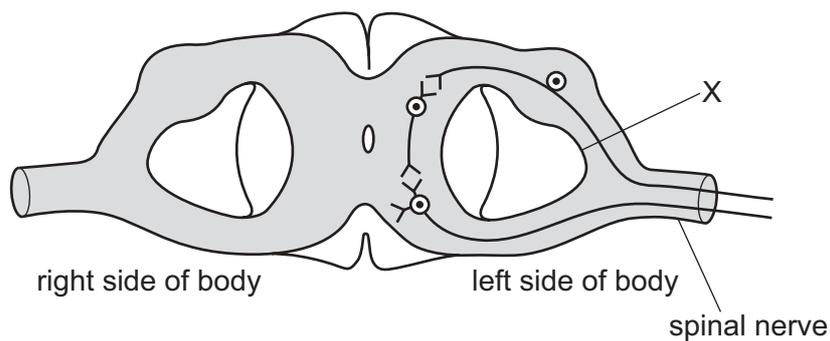


Which row identifies the names of the labelled structures?

	1	2	3	4
A	bladder	ureter	kidney	urethra
B	bladder	urethra	kidney	ureter
C	kidney	ureter	bladder	urethra
D	kidney	urethra	bladder	ureter

23 As a result of an accident in a factory, a small piece of metal entered the spinal cord of an engineer and severed the tissue at X.

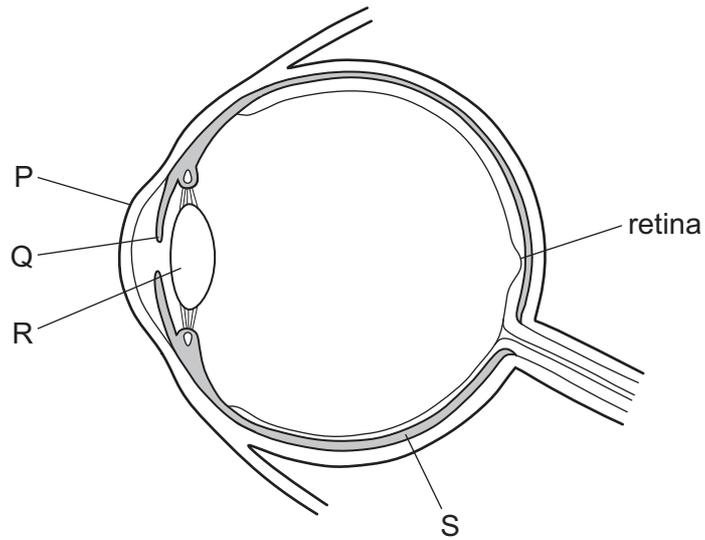
The diagram shows a section through the spinal cord in the neck at the point of the injury. A nervous pathway is also shown.



Which outcome from the accident is possible?

- A** loss of all sensation in the head above the spinal cord injury
- B** loss of some sensation on the left side of the body
- C** loss of all sensation on the right side of the body
- D** some paralysis on the right side of the body

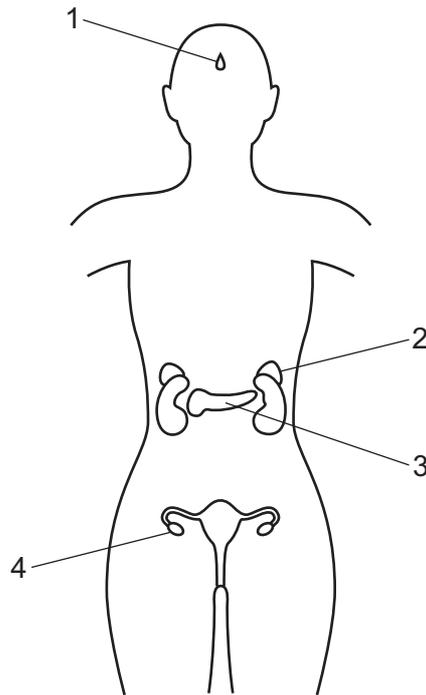
24 The diagram shows a section through the eye.



Which two structures focus light rays onto the retina?

- A** P and Q **B** P and R **C** Q and R **D** Q and S

25 The diagram shows some of the endocrine glands of a human female.



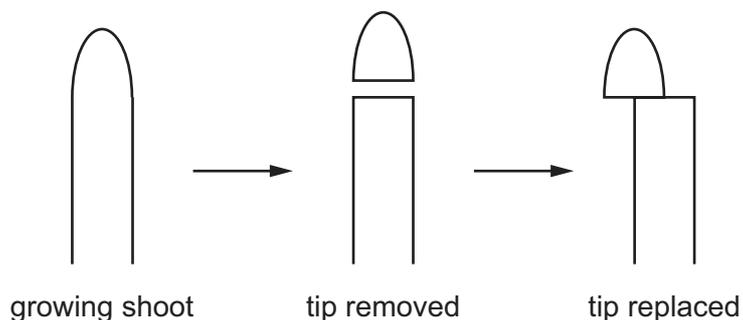
Which row matches the glands with the correct hormones?

	1	2	3	4
A	adrenaline	FSH	oestrogen	insulin
B	FSH	adrenaline	insulin	oestrogen
C	insulin	oestrogen	adrenaline	FSH
D	oestrogen	insulin	FSH	adrenaline

26 When the body temperature is too high, which process causes the body temperature to return to normal?

- A** contraction of hair erector muscles
- B** contraction of skeletal muscles, causing shivering
- C** secretion of sweat onto the surface of the skin
- D** vasoconstriction of arterioles supplying skin surface capillaries

- 27 Some seedlings were grown in a dark, warm and humid environment. The tips of the growing shoots were cut off and then replaced on one side of the shoot as shown. The shoots were then left to grow.



Which pattern of growth was then seen in the shoots?

- A The shoots stopped growing.
- B The shoots grew straight up.
- C The shoots grew with a curve to the left.
- D The shoots grew with a curve to the right.

- 28 Which statements about meiosis are correct?

	meiosis produces genetically identical nuclei	meiosis produces haploid nuclei	
A	x	x	key ✓ = yes x = no
B	x	✓	
C	✓	x	
D	✓	✓	

- 29 What is a feature of asexual reproduction in plants?

- A It only needs one type of gamete.
- B It requires two parents.
- C It uses cell division by meiosis.
- D It uses cell division by mitosis.

- 30** The seeds of some plants will not normally germinate until they have been in the soil for several months.

Some seeds were collected from a plant of this type.

Some students wanted to find out whether a chemical in the testa prevented germination.

The seeds were divided into three groups.

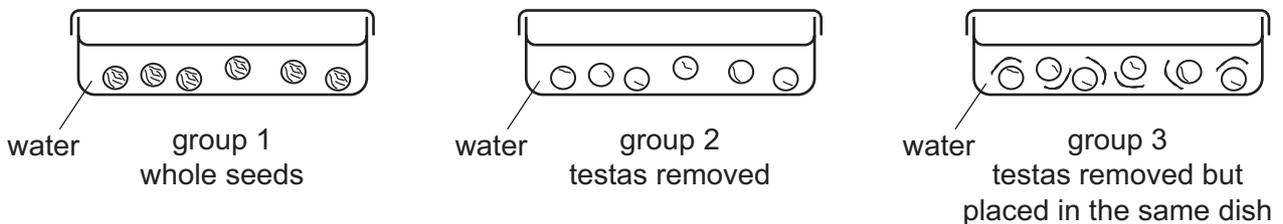
Each group of seeds was put into a shallow dish and covered with water.

The lid that was used was loose fitting so that oxygen could reach the seeds.

Group 1 were whole seeds.

Group 2 were seeds from which the testas had been removed.

Group 3 were seeds from which the testas had been removed, but the testas were placed separately in the same dish.

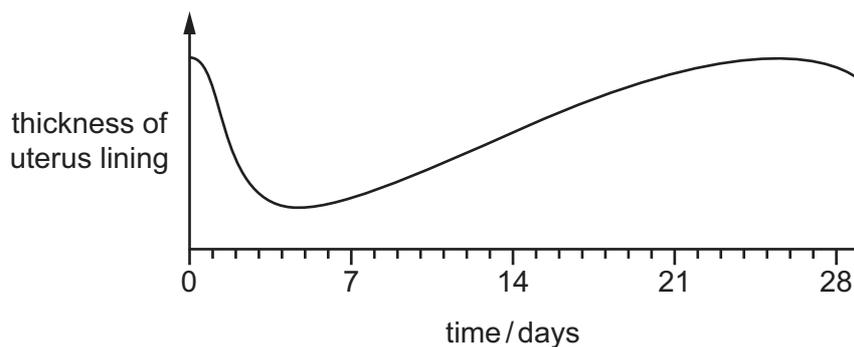


Only the seeds in group 2 germinated.

What would be the most logical extension of this experiment?

- A** change the water of the seeds in group 3 every day to see if they germinate
- B** change the apparatus so that oxygen cannot reach the seeds
- C** repeat the experiment at several different temperatures
- D** repeat the experiment using different species of seed

31 The diagram shows the changes in thickness of the uterus lining during one menstrual cycle.



When would the levels of progesterone and LH be highest?

	progesterone	LH
A	between days 12 and 16	between days 25 and 28
B	between days 19 and 23	on day 14
C	on day 5	between days 1 and 5
D	on day 13	on day 10

32 In the umbilical cord, the blood flowing from the fetus to the placenta in the umbilical artery has

- A** a higher concentration of carbon dioxide than the blood in the umbilical vein.
- B** a higher concentration of oxygen than the blood in the umbilical vein.
- C** a lower concentration of urea than the blood in the umbilical vein.
- D** the same concentration of glucose as the blood in the umbilical vein.

33 DNA is divided into sections called

- A** chromosomes.
- B** genes.
- C** nuclei.
- D** proteins.

34 A man and his wife have three children. The first two are both girls; one has blood group A and one has blood group O.

The children's father has blood group B.

What is the probability that the third child is a boy with blood group B?

- A** 0.125
- B** 0.25
- C** 0.50
- D** 1.00

35 Which outcomes might farmers want to achieve by using artificial selection?

	increased	decreased
A	fertiliser use	pesticide use
B	growth rate	yield
C	pesticide use	growth rate
D	yield	fertiliser use

36 Single-cell protein can be produced by growing a fungus in a fermenter.

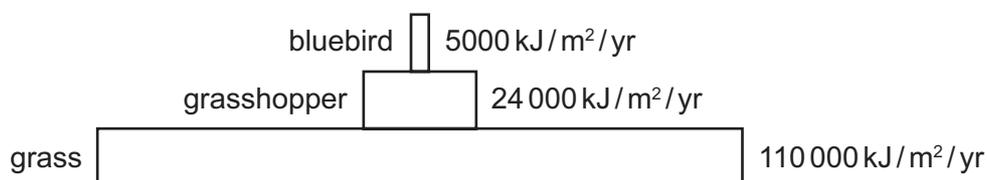
Why is it necessary for the fermenter to have a cooling unit?

- A** Fungi produce protein faster at low temperatures.
- B** The air bubbles generate heat as they float upwards.
- C** The glucose syrup is too warm when it is added to the fermenter.
- D** The fungus releases heat as it respire.

37 The diagram shows the pyramid of energy for the following food chain:

grass → grasshopper → bluebird.

A pyramid of energy shows the total quantity of energy stored in the biomass of organisms at each trophic level in the food chain per year.



To one decimal place, what percentage of energy is transferred from the producer to the herbivore?

- A** 3.7%
- B** 4.5%
- C** 20.8%
- D** 21.8%

38 Which statements about the carbon cycle are correct?

- 1 Burning wood and fossil fuels adds carbon dioxide to the atmosphere.
- 2 Decay and photosynthesis remove carbon dioxide from the atmosphere.
- 3 Photosynthesis and respiration add carbon dioxide to the atmosphere.

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

39 Aphids are small insects that feed on plants by sucking fluids from plant cells.

The population of aphids feeding on a bean plant increases rapidly.

Which row shows a combination of factors that explains this rapid growth?

	competition	food supply
A	high	high
B	high	low
C	low	high
D	low	low

40 A lake has been polluted by sewage.

How will the water in this lake compare with unpolluted water?

	bacteria	nitrites	oxygen
A	more	more	more
B	more	more	less
C	more	less	more
D	less	more	more

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