Cambridge Assessment International Education

Cambridge O Level

BIOLOGY **5090/11**

Paper 1 Multiple Choice **May/June 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.

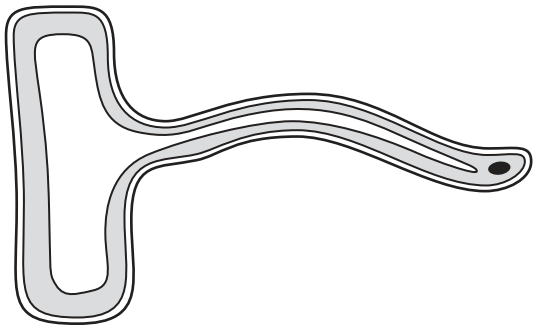
INFORMATION

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

[Turn over

1 The diagram shows a plant cell.



What is the function of this cell?

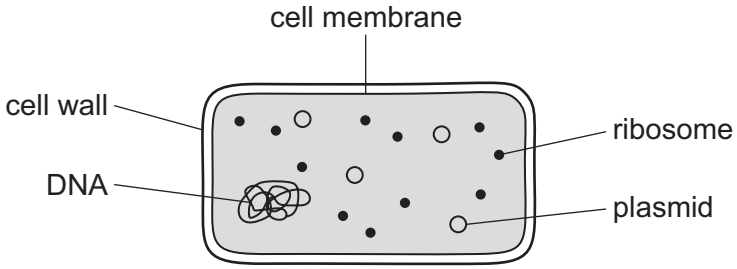
A to carry mineral ions along stems

B to photosynthesise

C to take in carbon dioxide

D to take in water

2 The diagram shows a structure that was observed using a microscope.



What does the diagram show?

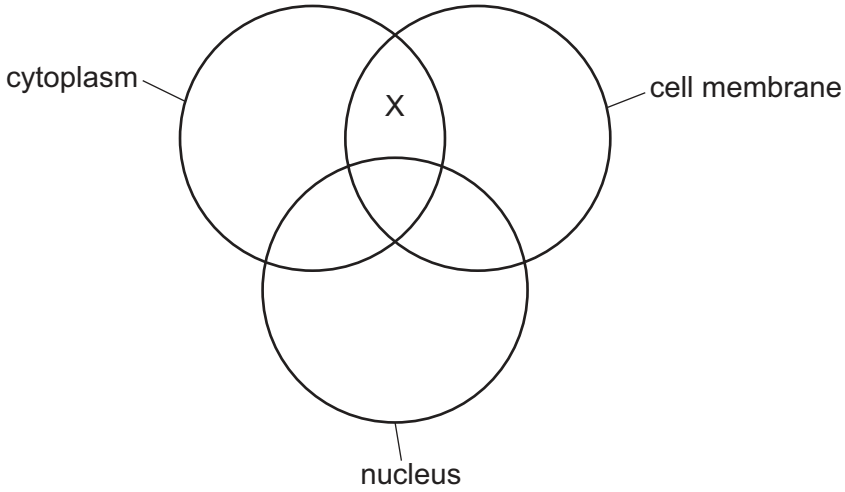
A an animal cell

B a bacterium

C a plant cell

D a virus

3 The diagram shows the structures found in cell X.



Which type of cell is X?

A liver cell

B red blood cell

C root hair cell

D xylem vessel

4 What is an example of an organ?

A digestive system

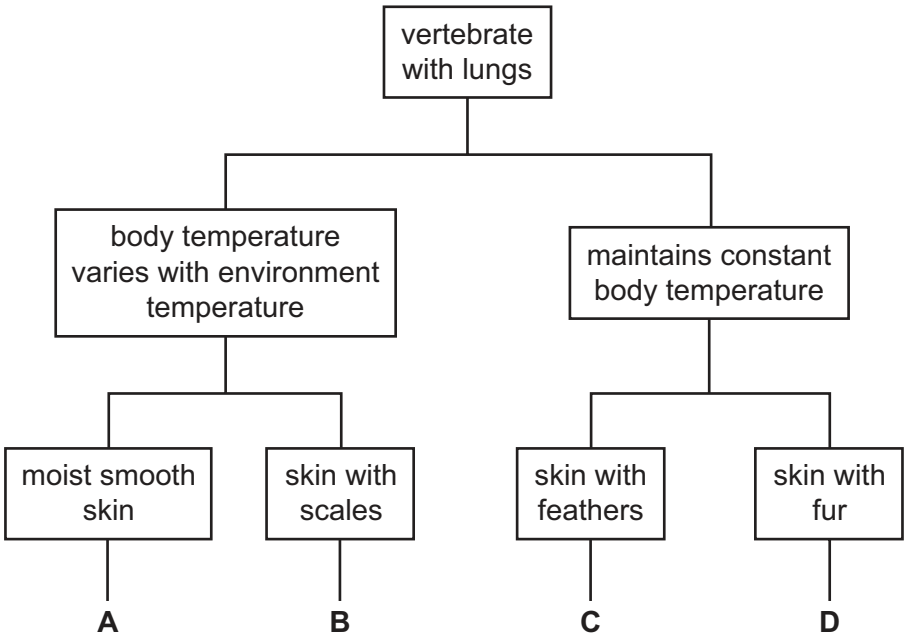
B eye

C blood

D neurone

5 A new type of small vertebrate with lungs is discovered. This is identified as a reptile.

Which vertebrate in the key is a reptile?



6 Molecules and ions can be moved into and out of cells by active transport.

Which statement about active transport is **not** correct?

A Active transport takes place only in plants.

B Active transport moves molecules and ions against a concentration gradient.

C Active transport uses energy to move molecules and ions.

D Molecules and ions are moved across partially permeable membranes by active transport.

7 Frogs are amphibians and so have a partially permeable skin. They live in and near water such as lakes and marshes, where the water contains a low concentration of mineral ions. They absorb any water they need through their skin.

Biologists are concerned that frogs living near coasts will be endangered if global warming leads to a rise in sea level. Sea water contains a high concentration of mineral ions.

What would happen to the frogs if their habitat became flooded with sea water?

A Water would move into the frog by osmosis.

B Mineral ions would move out of the frog by diffusion.

C Water would move into the frog by diffusion.

D Water would move out of the frog by osmosis.

8 The diagram shows an enzyme molecule.

Which diagram shows the substrate molecule for this enzyme?

A

B

C

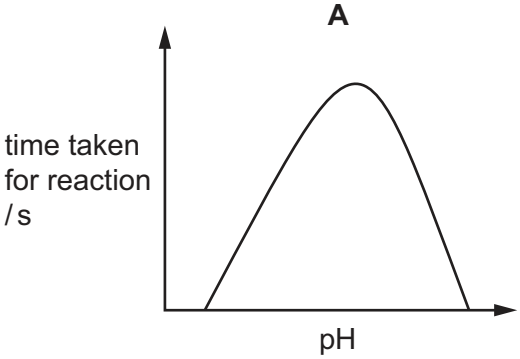
D

9 The enzyme amylase catalyses the breakdown of starch into maltose.

The effect of different pHs on the time it took for this breakdown to occur when all other variables were controlled was investigated.

Which graph shows the results of this investigation?

A



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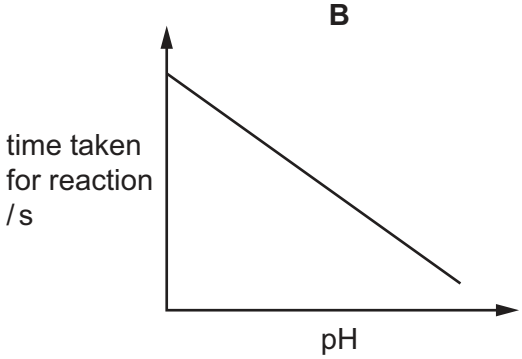

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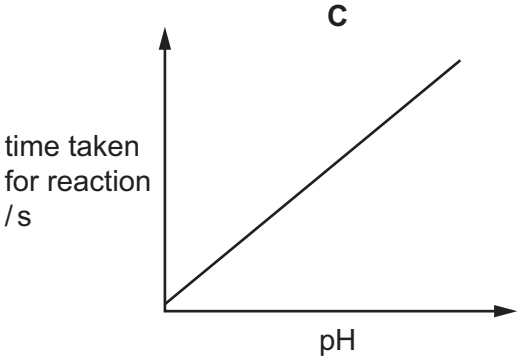

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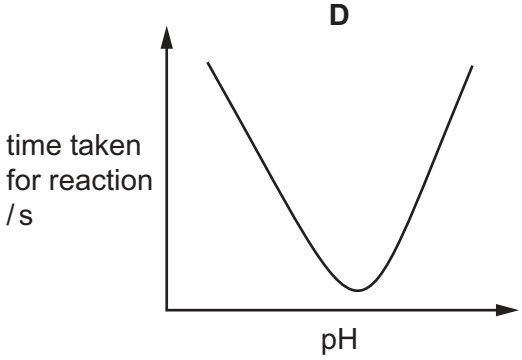


10 What are features of enzymes?

1 They act on specific substrates.

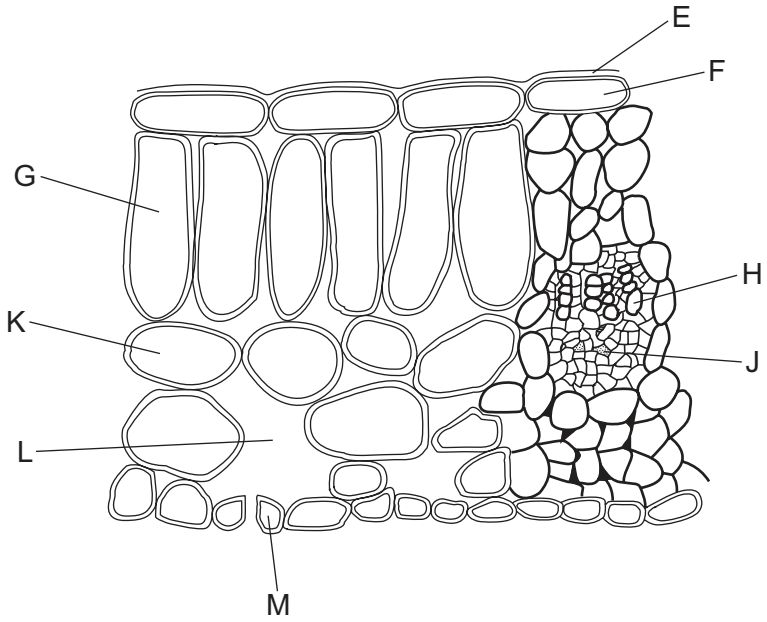
2 They are carbohydrates.

3 They are catalysts.

4 They are involved in some, but **not** all, metabolic reactions.

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

11 The diagram shows a transverse section through a leaf.

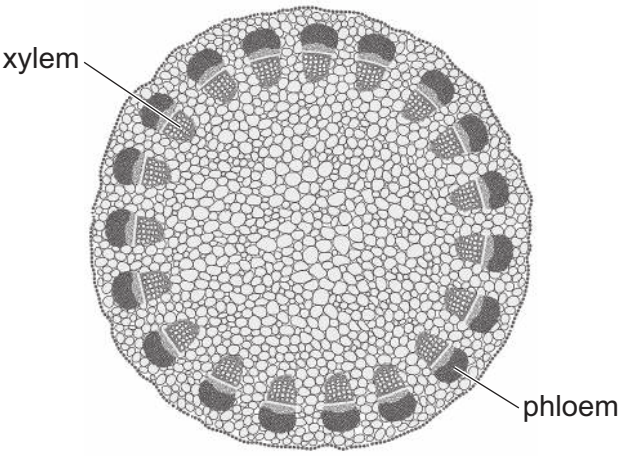


In which parts of the leaf can photosynthesis take place?

A K and L **B** E and F **C** G and M **D** H and J

12 Which transverse section photomicrograph shows the position of the xylem and phloem in a non-woody dicotyledonous stem?

A



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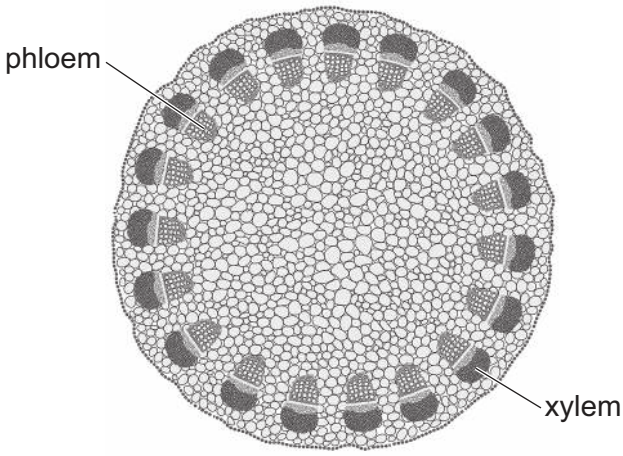

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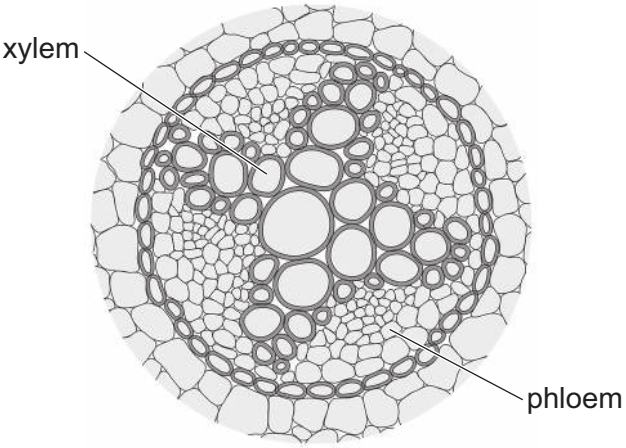

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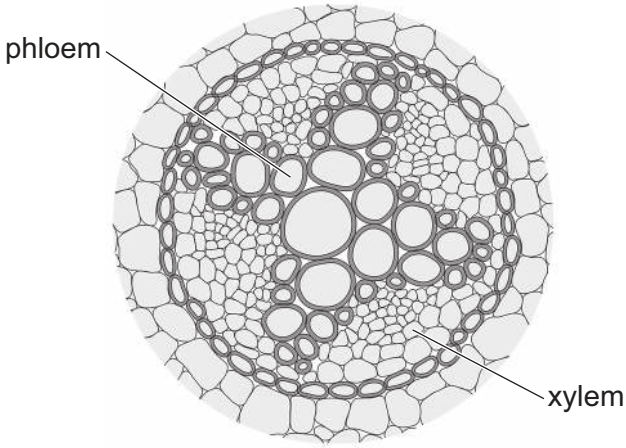
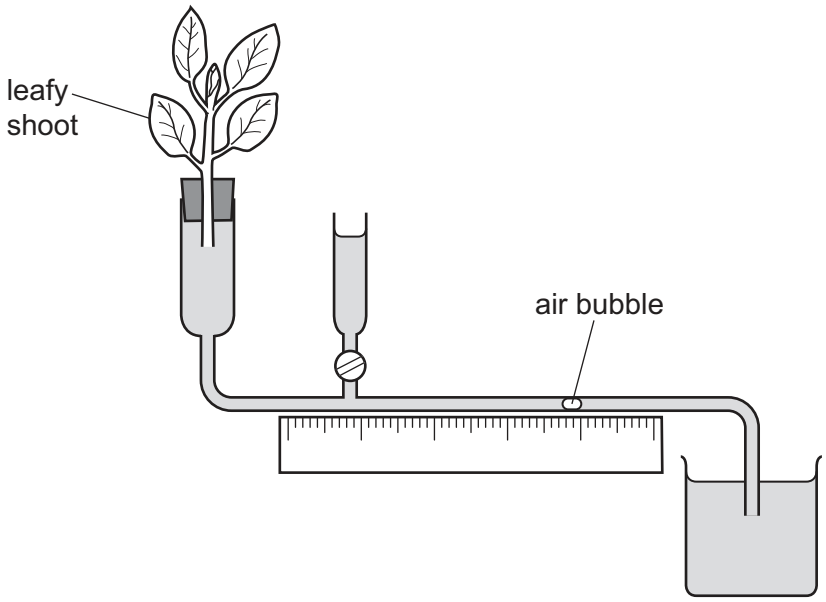


13 Students set up apparatus to measure the uptake of water by a leafy shoot.

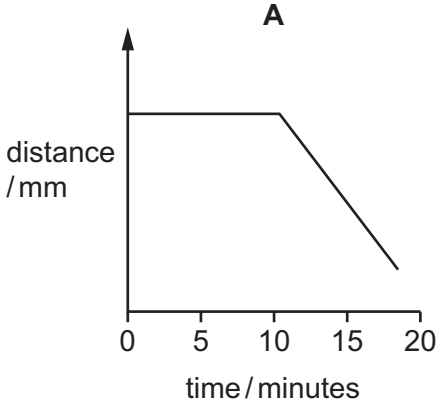


They recorded the position of the air bubble at the start. They observed the apparatus for 10 minutes, and recorded the distance travelled by the air bubble at one-minute intervals.

They then switched on a fan pointed towards the leafy shoot and recorded the distance travelled by the air bubble from the start, each minute, for another 10 minutes.

Which graph would they draw from their data?

A



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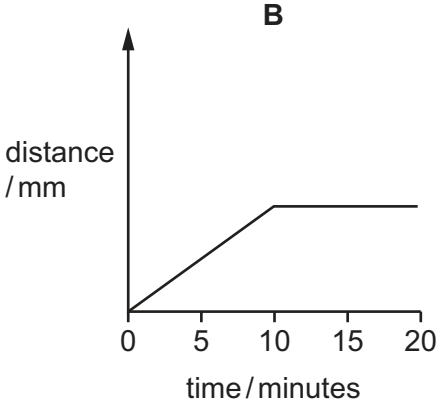

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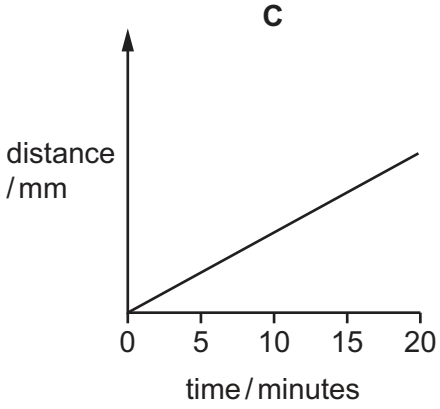

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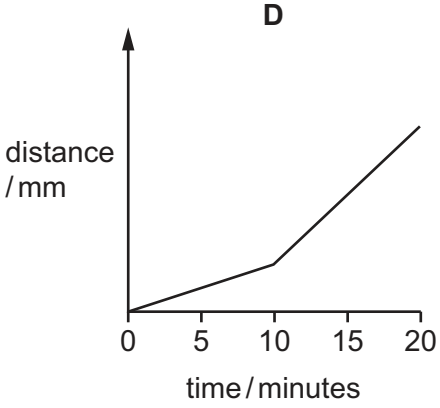


14 The percentages of each of the gases in inspired and expired air are measured when a student is resting and when a student is exercising.

The results are shown.

gas	percentage in inspired air	percentage in expired air when resting	percentage in expired air when exercising
nitrogen	78	78	78
oxygen	21	16	14.5
carbon dioxide	0.04	5.04	6.54

From the data, which statement is **not** correct?

A The difference between the percentages of carbon dioxide in expired air when exercising and in expired air when resting is 1.5.

B When resting, the difference between the percentage of oxygen in inspired and expired air is due to oxygen being used by respiration in the body.

C Inspired air contains 52.5 times more oxygen than carbon dioxide.

D The percentage of oxygen taken from inspired air is the same as the percentage of carbon dioxide added to expired air when exercising.

15 Which balanced chemical equation shows aerobic respiration?

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

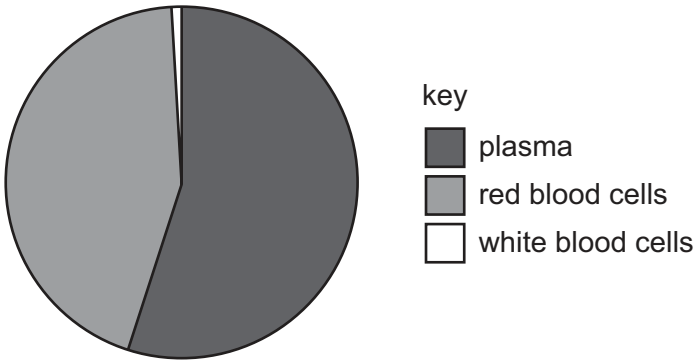
B $C_6H_{12}O_6 \rightarrow 2C_3H_6O_3$

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

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

16 Blood is made up from a number of different components.

The pie chart shows the percentage volume of each of the components of blood.



What is the percentage volume of blood for the component that has the function of transporting oxygen?

A 1% **B** 30% **C** 44% **D** 55%

17 What is the total number of atria and ventricles that the blood passes through during two complete circuits of the human body?

A 2 **B** 4 **C** 8 **D** 16

18 The table shows the range of percentages of different types of tissue found in the walls of the aorta of people of different ages.

Collagen tissue is present in the walls of blood vessels to provide strength and support.

type of tissue	percentage (%)	
	young adult	old adult
elastic	38–46	28–40
muscle	14–21	9–37
collagen	13–36	24–51

Which conclusion about the range of percentages is correct?

A The range of collagen tissue found in people of both age groups is 39.

B The range of each type of tissue is smaller in old adults than in young adults.

C The range of muscle tissue in old adults is four times greater than in young adults.

D The range of elastic tissue in people of both age groups is the greatest of all three types of tissue.

19 The table shows information about three different blood vessels, P, Q and R.

One of the vessels is an artery, one is a capillary and one is a vein.

blood vessel	P	Q	R
thickness of wall / μm	500	<1	1000
diameter of lumen / mm	5	0.008	4

Using the information from the table, what is the cross-sectional area of the lumen of the vein?

(Assume $\pi = 3.14$)

A $12.6\,mm^2$ **B** $19.6\,mm^2$ **C** $50.2\,mm^2$ **D** $78.5\,mm^2$

20 The table shows the number of deaths estimated to be due to smoking in England each year from 2009 to 2019.

year	number of deaths estimated to be due to smoking
2009	82 000
2010	80 300
2011	78 600
2012	78 700
2013	78 200
2014	77 800
2015	79 100
2016	77 900
2017	77 800
2018	77 000
2019	74 600

Using the information in the table, which statement is correct?

A The number of deaths decreased every year from 2009 to 2019.

B The number of deaths decreased by 9% between 2009 and 2019.

C The lowest number of deaths in one year occurred in 2018.

D The greatest decrease in the number of deaths in one year occurred between 2017 and 2018.

21 What is a method used to control the malarial vector?

A antibiotics

B antibodies

C insecticide

D herbicide

22 Which disease can be treated by using antibiotics?

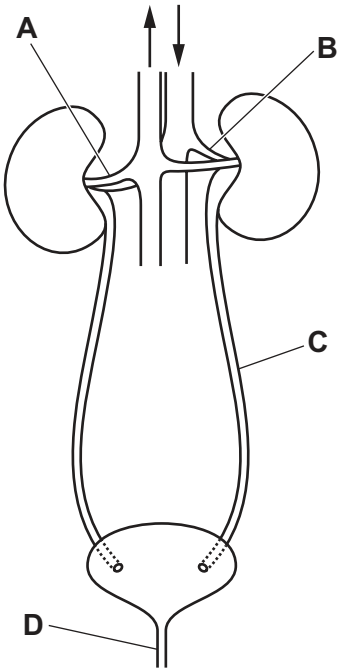
A cholera

B HIV

C malaria

D scurvy

23 Which structure is the ureter?



24 The processes of filtration and reabsorption take place in the kidneys.

The daily amounts of some of the substances entering the kidneys in the blood and of these substances leaving the kidneys in the urine are shown.

substance	amount entering the kidneys in the blood	amount leaving the kidneys in the urine
water	150 dm^3	1.5 dm^3
glucose	150 g	0 g
urea	50 g	30 g

Which percentage of each substance is reabsorbed by the kidneys during a day?

	% of substance reabsorbed by kidneys		
	water	glucose	urea
A	99	100	40
B	148.5	150	20
C	0.99	1.0	0.4
D	1.0	0.0	60

25 Where are the receptors for the pupil reflex located?

A brain

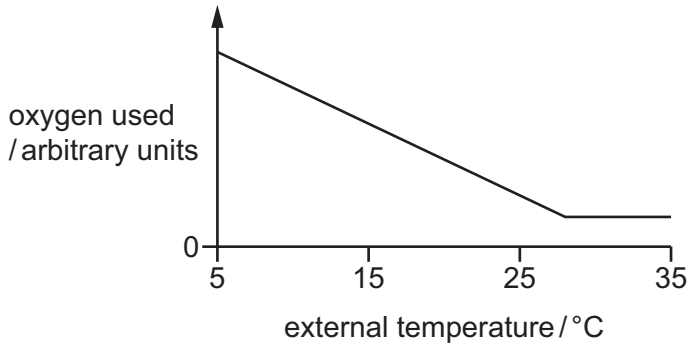
B iris

C pupil

D retina

26 The internal body temperature of some animals, including humans, remains constant even when the external temperature changes.

The graph shows how the oxygen used by one of these animals is affected by change in the external temperature.



Which conclusion can be made from this graph?

A The animal stops respiring when the external temperature is greater than 28 °C.

B The animal's respiration rate increases as the external temperature decreases from 28 °C.

C The internal temperature of the animal decreases as the external temperature increases.

D The animal's respiration rate increases as the external temperature increases.

27 Which statements about synapses are correct?

1 Synapses are junctions between neurones.

2 Synapses ensure impulses travel in only one direction.

3 Neurotransmitter chemicals diffuse across synaptic gaps.

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

28 Which process is **not** part of a homeostatic mechanism in mammals?

A change in flow of blood in vessels of the skin

B growth of longer hairs from the skin

C increased rate of sweat production

D contraction of hair erector muscles

29 A nurse tests a sample of urine from a patient using Benedict's reagent. The sample tests positive.

What is a possible explanation for this result?

A The patient's liver is **not** deaminating protein efficiently.

B The patient's pancreas is **not** producing sufficient insulin.

C The patient has eaten too much glucose.

D The patient's concentration of plasma proteins is too high.

30 Why do plant shoots grow towards light?

A Auxin inhibits cell elongation on one side.

B They grow more rapidly on the lighter side.

C More auxin accumulates on the darker side.

D Auxin stimulates cell division.

31 Which statement about nuclear division is correct?

A Meiosis results in the production of cells for the growth and repair of organisms.

B Meiosis results in genetically different daughter cells.

C Mitosis gives rise to cells where the chromosome number is halved.

D Mitosis results in the production of four daughter cells.

32 Stem cells are found in human embryos.

Which statements about stem cells are correct?

1 Stem cells are unspecialised cells.

2 Stem cells can divide by mitosis.

3 Stem cells are haploid.

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

33 In the placenta, which substance passes from the blood of the embryo to the blood of the mother down a concentration gradient?

A amino acids

B carbon dioxide

C glucose

D oxygen

34 What is the main function of the prostate gland?

A producing adrenaline

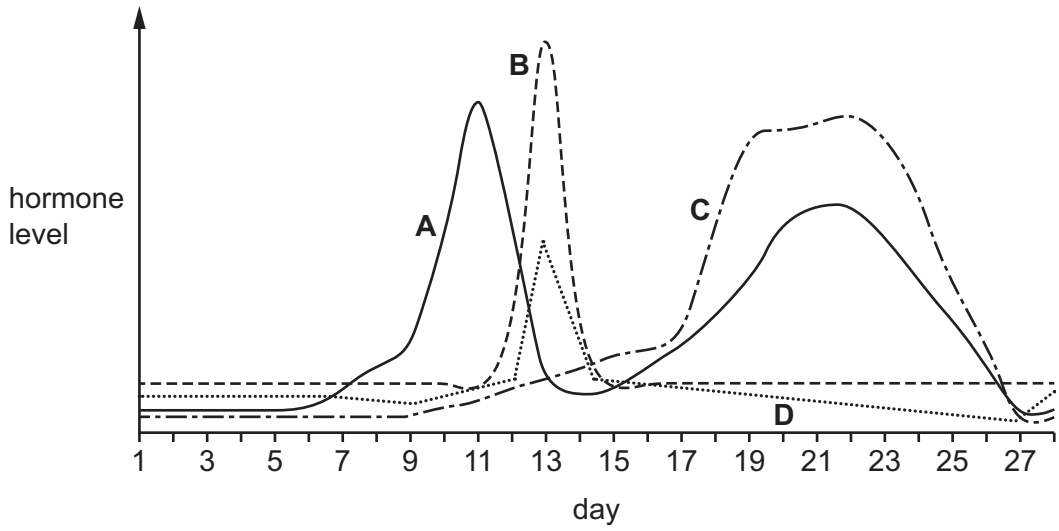
B producing testosterone

C producing a liquid in which the sperm can swim

D storing mature sperm cells

35 The graph shows the changes in levels of four hormones during the menstrual cycle.

Which line represents progesterone?



36 Which row identifies the factors causing continuous and discontinuous variation?

	continuous variation	discontinuous variation
A	both the environment and the genes	both the environment and the genes
B	the environment only	both the environment and the genes
C	the genes only	the environment only
D	both the environment and the genes	the genes only

37 Which row shows what happens in the eye when focusing on a nearby object?

	ciliary muscle	shape of lens
A	relaxes	becomes thinner
B	relaxes	becomes rounder
C	contracts	becomes thinner
D	contracts	becomes rounder

38 What is the principal source of energy in most biological systems?

A bacteria

B photosynthesis

C respiration

D sunlight

39 Untreated sewage contains nitrates and phosphates.

What will happen in the lake if untreated sewage is added?

A increased biodiversity

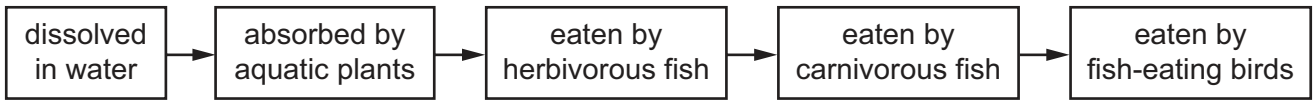
B increased eutrophication

C increased fish populations

D increased light penetration

40 DDT is an insecticide that is harmful to living organisms. It builds up in the cells of living organisms as it is **not** excreted.

The diagram shows the path taken by DDT when it enters a lake.



Which organisms would the DDT harm the most?

A aquatic plants

B carnivorous fish

C herbivorous fish

D fish-eating birds

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