



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

BIOLOGY

5090/01

Paper 1 Multiple Choice

October/November 2007

1 hour

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, highlighters, 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.

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.

This document consists of **16** printed pages.

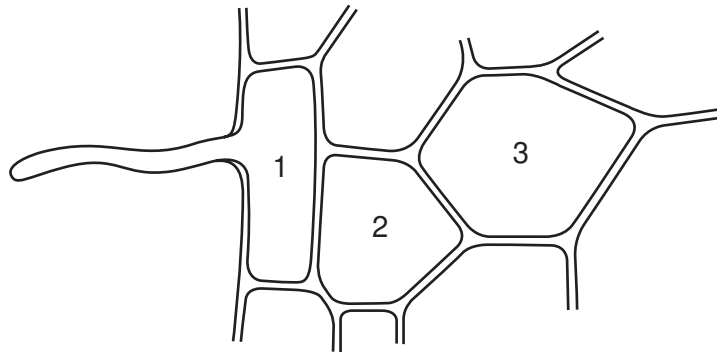


- 1 When a red stain is added to a culture containing both living and dead cells, only the dead cells take up the stain.

Which structure prevents the stain entering the living cells?

- A cell membrane
- B cell wall
- C cytoplasm
- D vacuole

- 2 The diagram shows some cells in a root of an actively growing plant.



How does the water potential of the cell marked 2 differ from the water potential of the cell marked 3 and how do mineral ions mainly enter the cell marked 1?

| | water potential of the cell marked 2 | mineral ions mainly enter the cell marked 1 |
|---|--------------------------------------|---|
| A | higher than cell 3 | by active transport |
| B | higher than cell 3 | by diffusion |
| C | lower than cell 3 | by active transport |
| D | lower than cell 3 | by diffusion |

- 3 The mass of a cube of fresh potato is found. It is then placed in a test-tube containing a dilute solution of sucrose. After a day, its mass has increased.

Which process has occurred and what has happened to the concentration of the sucrose in the solution in the test-tube?

| | process | sucrose concentration |
|---|------------------|-----------------------|
| A | active transport | decreased |
| B | active transport | increased |
| C | osmosis | decreased |
| D | osmosis | increased |

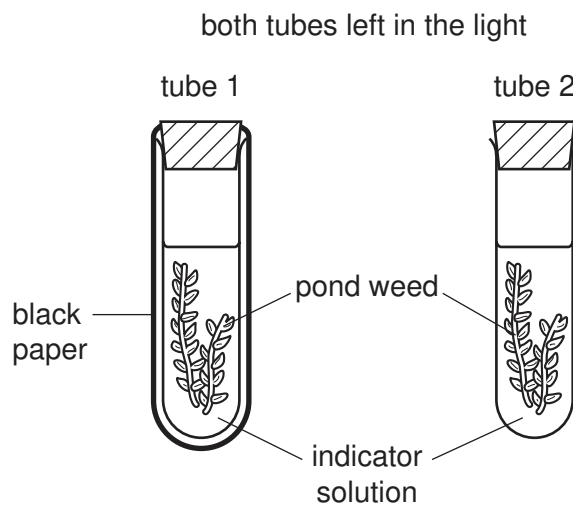
- 4 Which statement about enzymes is essential to the lock and key hypothesis?
- A Enzyme molecules are catalysts.
 B Enzyme molecules can be damaged by high pH values.
 C Enzyme molecules can be damaged by high temperatures.
 D Enzyme molecules each have a distinct shape.
- 5 Magnesium is an essential element for
- A the formation of cell walls.
 B the formation of chlorophyll.
 C the formation of proteins.
 D the process of cell division.
- 6 An indicator solution shows the following colour changes.

pH 7 : orange

pH below 7 : yellow

pH above 7 : purple

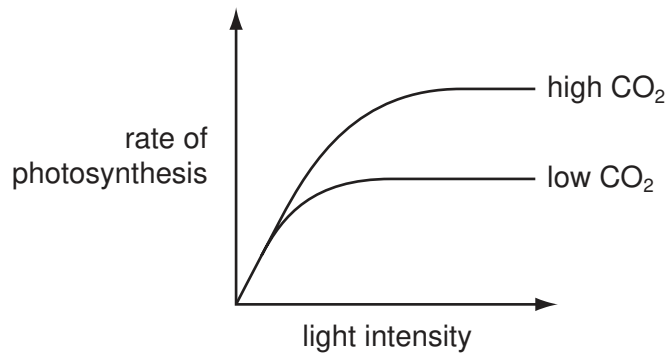
Consider the experiment represented by the diagram below. The indicator was orange in both tubes at the beginning of the experiment.



Which colours would the indicators show after three hours?

| | tube 1 | tube 2 |
|----------|--------|--------|
| A | purple | orange |
| B | orange | yellow |
| C | yellow | purple |
| D | yellow | orange |

- 7 The graph shows the effects of carbon dioxide and light intensity on the rate of photosynthesis.

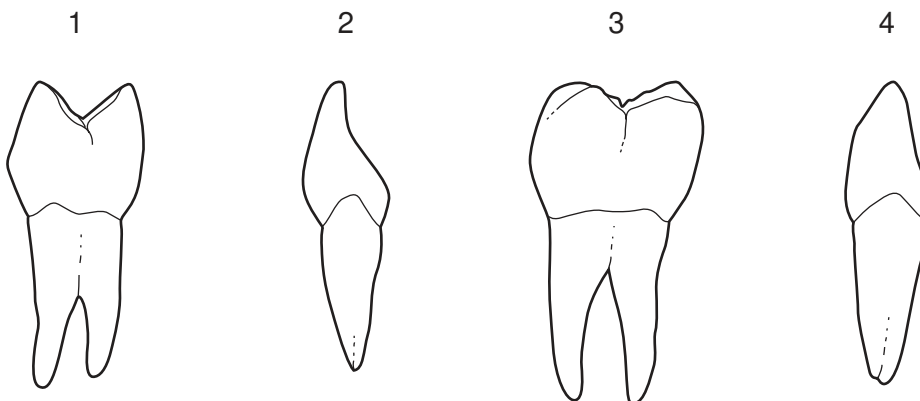


Which statement is supported **only** by evidence from the graph?

- A** Carbon dioxide limits the rate of photosynthesis at low light intensities.
B Light intensity and carbon dioxide both limit the rate of photosynthesis.
C The rate of photosynthesis is proportional to light intensity.
D Temperature affects the rate of photosynthesis.
- 8 A person tries eating a diet consisting only of lettuce leaves and water.

Which condition might develop?

- A** constipation
B heart disease
C rickets
D scurvy
- 9 Which of these human teeth are used for grinding?



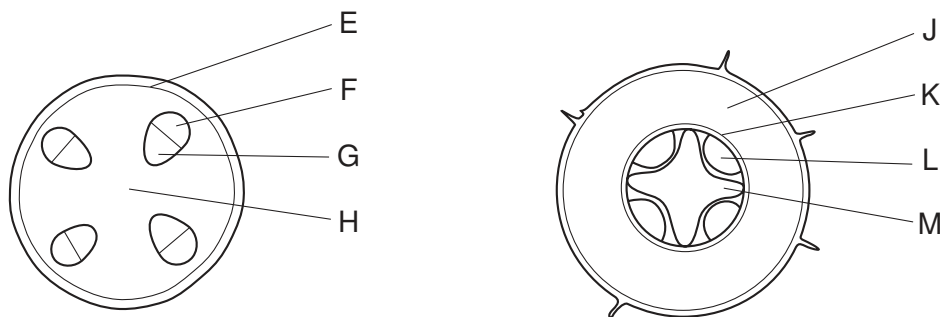
- A** 1 and 3 **B** 1 and 4 **C** 2 and 3 **D** 2 and 4

10 A protein solution is tested using three different reagents.

Which set of results is obtained?

| | iodine solution | Benedict's solution | biuret solution |
|----------|-----------------|---------------------|-----------------|
| A | black | blue | blue |
| B | black | red | blue |
| C | brown | blue | purple |
| D | brown | red | purple |

11 The diagram shows sections through the stem and root of a dicotyledonous plant.



Which structures transport sugars through the stem and root?

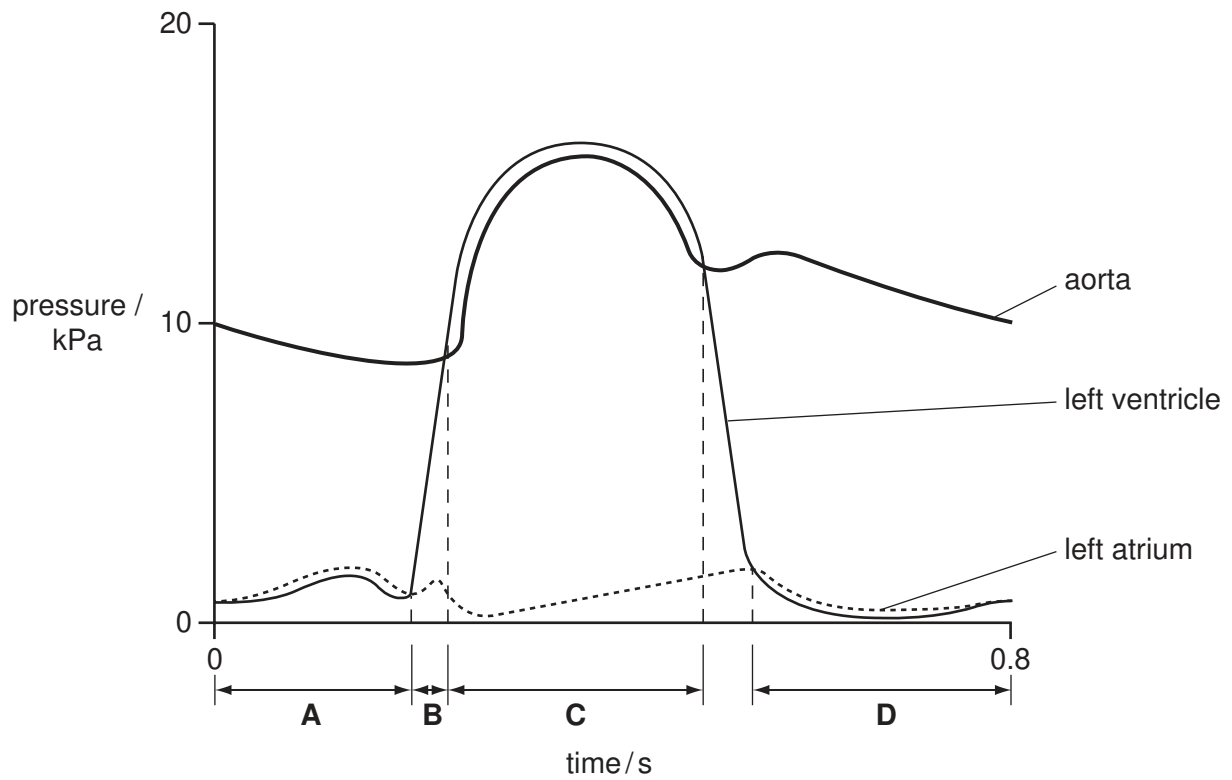
- A** E and J **B** F and L **C** G and M **D** H and K

12 Which adaptations of a root hair cell make it suitable for water uptake?

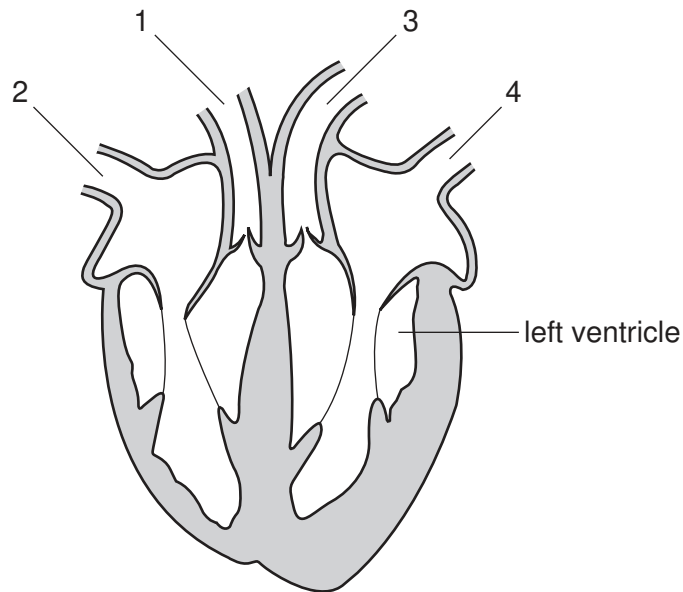
| | partially permeable cell membrane | surface area to volume ratio of the cell |
|----------|-----------------------------------|--|
| A | absent | high |
| B | absent | low |
| C | present | high |
| D | present | low |

13 The diagram shows the pressures in the left side of the heart during one heart beat.

At which time in the heart beat cycle are all four of the heart valves closed?



14 The diagram shows a vertical section through the heart.



What are the functions of the numbered blood vessels?

| | carries blood to body | carries blood to lungs | carries blood from lungs | carries blood from body |
|----------|-----------------------|------------------------|--------------------------|-------------------------|
| A | 1 | 2 | 3 | 4 |
| B | 1 | 3 | 4 | 2 |
| C | 2 | 4 | 3 | 1 |
| D | 3 | 1 | 4 | 2 |

15 After muscular exercise, which blood vessel carries the **lowest** concentration of carbon dioxide?

- A hepatic artery
- B pulmonary vein
- C renal artery
- D vena cava

16 Which changes occur as a person breathes in deeply?

| | diaphragm muscle | external intercostal muscles |
|----------|------------------|------------------------------|
| A | contracts | contract |
| B | contracts | no change |
| C | relaxes | contract |
| D | relaxes | relax |

17 Which do the cilia do in the bronchi of the lungs?

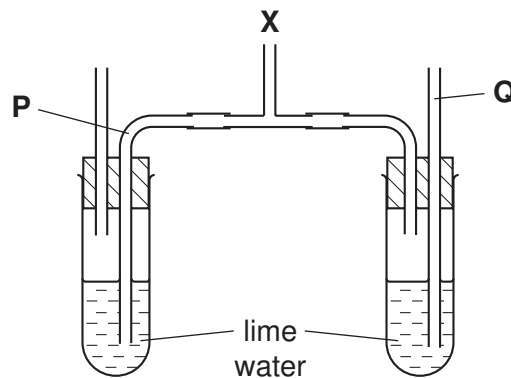
| | trap bacteria | move mucus out of the lungs |
|----------|---------------|-----------------------------|
| A | ✓ | ✓ |
| B | ✓ | x |
| C | x | ✓ |
| D | x | x |

key

✓ = function of the cilia

x = not a function of the cilia

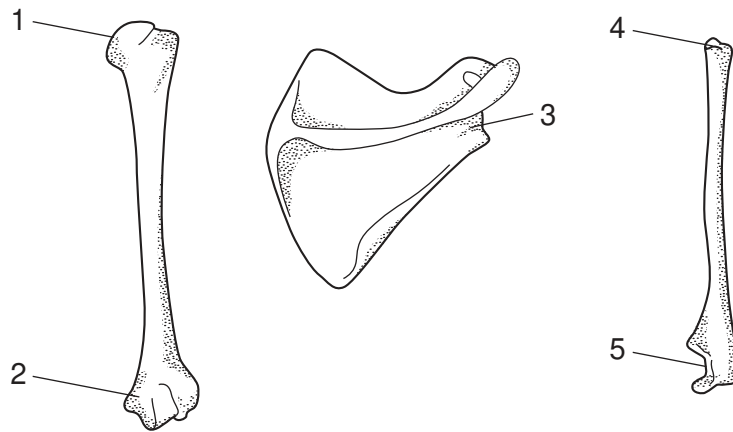
18 The diagram shows apparatus to investigate inspired and expired air. A person breathes in and out through tube **X**.



What are the carbon dioxide concentrations at **P** and **Q**?

| | CO ₂ at P (%) | CO ₂ at Q (%) |
|----------|---------------------------------|---------------------------------|
| A | 16 | 20 |
| B | 0.04 | 4.00 |
| C | 4.00 | 0.04 |
| D | 20 | 16 |

19 The diagram shows three bones from the forelimb of a mammal.



Between which parts is a ball and socket joint formed?

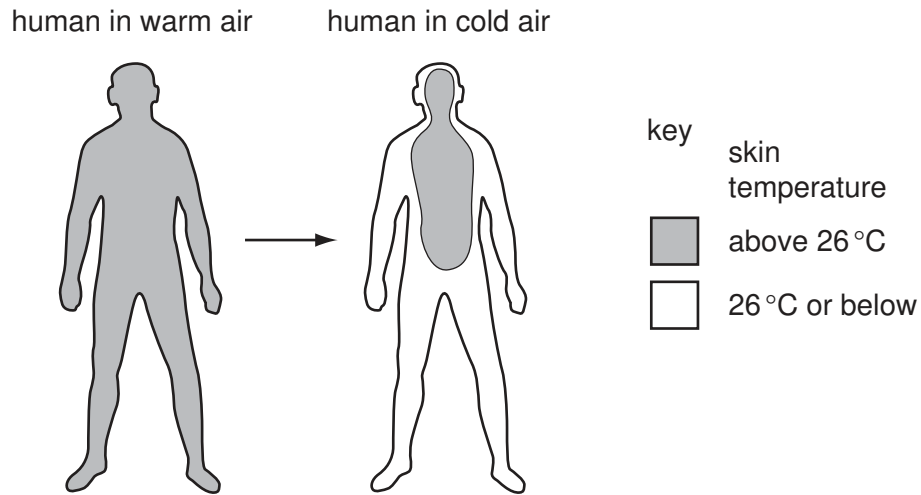
- A** 1 and 3 **B** 1 and 5 **C** 2 and 5 **D** 3 and 4

20 Urea is removed by the kidneys.

What is this process called?

- A** dialysis
B diffusion
C egestion
D excretion

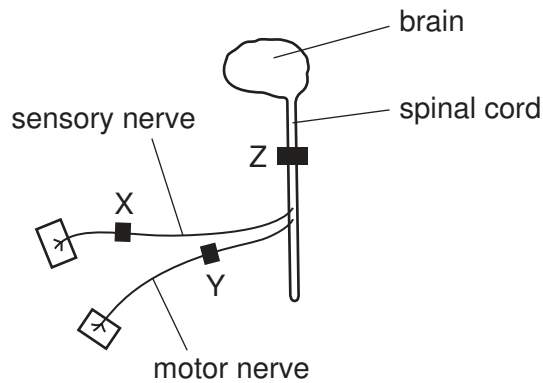
- 21 The diagram shows skin temperature of a human when exposed to warm air and then exposed to cold air.



What causes the observed change in skin temperature on exposure to cold air?

- A less blood flowing just below the skin
- B less blood going to the heart and lungs
- C more blood flowing just below the skin
- D more blood going to the heart and lungs

- 22 The diagram shows the central nervous system which has been blocked in three different places by a drug used as an anaesthetic.



Of four men, one had no anaesthetic block and the other three had only one anaesthetic block at X, Y or Z.

One of the men can move his leg in response to a pinprick, but does not feel it.

Where is the anaesthetic block?

- A block is at X
 - B block is at Y
 - C block is at Z
 - D no block
- 23 Which is a function of adrenalin?
- A to convert glycogen into glucose
 - B to decrease the breathing rate
 - C to increase the rate of peristalsis in the ileum
 - D to stimulate cells of the liver to take up glucose
- 24 What happens to these structures when focussing on an object near the eye?

| | ciliary muscles | suspensory ligaments |
|---|-----------------|----------------------|
| A | contract | tighter |
| B | contract | looser |
| C | relax | tighter |
| D | relax | looser |

25 Some drugs are listed.

- 1 alcohol
- 2 heroin
- 3 penicillin

Which of these drugs may be addictive, leading to possible withdrawal symptoms when their use is discontinued?

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

26 What do microorganisms release during the production of bread and cheese?

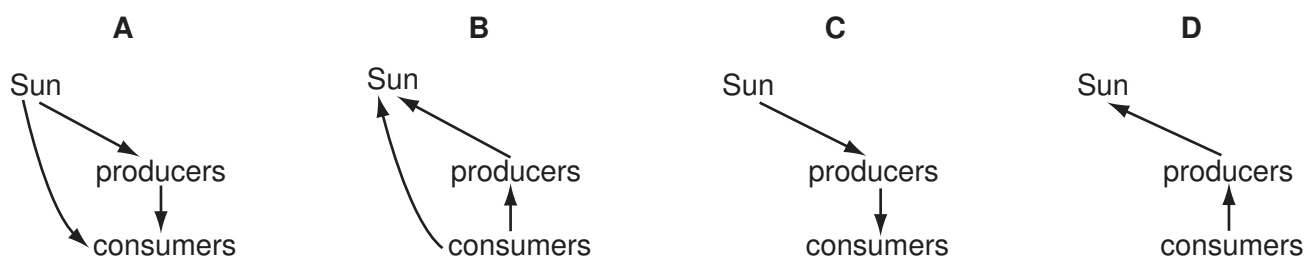
| | bread | cheese |
|----------|---------|---------|
| A | alcohol | acid |
| B | alcohol | alcohol |
| C | water | acid |
| D | water | alcohol |

27 New yoghurt can be made by adding a small amount of old yoghurt to some fresh, sterile milk.

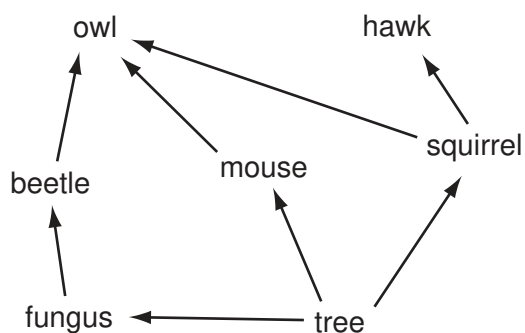
What does the old yoghurt provide that is essential for this process?

- A** bacteria
- B** protein
- C** sugar
- D** vitamins

28 Which diagram shows part of the energy flow in an ecosystem?



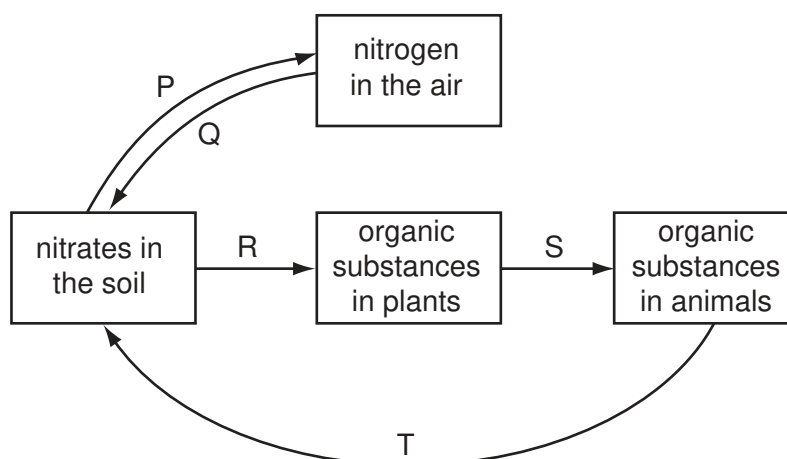
29 The diagram shows a food web.



Which of the organisms, shown in the food web, can survive by taking in only simple inorganic materials?

- A beetle
- B fungus
- C owl
- D tree

30 The diagram shows part of the nitrogen cycle.



Which stages involve bacteria?

- A P, Q and T
- B P, R and S
- C Q, S and T
- D R, S and T

31 Some samples are taken from a human patient.

Which sample could be examined to find out whether the patient is infected with the malarial parasite?

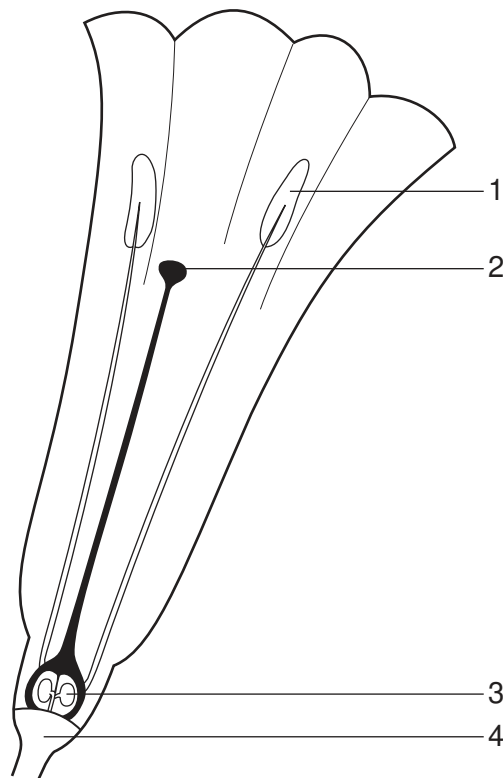
- A red blood cells
- B saliva
- C urine
- D white blood cells

32 Many rivers are becoming clogged up by rapidly growing plants due to high levels of soluble nitrates.

Which is the main source of these nitrates?

- A decay of animals
- B denitrification by bacteria
- C drainage of fertilisers
- D pollution from the atmosphere

33 The diagram shows a section through a flower.



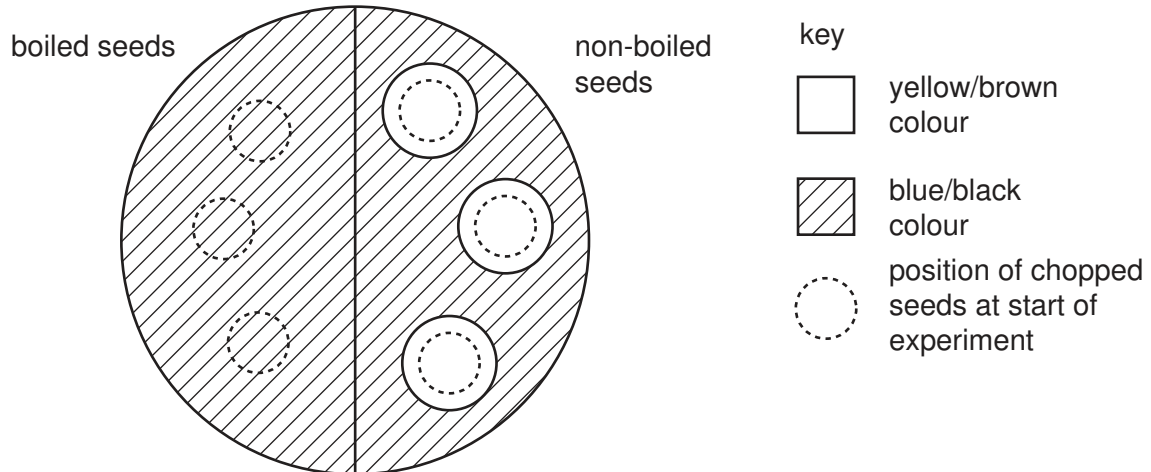
In which structures are haploid nuclei formed by reduction division?

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

- 34** Six bean seeds were soaked in water for 24 hours. Three of them were then boiled and cooled. The boiled and the non-boiled seeds were separately chopped up and then placed on the surface of agar jelly containing starch.

After two days, all the seeds were removed and the jelly was flooded with iodine solution.

The diagram shows the result of the experiment.



What is the explanation for the results with the non-boiled bean seeds?

- A** They absorb iodine.
 - B** They absorb starch.
 - C** They contain acid.
 - D** They contain amylase.
- 35** Which method of contraception is the most effective in preventing the spread of diseases such as syphilis and HIV / AIDS?
- A** cervical caps / diaphragms
 - B** male condoms
 - C** oral contraceptive pills
 - D** spermicides
- 36** What would be the result of cutting the sperm ducts on the right and left sides in a man?
- A** He would become sterile.
 - B** He would be unable to develop sperms.
 - C** He would be unable to pass urine.
 - D** Male sex hormones would no longer circulate in the blood.

37 The inheritance of the ABO blood groups depends on three alleles I^A , I^B and I^o .

I^A and I^B are codominant, I^o is recessive.

What are the possible genotypes for a man of blood group A?

- A $I^A I^A$ only
- B $I^A I^A$, and $I^A I^B$ only
- C $I^A I^A$, and $I^A I^o$ only
- D $I^A I^A$, $I^A I^o$ and $I^A I^B$

38 Which statement is true of a dominant allele?

- A It cannot undergo mutation.
- B It gives a greater chance of survival than a recessive allele.
- C It gives the same phenotype in heterozygotes and homozygotes.
- D It is only responsible for male characteristics.

39 What determines the sex of a child?

- A chromosome content of the ovum
- B chromosome content of the sperm
- C number of days between ovulation and fertilisation
- D number of days between fertilisation and implantation

40 A homozygous short-winged fly is crossed with a homozygous long-winged fly.

Which phenotypic ratio would result?

- A 1:1 B 1:2:1 C 3:1 D all similar

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