Cambridge Assessment International Education

Cambridge IGCSE™

BIOLOGY **0610/22**

Paper 2 Multiple Choice (Extended) **February/March 2024**

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.

This document has **20** pages. Any blank pages are indicated.

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1 Which characteristic of living organisms is represented by gas exchange in the alveoli?

A excretion

B growth

C nutrition

D reproduction

2 The diagram shows how *Homo sapiens* (modern people) could have evolved from earlier ancestors.

Homo sapiens (modern people)

↑

Homo heidelbergensis

↑

Homo erectus

↑

Homo habilis

Which statement about modern people and their ancestors is correct?

A They are the same species and the same genus.

B They are the same species but **not** the same genus.

C They are the same genus but **not** the same species.

D They are neither the same species nor the same genus.

3 What is a characteristic of both insects and arachnids?

A eight legs

B exoskeleton

C only three pairs of legs

D wings

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4 An animal can swim, has a backbone and produces milk.

Which group does this animal belong to?

A amphibians

B fish

C mammals

D reptiles

5 In which cell structure does aerobic respiration occur?

A mitochondrion

B nucleus

C ribosome

D vacuole

6 Which formula shows the correct way to calculate the actual size of an object?

A $\text{actual size} = \dfrac{\text{magnification}}{\text{image size}}$

B $\text{actual size} = \dfrac{\text{image size}}{\text{magnification}}$

C actual size = image size × magnification

D actual size = image size – magnification

7 What is a reason why oxygen diffuses into the blood from an alveolus in the lungs?

A The oxygen concentration in the alveolus is greater than the carbon dioxide concentration in the blood.

B The oxygen concentration in the alveolus is greater than the oxygen concentration in the blood.

C The oxygen concentration in the blood is greater than the oxygen concentration in the alveolus.

D The oxygen concentration in the blood is greater than the carbon dioxide concentration in the alveolus.

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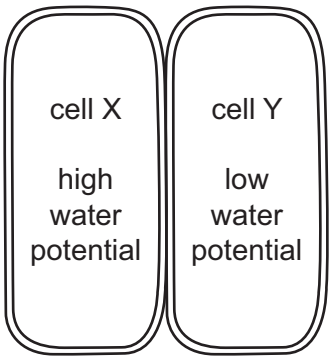
8 The diagram shows two plant cells.



Which statement describes what will happen to the water in the cells?

A equal movement between cells

B net movement from cell X to cell Y

C net movement from cell Y to cell X

D no movement between cells

9 Which row describes active transport?

	moves substances from a lower to a higher concentration	requires energy from respiration	requires a protein carrier in the cell membrane
A	no	no	no
B	no	no	yes
C	yes	yes	no
D	yes	yes	yes

10 Which row shows the elements that make up a carbohydrate molecule?

	carbon	hydrogen	nitrogen	oxygen
A	no	no	yes	yes
B	no	yes	no	yes
C	yes	yes	no	yes
D	yes	yes	yes	no

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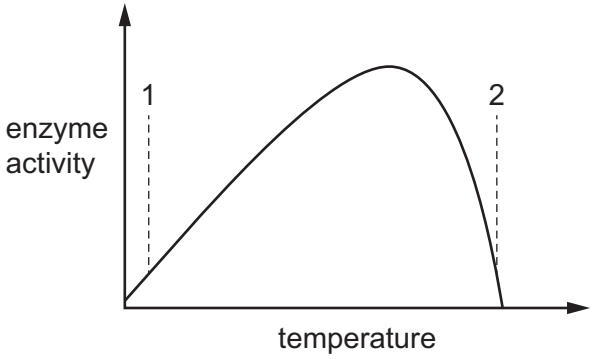
11 Large molecules are made from smaller molecules.

Which row names the large molecule and the small molecules it is made from?

	large molecule	small molecules
A	cellulose	glucose
B	fat	glycogen
C	glycogen	fatty acid
D	starch	amino acid

12 The graph shows the effect of temperature on the activity of an enzyme.

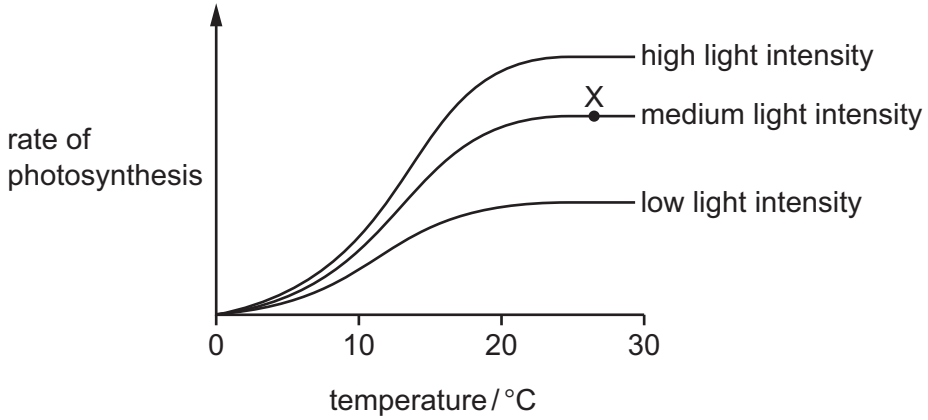


Which statements about the enzyme and substrate at temperatures 1 and 2 are correct?

	temperature 1	temperature 2
A	The active site fits into the substrate of the enzyme.	The substrate changes shape so that it cannot fit into the active site.
B	The enzyme and substrate have the same shape.	The enzyme and substrate have different shapes.
C	The enzyme is denatured.	The enzyme and substrate have complementary shapes.
D	The substrate fits into the active site of the enzyme.	The active site changes shape so that the substrate cannot fit into it.

13 In an investigation, the rate of photosynthesis in a plant is measured at different temperatures.

The investigation is carried out at three different light intensities. The results are shown.



What is the limiting factor for the rate of photosynthesis at point X?

	light intensity	temperature
A	no	no
B	no	yes
C	yes	no
D	yes	yes

14 In plants, which ions are used to make amino acids?

A magnesium

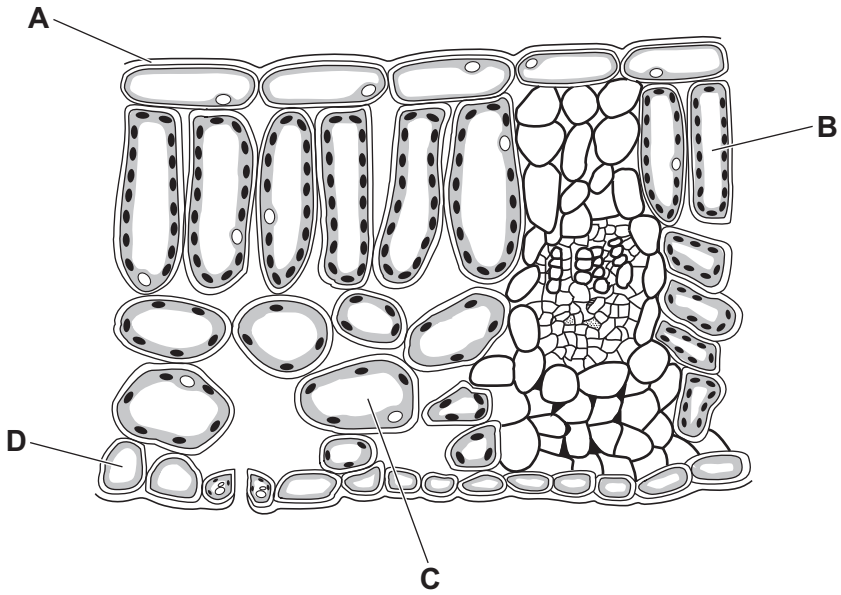
B nitrates

C phosphates

D potassium

15 The diagram shows a cross-section of part of a leaf.

Which structure is the cuticle?



16 Poor nutrition can lead to a condition called rickets in which bones fail to develop properly.

The table shows some minerals and vitamins present in four foods.

Which food would be best for a child who has rickets?

	calcium	iron	vitamin C	vitamin D
A	✓	✗	✓	✗
B	✓	✗	✗	✓
C	✗	✓	✓	✗
D	✗	✓	✗	✓

key

✓ = substance present

✗ = substance absent

17 Which food group is chemically digested in the mouth, passes through the stomach and continues to be broken down by chemical digestion in the small intestine?

A carbohydrates

B mineral salts

C proteins

D vitamins

18 Which row about bile is correct?

	organ where bile is produced	effect of bile on fat droplet surface area	process involved
A	gall bladder	increases	chemical digestion
B	gall bladder	decreases	physical digestion
C	liver	decreases	chemical digestion
D	liver	increases	physical digestion

19 The small intestine is where most digested foods are absorbed. The small intestine has many villi.

These are some features of villi.

1 Each villus contains a network of capillaries.

2 Each villus contains a lacteal.

3 The surface of each epithelial cell is covered with microvilli.

4 Villi increase the internal surface area of the small intestine.

Which statements about the villi are important for the efficient absorption of glucose?

A 1, 2, 3 and 4

B 1, 3 and 4 only

C 1 and 3 only

D 2 and 4 only

20 Which statements about xylem vessels are correct?

1 Xylem vessels have cells with cross walls.

2 Xylem vessels have thick walls with lignin.

3 Xylem vessels transport water and mineral ions.

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

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21 Dodder is a plant that grows on other plants called hosts. The dodder plant connects to the host's vascular bundles.

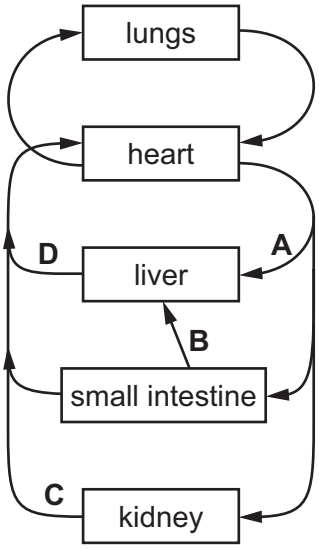
The dodder plant does **not** have green leaves or roots.

What correctly describes the regions for translocation?

	host leaves	dodder
A	sink	sink
B	sink	source
C	source	sink
D	source	source

22 The diagram shows part of the human circulatory system.

Which structure is the hepatic vein?



23 What is a feature of passive immunity?

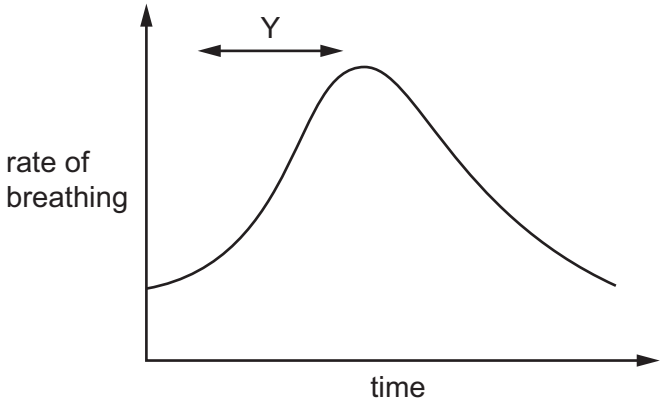
A Antibodies are acquired from another individual.

B It can be gained through infection with a pathogen.

C Long-term protection is gained.

D Memory cells are produced.

24 The graph shows the change in the rate of breathing of an athlete.



What causes the response during time period Y?

A a decrease in the concentration of oxygen in the blood

B a decrease in the concentration of urea in the blood

C an increase in the concentration of carbon dioxide in the blood

D an increase in the concentration of red blood cells in the blood

25 These are processes that occur in plants.

1 active transport

2 cell division

3 osmosis

4 transpiration

Which processes use energy from respiration?

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

26 What is the balanced equation for anaerobic respiration in yeast?

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

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

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

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

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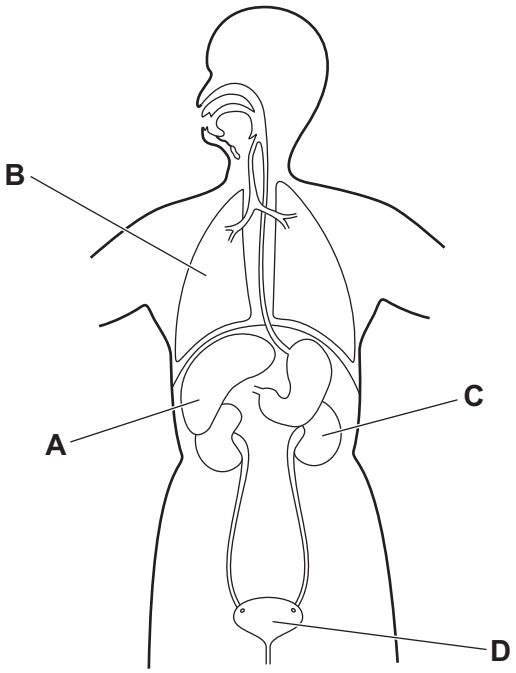
27 Which labelled organ has a major role in the assimilation of amino acids by converting them to proteins?



28 A toxin that is the same shape as a neurotransmitter prevents muscle contraction.

Which statement explains why the toxin prevents muscle contraction?

A The toxin blocks the binding of neurotransmitters to receptors on motor neurones.

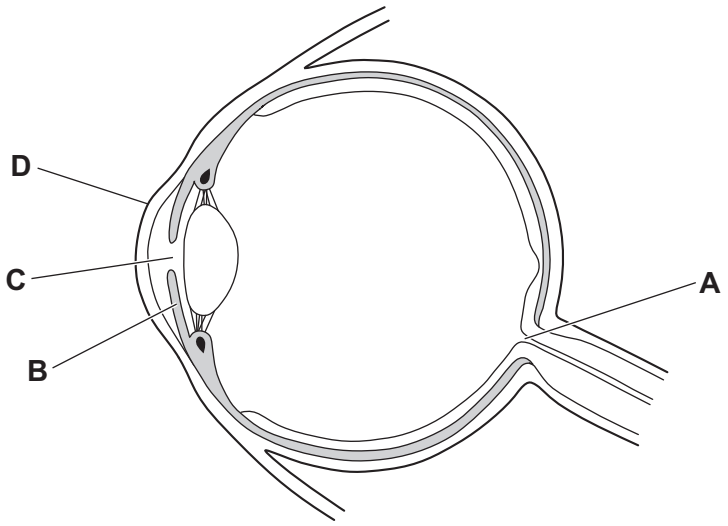
B The toxin increases the release of neurotransmitters from relay neurones.

C The toxin increases the release of neurotransmitters from sensory neurones.

D The toxin stimulates impulses in motor neurones.

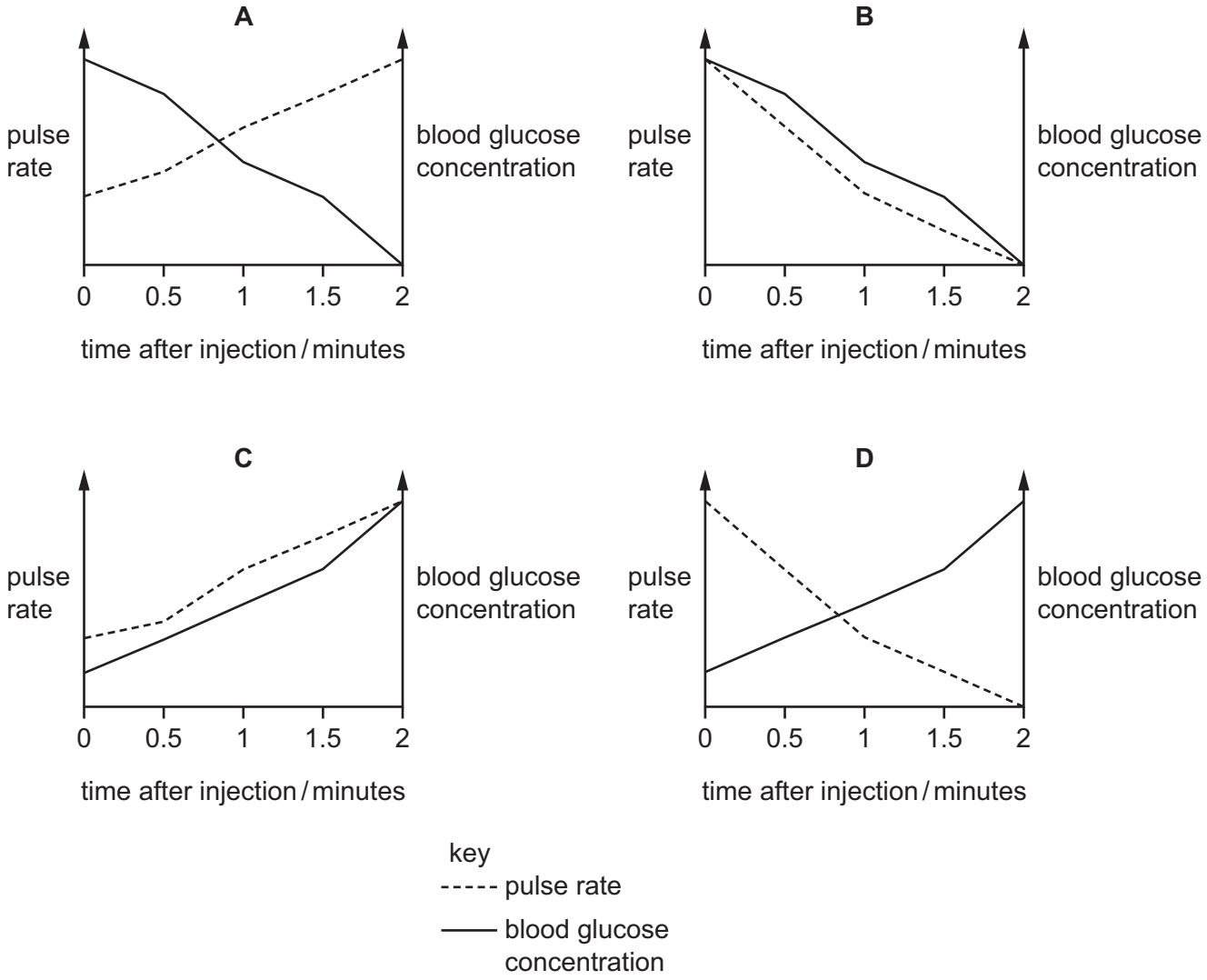
29 The diagram shows the structure of the human eye.

Which labelled part refracts light entering the eye?

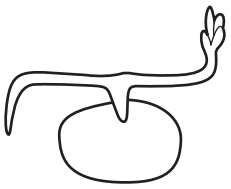


30 A patient is injected with adrenaline.

Which graph shows the expected changes to pulse rate and blood glucose concentration?



31 The diagram shows the shoot and root of a seedling, responding to gravity.



Which row shows where the auxin accumulates and the effect of this in the shoot?

	accumulates	effect
A	lower surface	inhibits cell elongation
B	lower surface	promotes cell elongation
C	upper surface	inhibits cell division
D	upper surface	promotes cell division

32 Which factors would **increase** the chance of antibiotic resistance developing?

1 regularly giving antibiotics to healthy livestock

2 only using antibiotics to treat bacterial infections

3 using several different antibiotics to treat an infection

4 using good personal hygiene to avoid infection

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

33 What is an advantage of using asexual reproduction in crop plants?

A It can reliably produce many crop plants with a desirable characteristic.

B It increases genetic variation.

C It only requires wind pollination.

D It reduces the chance of a new disease spreading through all the crop plants.

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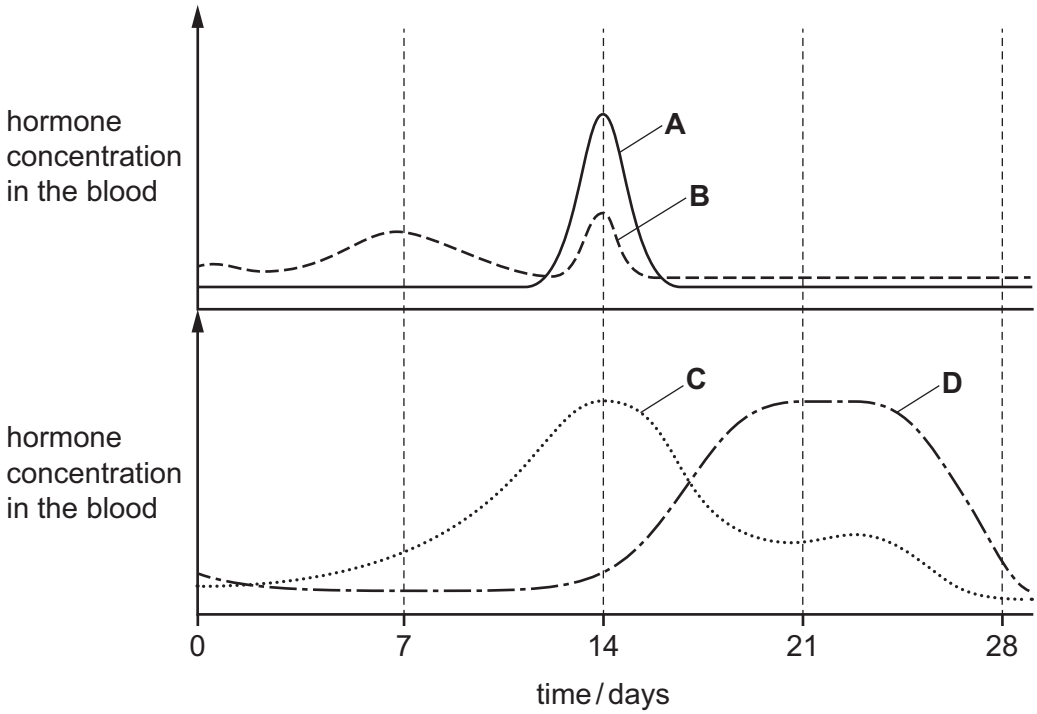
34 The graphs show the concentrations in the blood of four hormones involved in controlling the menstrual cycle.

Which line represents FSH (follicle-stimulating hormone)?



35 The mitotic index of a tissue is the percentage of cells in the tissue that are dividing by mitosis.

The table shows information about two tissue samples, X and Y.

tissue sample	number of cells dividing by mitosis	number of cells **not** dividing by mitosis	total number of cells in the tissue sample
X	25	55	80
Y	15	95	110

Which statement is correct?

A Tissue X is growing fastest with a mitotic index of 31.3%.

B Tissue X is growing fastest with a mitotic index of 45.4%.

C Tissue Y is growing fastest with a mitotic index of 13.6%.

D Tissue Y is growing fastest with a mitotic index of 15.8%.

36 Fruit flies can either have red eyes or white eyes.

This is a sex-linked characteristic with the gene for eye colour located on the X chromosome.

The allele for red eyes (R) is dominant over the allele for white eyes (r).

A fruit fly with the genotype X^RX^r was crossed with a fruit fly with the genotype X^RY.

Which percentage of the offspring will have red eyes?

A 25% **B** 50% **C** 75% **D** 100%

37 Which statement about variation is correct?

A ABO blood groups show continuous variation.

B Body mass shows discontinuous variation.

C Seed colour in peas shows continuous variation.

D Seed shape in peas shows discontinuous variation.

38 Which row shows part of the nitrogen cycle?

	name of process	chemical changed	chemical produced
A	decomposition	ammonium ions	protein
B	denitrification	nitrate ions	ammonium ions
C	nitrogen fixation	nitrate ions	nitrogen gas
D	nitrification	ammonium ions	nitrate ions

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39 When *in vitro* fertilisation (IVF) is used in captive breeding programmes, these processes occur.

1 The egg cell is fertilised.

2 The egg cell is removed from an ovary.

3 The embryo is implanted into the uterus.

4 The sperm cells are added.

In which order do these processes occur?

A 2 → 3 → 4 → 1

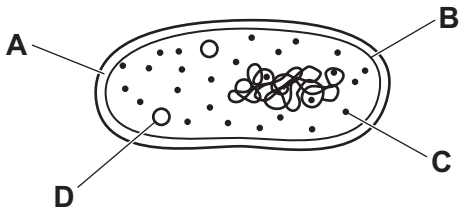
B 2 → 4 → 1 → 3

C 4 → 1 → 2 → 3

D 4 → 3 → 2 → 1

40 The diagram shows a bacterial cell.

Which cell structure is useful in genetic modification?



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