



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
General Certificate of Education Ordinary Level

**SCIENCE (PHYSICS, BIOLOGY)**

**5125/01**

Paper 1 Multiple Choice

**October/November 2011**

**1 hour**

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

\* 8 1 0 8 2 4 0 2 4 1 \*

**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.

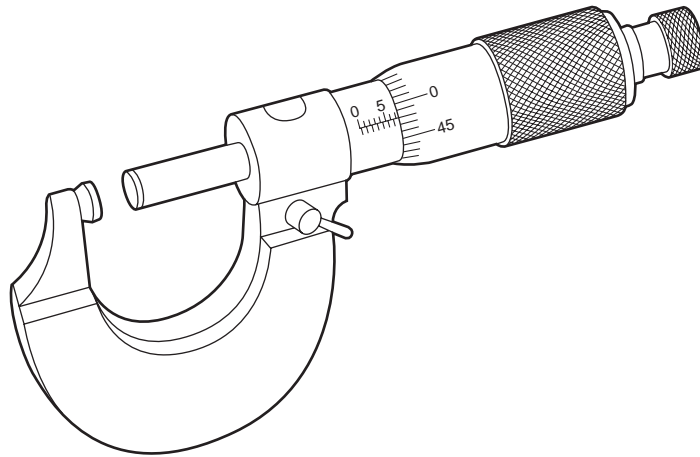
**Read the instructions on the Answer Sheet very carefully.**

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 The diagram shows an instrument used in Physics.



What is the name of this instrument and what is it used to measure?

|          | name       | used to measure |
|----------|------------|-----------------|
| <b>A</b> | calipers   | length          |
| <b>B</b> | calipers   | pressure        |
| <b>C</b> | micrometer | length          |
| <b>D</b> | micrometer | pressure        |

- 2 Which car, moving from rest, has an average acceleration of  $2.0 \text{ m/s}^2$ ?

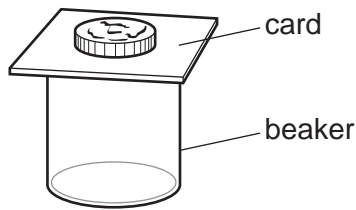
- A** a car reaching a speed of  $10 \text{ m/s}$  in  $2 \text{ s}$
- B** a car reaching a speed of  $20 \text{ m/s}$  in  $5 \text{ s}$
- C** a car reaching a speed of  $30 \text{ m/s}$  in  $10 \text{ s}$
- D** a car reaching a speed of  $40 \text{ m/s}$  in  $20 \text{ s}$

- 3 A force is applied to an object on a frictionless surface. It produces an acceleration of  $3 \text{ m/s}^2$ .

What are possible values for the applied force and for the mass of the object?

|          | force / N | mass / kg |
|----------|-----------|-----------|
| <b>A</b> | 2         | 5         |
| <b>B</b> | 2         | 6         |
| <b>C</b> | 5         | 2         |
| <b>D</b> | 6         | 2         |

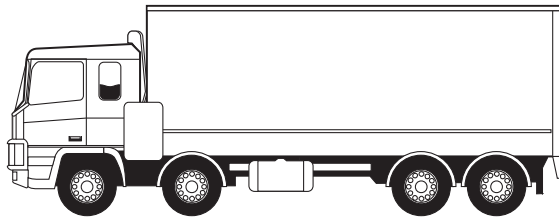
- 4 A coin is placed on top of a beaker, as shown.



If the card is pulled away quickly, the coin does not move sideways but falls into the beaker.

Which property of the coin makes this possible?

- A density
  - B inertia
  - C thickness
  - D volume
- 5 The diagram shows a lorry.

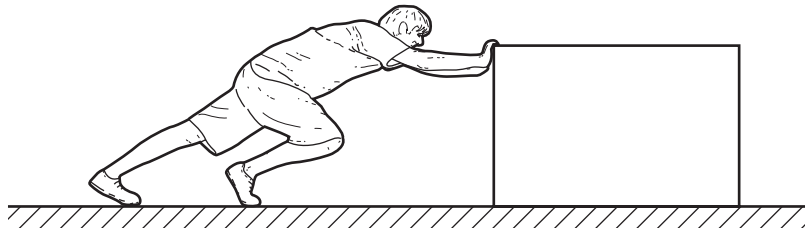


What is the best position for its centre of mass and why is it placed there?

|   | best position       | reason for the position               |
|---|---------------------|---------------------------------------|
| A | as high as possible | the lorry can accelerate more rapidly |
| B | as high as possible | the lorry is more stable              |
| C | as low as possible  | the lorry can accelerate more rapidly |
| D | as low as possible  | the lorry is more stable              |

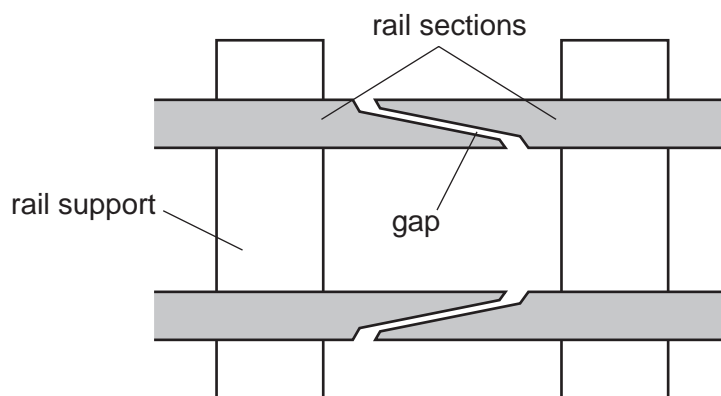
- 6 In an energy transformation sequence, what produces kinetic energy from gravitational potential energy as part of the sequence?
- A burning fuel in a power station
  - B generating hydroelectric energy
  - C generating energy in a nuclear power station
  - D generating energy in a geothermal power station

- 7 A man pushes a heavy box across a floor. He exerts a force of 80 N and the box moves 4.0 m in 5.0 seconds.



What useful power does the man develop?

- A** 4.0W      **B** 64W      **C** 100W      **D** 1600W
- 8 Which property is essential to a clinical thermometer?
- A** It contains mercury.  
**B** It has a constriction in its bore.  
**C** It has a range of 40 °C.  
**D** It is accurate to 0.001 °C.
- 9 At regular intervals along a railway line there is a gap between the rail sections.



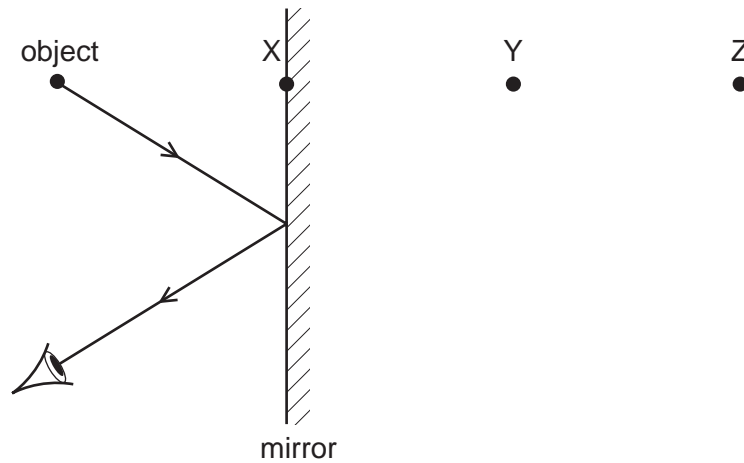
What is the reason for the gap between the rail sections?

- A** to allow for expansion of the rail sections during hot weather  
**B** to allow for vibrations of the rail sections as the train passes over them  
**C** to allow rain water to drain from the rail sections  
**D** to keep the wheels of the train and carriages on the rail sections
- 10 A VHF radio station broadcasts at a frequency of 60 MHz ( $6.0 \times 10^7$  Hz). The speed of radio waves is  $3.0 \times 10^8$  m/s.

What is the wavelength of the waves broadcast by the station?

- A** 5.0m      **B** 2.0m      **C** 0.5m      **D** 0.2m

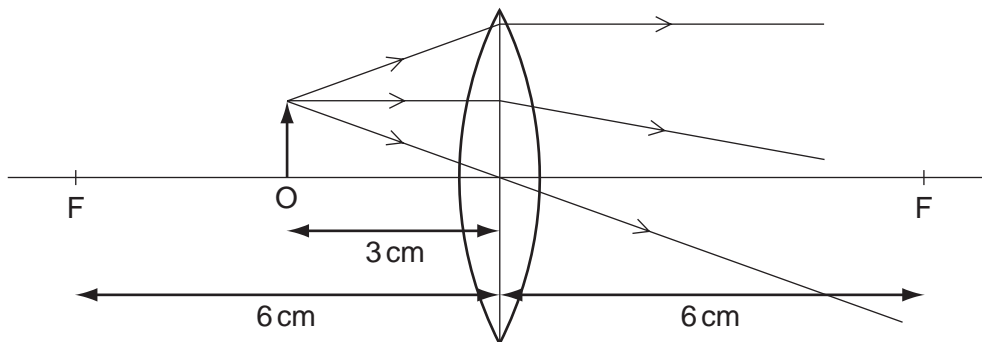
11 The diagram shows the reflection of a ray of light from an object in a plane mirror.



Which statement is correct?

- A The image is at X.
- B The image is between X and Y.
- C The image is at Y.
- D The image is between Y and Z.

12 The diagram shows an object O placed 3 cm away from a converging lens of focal length 6 cm.



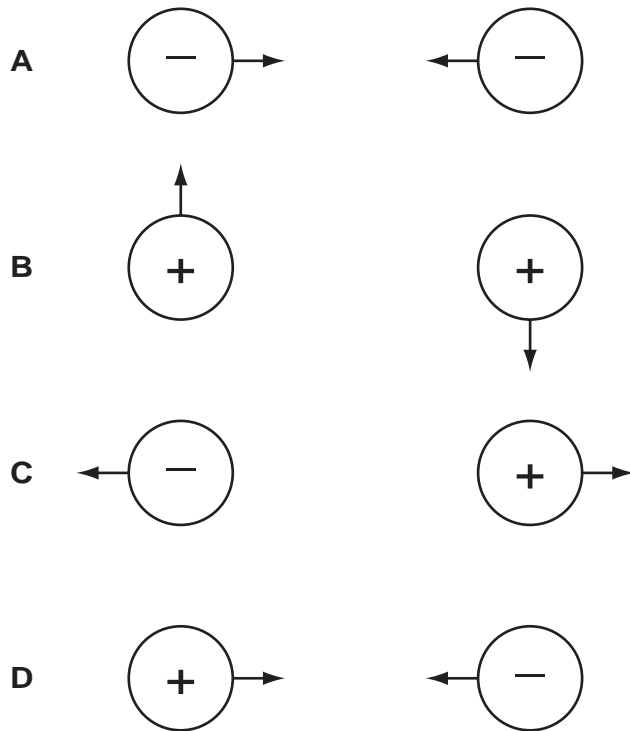
What type of image is produced?

- A real, upright and diminished
- B real, inverted and magnified
- C virtual, upright and magnified
- D virtual, inverted and diminished

13 What is an approximate value of the speed of sound in air under normal atmospheric conditions?

- A  $3 \times 10^8 \text{ cm/s}$
- B  $3 \times 10^6 \text{ cm/s}$
- C  $3 \times 10^4 \text{ cm/s}$
- D  $3 \times 10^2 \text{ cm/s}$

14 Which diagram correctly shows the directions of the electrostatic forces on a pair of charged spheres?



15 A conductor carries a current of 2.0 A.

How long does it take for 10 C of charge to pass one point in the conductor?

- A 0.20 s
- B 5.0 s
- C 12 s
- D 20 s

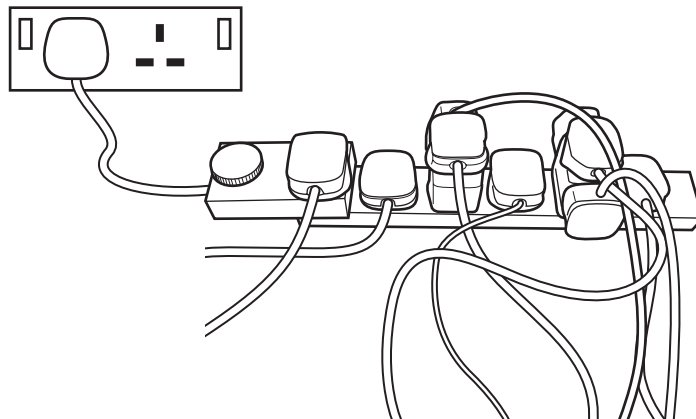
16 A constant-voltage source is connected to a resistor which has a current  $I$  through it.

Two more identical resistors are then added in series with the first.

What is the current now?

- A  $\frac{I}{4}$
- B  $\frac{I}{3}$
- C  $I$
- D  $3I$

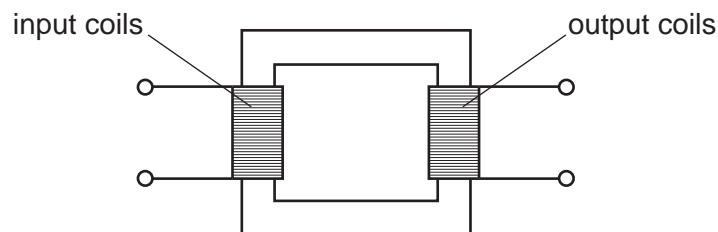
17 The diagram shows an unsafe use of an extension cable.



What is the electrical hazard?

- A the danger of burning out the appliances
- B the danger of melting the fuse
- C the danger of overheating the cable
- D the danger of the appliances not being earthed

18 The transformer in the diagram has an input coil with  $N_i$  turns and an output coil with  $N_o$  turns.



The output voltage needs to be lower than the input voltage.

What is needed for the transformer to work correctly?

|          | input supply | relative values of $N_i$ and $N_o$ |
|----------|--------------|------------------------------------|
| <b>A</b> | a.c.         | $N_i > N_o$                        |
| <b>B</b> | a.c.         | $N_i < N_o$                        |
| <b>C</b> | d.c.         | $N_i > N_o$                        |
| <b>D</b> | d.c.         | $N_i < N_o$                        |

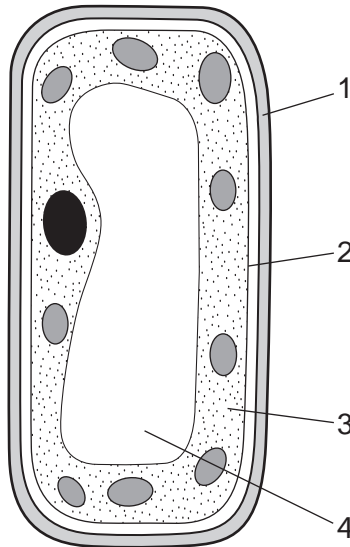
19 What is the relationship between the number of electrons, neutrons and protons in a neutral atom of  $^{14}_6\text{C}$ ? ( $n$  = number of neutrons,  $p$  = number of protons,  $e$  = number of electrons)

- A  $n > p, p = e$
- B  $n = p, p > e$
- C  $n = p, p < e$
- D  $n < p, p = e$

20 When a radioactive nucleus decays by alpha-particle emission, it loses

- A 1 proton and 1 electron.
- B 1 proton only.
- C 2 protons and 2 electrons.
- D 2 protons and 2 neutrons.

21 The diagram shows a plant cell.



Which structures are the cell membrane, cell wall and cytoplasm?

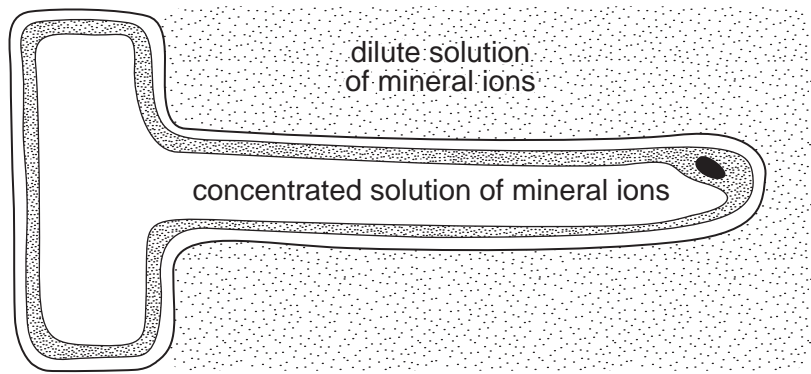
|          | cell membrane | cell wall | cytoplasm |
|----------|---------------|-----------|-----------|
| <b>A</b> | 1             | 2         | 3         |
| <b>B</b> | 1             | 2         | 4         |
| <b>C</b> | 2             | 1         | 3         |
| <b>D</b> | 2             | 1         | 4         |

22 A mature xylem vessel has

- A a cell wall only.
- B a cell wall and cytoplasm only.
- C a cell membrane, cytoplasm and a nucleus.
- D cytoplasm, a cell wall and a nucleus.



23 The diagram shows a root hair, surrounded by a dilute solution of mineral ions.

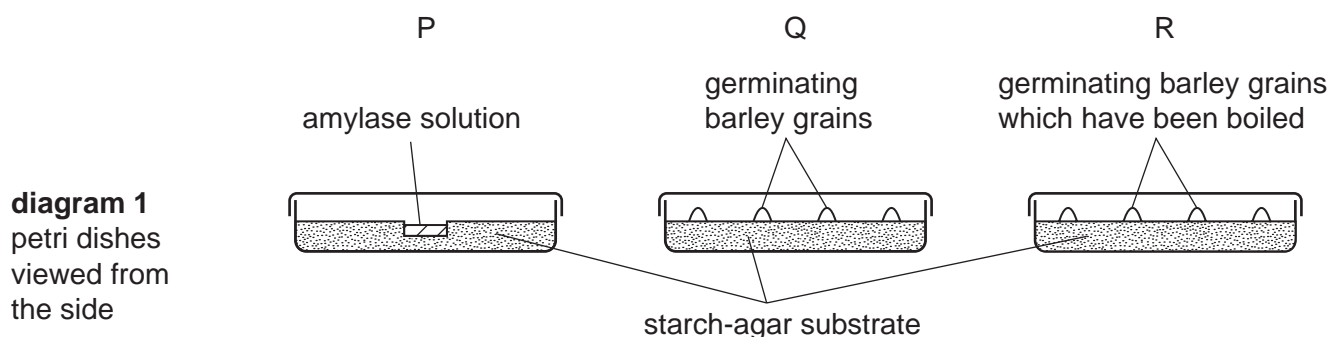


Which statement describes what happens?

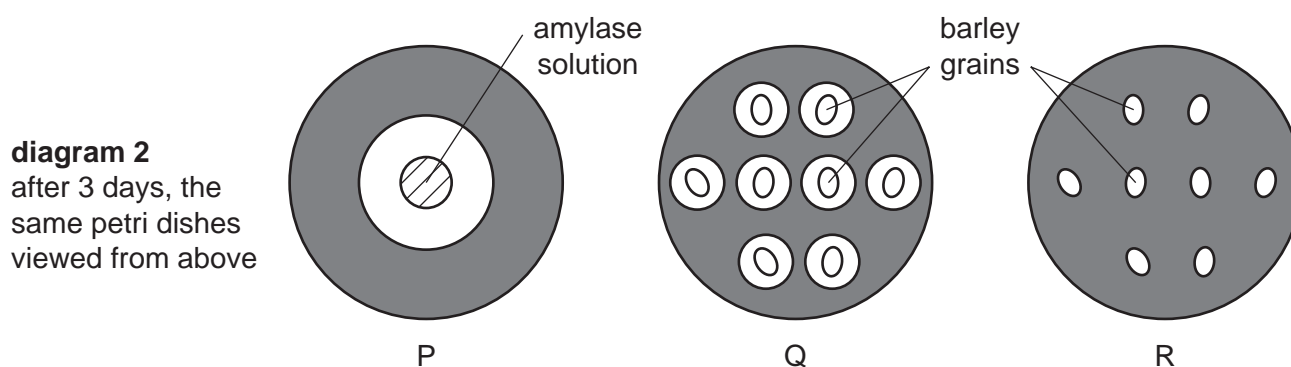
- A Water molecules move into the root hair because their concentration is lower inside.
- B Water molecules move into the root hair because their concentration is lower outside.
- C Water molecules move out of the root hair because their concentration is lower inside.
- D Water molecules move out of the root hair because their concentration is lower outside.

24 An experiment is performed to investigate the germination of barley grains, as follows.

- Three petri dishes are set up as shown in diagram 1.
- The dishes are left for 3 days.
- Iodine solution is added to the starch-agar substrate.



The results are shown in diagram 2. The shaded areas went blue-black.



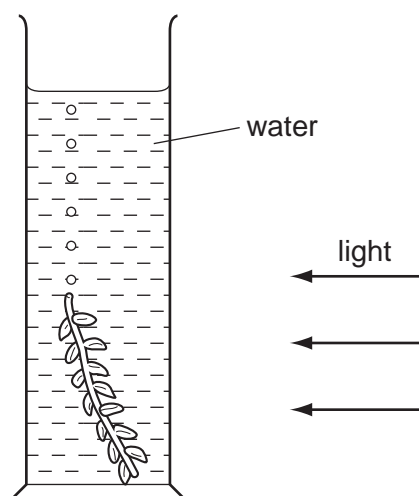
Which is the **best** explanation of the results?

- A** Amylase is produced by barley grains that have been boiled.
- B** Amylase from barley grains is destroyed when they are boiled.
- C** Germinating grains prevent iodine from staining starch blue/black.
- D** Starch from the substrate is used by the grains as an energy source.

25 Where and how does carbon dioxide enter a plant?

|          | where           | how       |
|----------|-----------------|-----------|
| <b>A</b> | root hair cells | osmosis   |
| <b>B</b> | root hair cells | diffusion |
| <b>C</b> | stomata         | osmosis   |
| <b>D</b> | stomata         | diffusion |

- 26 The diagram shows a photosynthesising water plant. The rate of photosynthesis is measured by bubbles of gas released.



After a few minutes the bubbles cease.

Which factor in the water might be limiting the rate of photosynthesis?

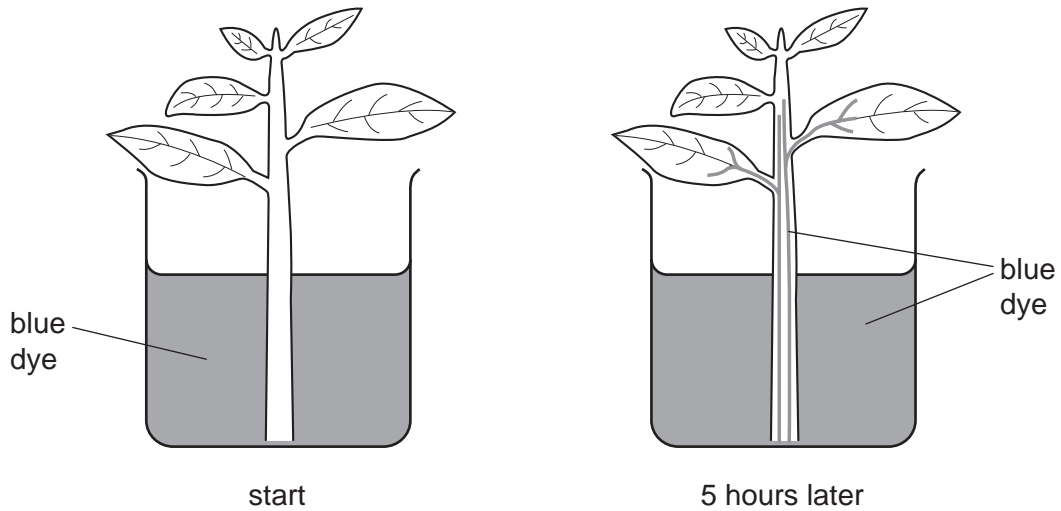
- A carbon dioxide  
 B nitrate  
 C oxygen  
 D water
- 27 To investigate whether bacteria in the mouth produce acids, a student
- rubbed two pieces of sterile cotton wool on his teeth,
  - dipped only one of these pieces into finely powdered sugar,
  - left both pieces in separate petri dishes for thirty minutes,
  - covered both pieces with Universal Indicator solution.

[Universal Indicator solution colours: above pH 7, dark green to blue; pH 6-7, green; below pH 6, yellow to red]

Which colours will be observed at the end of the experiment?

|          | sample dipped into sugar | sample not dipped into sugar |
|----------|--------------------------|------------------------------|
| <b>A</b> | green                    | green                        |
| <b>B</b> | green                    | red                          |
| <b>C</b> | red                      | green                        |
| <b>D</b> | red                      | red                          |

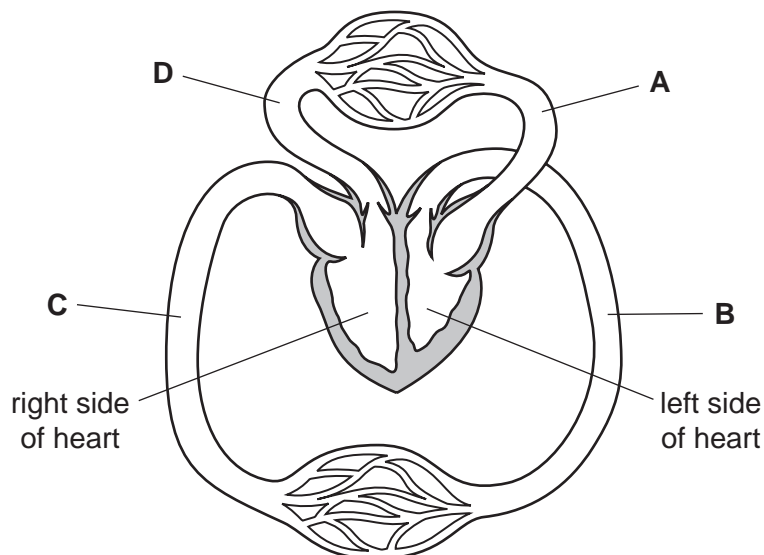
- 28 A plant shoot with a transparent stem was placed in a beaker containing a blue dye and then examined 5 hours later.



Which statement explains the change in appearance?

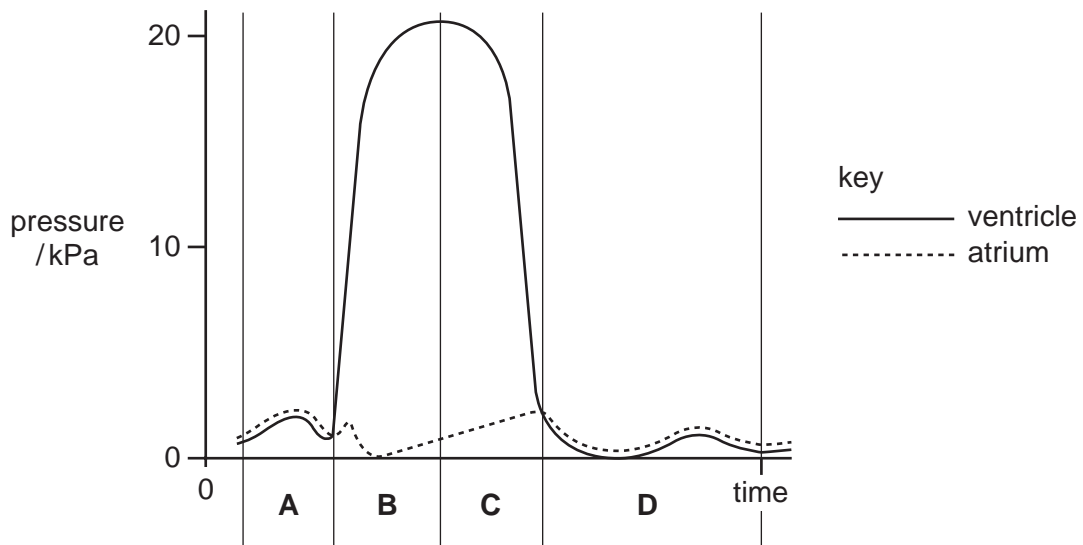
- A Blue dye diffuses through the cells of the plant.
  - B Blue dye diffuses up the stem by osmosis.
  - C Blue dye moves up through the phloem.
  - D Blue dye moves up through the xylem.
- 29 The diagram represents part of the human circulatory system.

Where is the blood pressure highest?



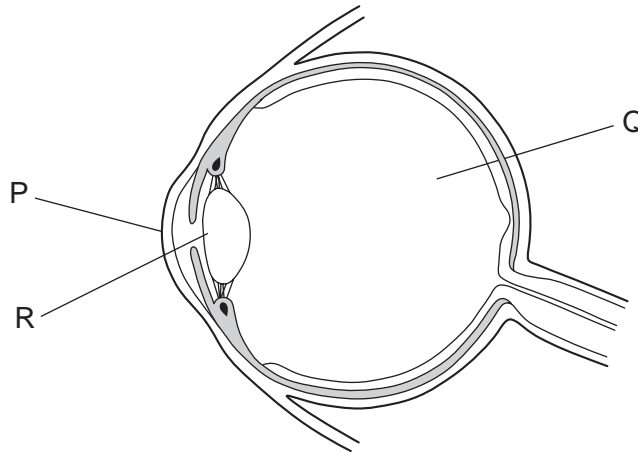
- 30 The graph shows pressure changes in the left ventricle and the left atrium (auricle) as the heart beats.

When is the ventricle contracting?



- 31 Which equation represents anaerobic respiration in yeast?
- A** glucose  $\rightarrow$  alcohol + carbon dioxide  
**B** glucose  $\rightarrow$  alcohol + water  
**C** glucose  $\rightarrow$  lactic acid + carbon dioxide  
**D** glucose  $\rightarrow$  lactic acid + water
- 32 What is the excretory product in blood that is removed by the lungs?
- A** carbon dioxide  
**B** lactic acid  
**C** urea  
**D** water

33 The diagram shows a section through a human eye.



The eye produces an image by refracting (bending) light onto the retina.

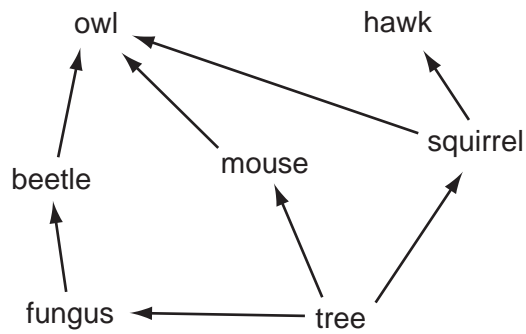
How much of this refraction is created by the parts P, Q and R?

|          | most refraction | some refraction | no refraction |
|----------|-----------------|-----------------|---------------|
| <b>A</b> | P               | Q               | R             |
| <b>B</b> | P               | R               | Q             |
| <b>C</b> | R               | P               | Q             |
| <b>D</b> | R               | Q               | P             |

34 What is the **best** way to discover whether a bacterium would be destroyed by penicillin?

- A** Compare the growth of the bacterium in a nutrient medium with the growth of a similar but non-pathogenic bacterium.
- B** Grow the bacterium in a nutrient medium and observe the effect of adding penicillin.
- C** Inoculate a person with the bacterium and then observe the effect of the treatment with penicillin.
- D** Treat an infected person with another antibiotic and observe the result.

35 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

36 Which processes occur during the carbon cycle?

|          | carbon compounds absorbed by living organisms | carbon compounds excreted by living organisms |
|----------|---|---|
| <b>A</b> | ✓   | ✓   |
| <b>B</b> | ✓   | ✗   |
| <b>C</b> | ✗   | ✓   |
| <b>D</b> | ✗   | ✗   |

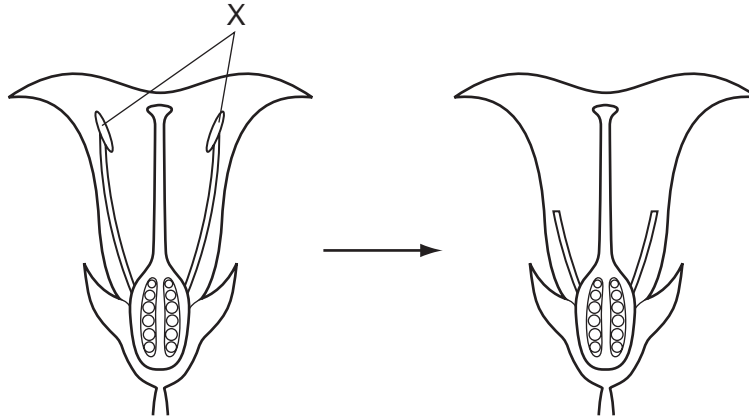
37 Cutting down large areas of tropical forest can lead to a reduction in rainfall.

What is the reason for the reduction in rainfall?

- A a reduction in photosynthesis
- B a reduction in transpiration
- C an increase in flooding
- D an increase in respiration

38 The diagram shows a flower in longitudinal section.

Before they had developed fully, a plant breeder removed the structures labelled X, as shown.



What is the effect of removing these structures?

- A It prevents asexual reproduction.
  - B It prevents the flower from being pollinated.
  - C It prevents the flower from producing seeds.
  - D It prevents the flower from pollinating itself.
- 39 What is a method of preventing the spread of HIV?
- A avoiding sharing cups for drinking
  - B checking blood before transfusions
  - C taking the contraceptive pill
  - D using spermicides
- 40 Which two characteristics both show continuous variation?
- A height and weight
  - B sex and sickle-cell anaemia
  - C sickle-cell anaemia and height
  - D weight and sex