



BIOLOGY

0610/21

Paper 2 Multiple Choice (Extended)

October/November 2019

45 minutes

Additional Materials: Multiple Choice Answer Sheet
Soft clean eraser
Soft pencil (type B or HB is recommended)



READ THESE INSTRUCTIONS FIRST

Write in soft pencil.

Do not use staples, paper clips, glue or correction fluid.

Write your name, centre number and candidate number on the Answer Sheet in the spaces provided unless this has been done for you.

DO NOT WRITE IN ANY BARCODES.

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 separate Answer Sheet.

Read the instructions on the Answer Sheet very carefully.

Each correct answer will score one mark. A mark will not be deducted for a wrong answer.

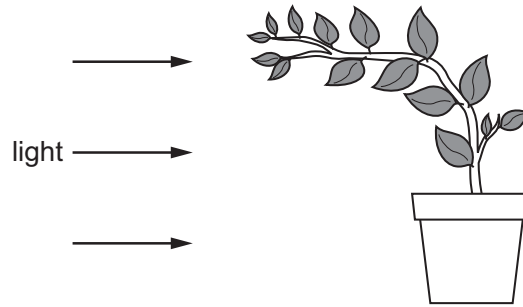
Any rough working should be done in this booklet.

Electronic calculators may be used.

This syllabus is regulated for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate.

This document consists of **15** printed pages and **1** blank page.

1 The diagram shows a plant.



Which characteristic of living organisms is shown by the plant in the diagram?

- A excretion
- B reproduction
- C respiration
- D sensitivity

2 Using the binomial system of naming organisms, the name of the lion is *Panthera leo*.

Which statement is correct?

- A The lion belongs to the kingdom *Panthera*.
- B The lion belongs to the genus *Panthera*.
- C The lion belongs to the species *Panthera*.
- D The lion belongs to the genus *leo*.

3 The table shows the number of animals collected in a sample from a woodland and the groups to which they belong.

| animal group | number in sample |
|--------------|------------------|
| arachnids | 10 |
| crustaceans | 8 |
| insects | 80 |
| myriapods | 7 |

How many arthropods in total, in this sample, have six or eight legs?

- A 15
- B 88
- C 90
- D 98

4 Which features do animal cells share with plant cells?

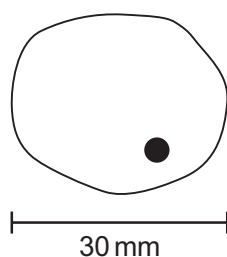
| | chloroplast | cytoplasm | nucleus |
|----------|-------------|-----------|---------|
| A | ✓ | ✓ | ✓ |
| B | ✓ | x | ✓ |
| C | x | ✓ | ✓ |
| D | x | x | x |

key

✓ = yes

x = no

5 The diagram shows a cell with an actual size of $30\ \mu\text{m}$.



What is the magnification of the diagram?

A $\times 10$

B $\times 100$

C $\times 1000$

D $\times 10\,000$

6 Red blood cells were placed in pure water.

Movement of water across the cell membrane caused a change in their appearance.

What caused this change in appearance?

| | direction of water movement | from higher to lower water potential | from lower to higher water potential |
|----------|-----------------------------|--------------------------------------|--------------------------------------|
| A | into cells | yes | no |
| B | into cells | no | yes |
| C | out of cells | yes | no |
| D | out of cells | no | yes |

7 Some examples of substances moving across membranes are listed.

- 1 glucose molecules into the epithelium that lines the small intestine
- 2 nitrate ions from a dilute solution in soil into a more concentrated solution in root hair cells
- 3 water molecules from mesophyll cells into the air spaces of a leaf

For which must oxygen be present?

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

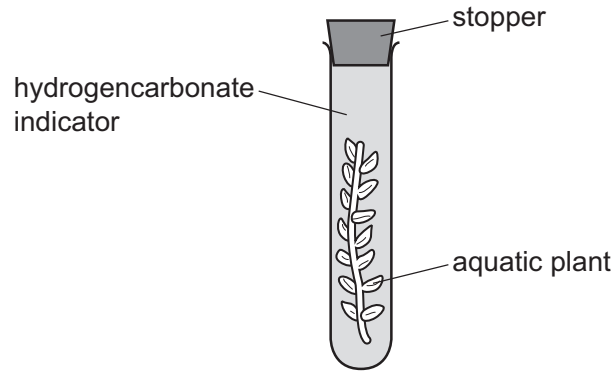
8 Which identifies the chemical elements found in proteins?

| | carbon | hydrogen | oxygen | nitrogen | |
|----------|--------|----------|--------|----------|-------------|
| A | ✓ | ✓ | ✓ | ✓ | key |
| B | ✓ | ✓ | ✓ | x | ✓ = present |
| C | ✓ | x | ✓ | x | x = absent |
| D | x | ✓ | x | ✓ | |

9 What is the correct definition of the term *enzyme*?

- A** carbohydrates that act as biological catalysts
B carbohydrates that act as substrates
C proteins that act as biological catalysts
D proteins that act as substrates

10 Two sealed test-tubes containing aquatic plants and hydrogencarbonate indicator were set up.



The indicator in the sealed test-tubes shows the concentration of dissolved carbon dioxide present.

| concentration of carbon dioxide | colour of indicator |
|---------------------------------|---------------------|
| low | red |
| medium | orange |
| high | yellow |

One of the sealed test-tubes was kept in the light for 24 hours and one of the sealed test-tubes was kept in the dark for 24 hours.

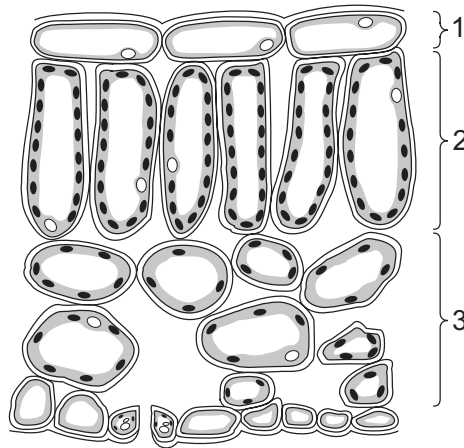
The results are shown in the table.

| test-tube kept in | start colour | end colour |
|-------------------|--------------|------------|
| light | orange | red |
| dark | orange | yellow |

What is the correct explanation of what has taken place?

- A Photosynthesis and respiration both occur in the light, but the rate of photosynthesis is higher.
- B Photosynthesis occurs in the light, but respiration does not.
- C Respiration can only occur when photosynthesis is not taking place.
- D The amount of carbon dioxide used and produced in the light is equal.

11 The diagram shows a leaf as seen in cross-section under the microscope.

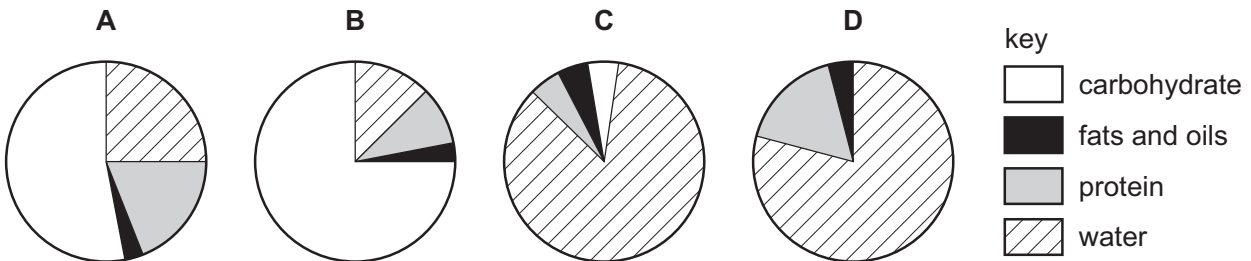


What are tissues 1, 2 and 3?

| | 1 | 2 | 3 |
|----------|--------------------|--------------------|--------------------|
| A | epidermis | palisade mesophyll | spongy mesophyll |
| B | epidermis | spongy mesophyll | palisade mesophyll |
| C | palisade mesophyll | epidermis | spongy mesophyll |
| D | spongy mesophyll | palisade mesophyll | epidermis |

12 The pie charts show the composition of 100 g of four different foods.

Which food provides the most energy?

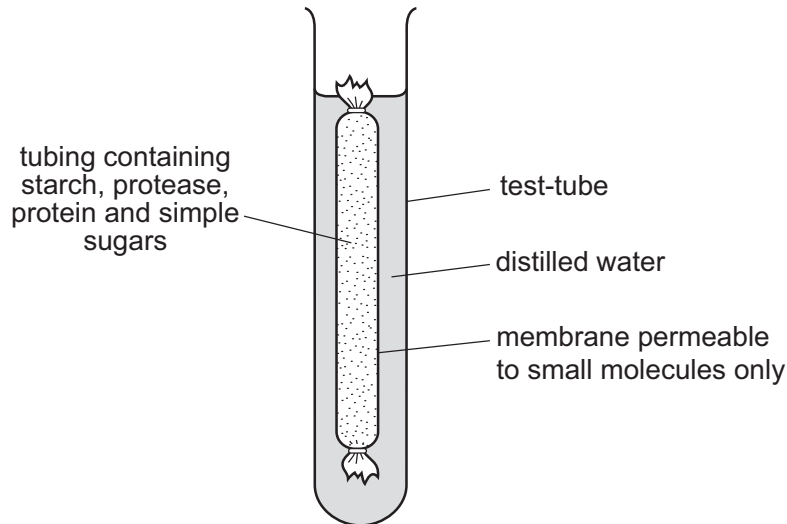


13 One of the symptoms of the disease cholera is diarrhoea. This is due to water loss by osmosis caused by the cholera toxin.

Cholera toxins result in

- A** secretion of chloride ions out of the small intestine lowering the water potential.
- B** secretion of chloride ions out of the small intestine raising the water potential.
- C** secretion of chloride ions into the small intestine lowering the water potential.
- D** secretion of chloride ions into the small intestine raising the water potential.

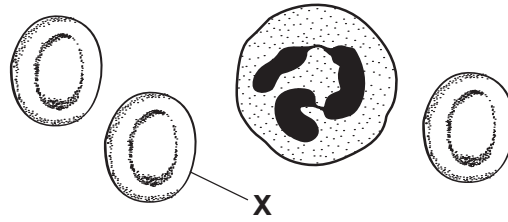
14 The diagram shows an experiment kept at room temperature.



What is present in the water surrounding the membrane after 45 minutes?

- A amino acids and simple sugars
 - B protein and amino acids
 - C protein and simple sugars
 - D starch and simple sugars
- 15 What is an example of diffusion?
- A dust particles being moved by ciliated cells in the trachea
 - B oxygen molecules moving into a red blood cell in the lungs
 - C pollen grains moving from anthers to stigmas in the wind
 - D red blood cells moving in a blood capillary in a muscle
- 16 In plants, what is transported by translocation?
- A glucagon
 - B glycogen
 - C starch
 - D sucrose

17 The diagram shows human blood cells, as seen under a microscope.



What is the function of cell **X**?

- A to carry glucose
- B to carry oxygen
- C to defend against disease
- D to make the blood clot

18 Which row describes the features of passive immunity?

| | antibodies made | involves memory cells | effective period |
|----------|-----------------|-----------------------|------------------|
| A | no | no | short term |
| B | no | yes | short term |
| C | yes | no | long term |
| D | yes | yes | long term |

19 Which row shows the approximate percentage of gases in expired air?

| | percentage of carbon dioxide | percentage of oxygen |
|----------|------------------------------|----------------------|
| A | 12 | 9 |
| B | 4 | 16 |
| C | 24 | 24 |
| D | 27 | 20 |

20 What is the correct equation for aerobic respiration?

- A $6\text{CO}_2 + 6\text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$
- B $\text{C}_6\text{H}_{12}\text{O}_6 + 6\text{CO}_2 \rightarrow 6\text{O}_2 + 6\text{H}_2\text{O}$
- C $\text{C}_6\text{H}_{12}\text{O}_6 + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O}$
- D $\text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 \rightarrow 6\text{CO}_2 + 6\text{H}_2\text{O}$

21 Lactic acid builds up in the muscles during vigorous exercise.

During recovery, how is this lactic acid removed?

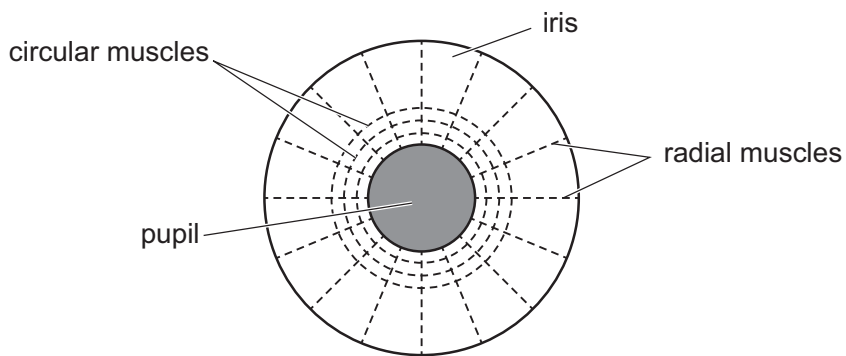
- A aerobic respiration of lactic acid in the liver
- B anaerobic respiration of lactic acid in the muscles
- C excretion of lactic acid by the lungs
- D removal of lactic acid by the alimentary canal

22 The neurones at synapses contain vesicles.

Which type of substance is found inside the vesicles?

- A enzyme
- B chromosomes
- C neurotransmitter
- D steroid

23 The diagram shows the muscles that control the size of the pupil in an eye.



How do the muscles make the pupil smaller?

| | circular muscles | radial muscles |
|----------|------------------|----------------|
| A | contract | contract |
| B | contract | relax |
| C | relax | contract |
| D | relax | relax |

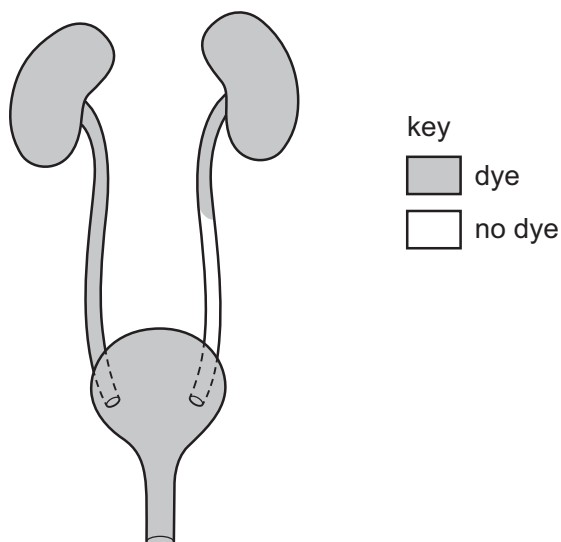
- 24 More adrenaline is produced by the adrenal glands when a person is frightened.

This increase affects several parts of the body.

| | change | increases | decreases | |
|---|-----------------------------|-----------|-----------|---------|
| 1 | blood glucose concentration | x | ✓ | key |
| 2 | heart rate | ✓ | x | ✓ = yes |
| 3 | breathing rate and depth | ✓ | x | x = no |
| 4 | dilation of pupil | x | ✓ | |

Which rows are correct?

- A 1 and 3 B 1 and 4 C 2 and 3 D 2 and 4
- 25 A patient has dye injected into the blood supply to his kidneys. The dye appears in his excretory system as shown.



Which part is blocked?

- A the kidney
 B the ureter
 C the bladder
 D the urethra

26 Which statement is a reason why viruses are unharmed by antibiotics such as penicillin?

- A They are very small in size.
- B They do not have a cell wall.
- C They have genetic material.
- D They have a protein coat.

27 Several athletes have been banned from their sport for using the drug nandrolone. This drug helps the body to build up muscle tissue.

What sort of drug is nandrolone?

- A anabolic steroid
- B antibiotic
- C depressant
- D neurotransmitter

28 Which statement about the hormone FSH is correct?

- A It stimulates ovulation.
- B It stimulates ovulation and menstruation.
- C It stimulates the maturation of follicles.
- D It stimulates the maturation of follicles and menstruation.

29 HIV is transmitted by body fluids during sexual contact.

HIV affects the immune system.

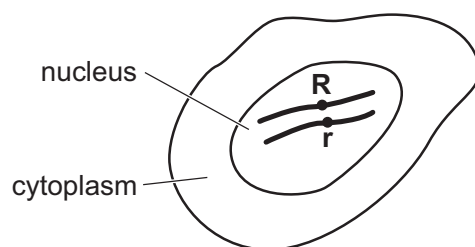
Which statement best describes the effect of HIV?

- A The body has increased immunity.
- B The body produces fewer antibodies.
- C The body produces more antibodies.
- D The number of lymphocytes increases.

30 How many chromosomes are there in each of the human cells shown in the table?

| | goblet cell | motor neurone | mature red blood cell | sperm |
|----------|-------------|---------------|-----------------------|-------|
| A | 0 | 23 | 0 | 0 |
| B | 23 | 23 | 23 | 0 |
| C | 46 | 46 | 0 | 23 |
| D | 46 | 46 | 46 | 23 |

31 The diagram shows a diploid cell and alleles **R** and **r** on one pair of chromosomes.



When this cell divides by mitosis, which daughter cells will be produced?

| | chromosome number | genotype |
|----------|-------------------|--------------|
| A | diploid | heterozygous |
| B | diploid | homozygous |
| C | haploid | heterozygous |
| D | haploid | homozygous |

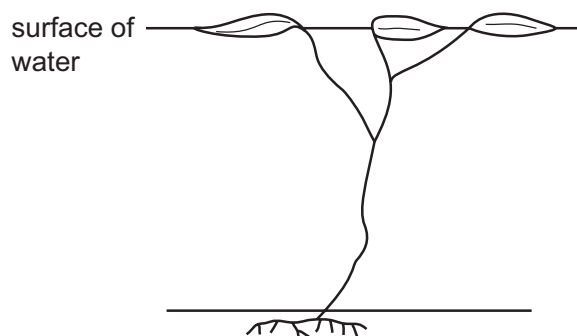
32 The diagram shows breeding rats where the allele for grey fur is dominant to white fur.



Which two individuals are definitely heterozygous for fur colour?

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

33 The diagram shows a hydrophyte in a lake.



Which statement about the leaves is correct?

- A They cannot photosynthesise.
 - B They have a thick cuticle.
 - C They have large air spaces in the spongy mesophyll.
 - D They require many xylem vessels for support.
- 34 Some disease-causing bacteria survive treatment with an antibiotic.

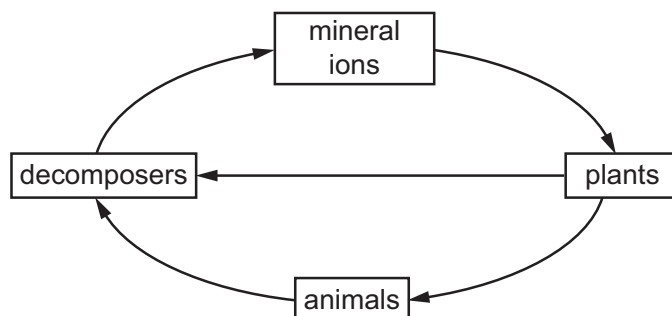
Which statement about the surviving bacteria is correct?

- A The antibiotic will work better on the next generation of bacteria.
- B The bacteria have undergone a process of natural selection.
- C The bacteria will now be resistant to all antibiotics.
- D The resistance of the bacteria is a result of selective breeding.

35 Which row describes the energy flow into and through a food chain that starts with a plant?

| | energy entering a food chain | energy transferred between organisms in a food chain |
|---|------------------------------|--|
| A | chemical | chemical |
| B | chemical | heat |
| C | light | chemical |
| D | light | heat |

36 The diagram shows part of the nitrogen cycle.



What is one of the mineral ions?

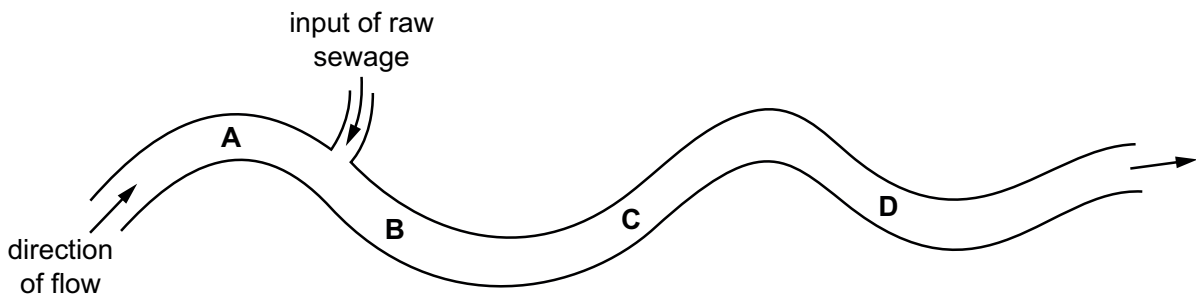
- A amino acids
 - B nitrate
 - C nitrogen
 - D protein
- 37 Which part of a bacterial cell makes it useful in genetic engineering?
- A cell wall
 - B cytoplasm
 - C flagellum
 - D plasmid
- 38 Which enzyme would be used in a biological washing powder?
- A DNA ligase
 - B lactase
 - C pectinase
 - D protease
- 39 What are the possible effects of deforestation?

| | loss of soil | flooding | decrease in atmospheric carbon dioxide |
|----------|--------------|----------|--|
| A | yes | yes | no |
| B | yes | no | yes |
| C | no | yes | no |
| D | no | no | yes |

40 The bloodworm is an organism that is found in heavily polluted water.

The diagram shows where raw sewage flows into a river.

Where would there be fewest bloodworms?



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