

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
General Certificate of Education Ordinary Level

**ADDITIONAL COMBINED SCIENCE**

**5130/01**

Paper 1 Multiple Choice

October/November 2004

**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.

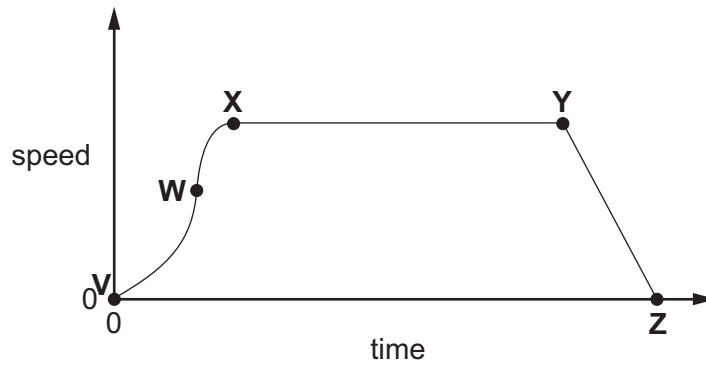
Any rough working should be done in this booklet.

A copy of the Periodic Table is included on page 20.

This document consists of **18** printed pages and **2** blank pages.



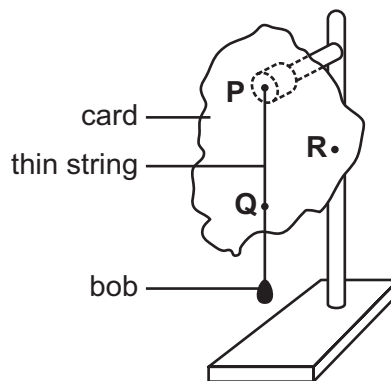
- 1 The diagram shows a speed-time graph.



In which region is the acceleration decreasing?

- A V to W
  - B W to X
  - C X to Y
  - D Y to Z
- 2 The diagram shows a step in an experiment to determine the position of the centre of mass of a thin card.

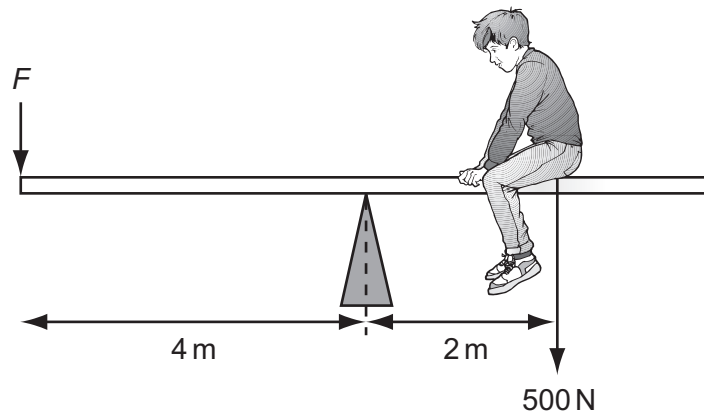
A pencil line is drawn between **P** and **Q**.



What is the next step in this experiment?

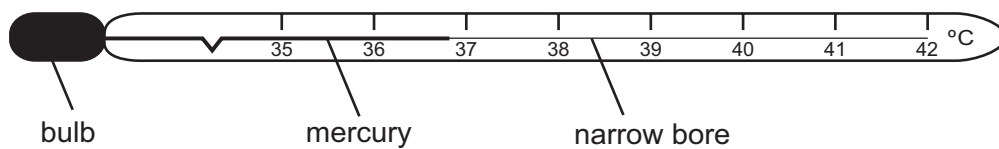
- A Find the mid-point of **PQ**.
- B Hang the card from point **R**.
- C Measure the mass of the card.
- D Measure the thickness of the card.

- 3 The diagram shows a boy weighing 500 N sitting on a see-saw. He sits 2 m from the pivot.



What is the force  $F$  needed to balance the see-saw?

- A 250 N  
 B 750 N  
 C 1000 N  
 D 3000 N
- 4 Which quantity is calculated by multiplying the magnitude of a force by the distance moved in the direction of the force?
- A acceleration  
 B power  
 C pressure  
 D work
- 5 The diagram shows a clinical thermometer.



Why does the stem have a very narrow bore?

- A to increase the temperature range measured  
 B to improve its sensitivity  
 C to prevent mercury returning to the bulb  
 D to reduce the amount of mercury used

- 6 A wave has a frequency of 10 kHz.

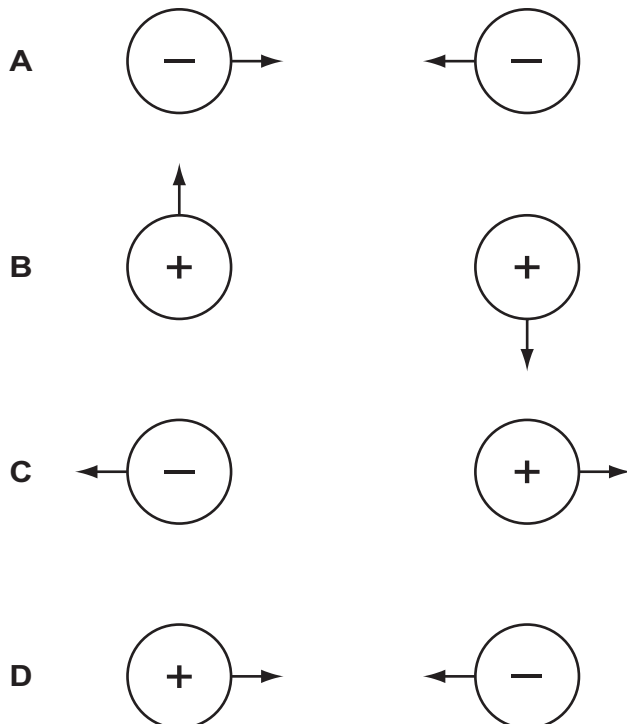
What are the possible values of its velocity and wavelength?

|          | velocity in m/s | wavelength in m |
|----------|-----------------|-----------------|
| <b>A</b> | 330             | 0.33            |
| <b>B</b> | 330             | 33              |
| <b>C</b> | $3 \times 10^8$ | 30              |
| <b>D</b> | $3 \times 10^8$ | $3 \times 10^4$ |

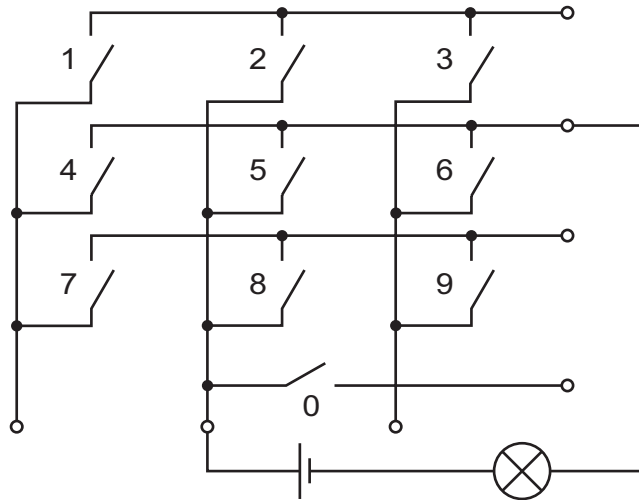
- 7 In which situation could sound waves **not** travel

- A** between two spaceships in space
- B** from a surface ship to a submarine
- C** from inside a diving chamber to a microphone in water outside
- D** through a balloon filled with helium gas

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

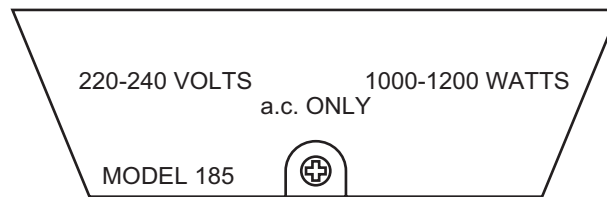


- 9 A student tests the circuit of a press-button telephone with a bulb and a battery.



Which single switch can be pressed to make the bulb light?

- A** 0                      **B** 1                      **C** 5                      **D** 6
- 10 The diagram shows the information given on an electric iron.

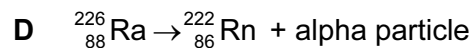
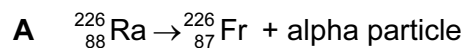


If electricity costs 7 cents per unit, what is the cost of using this iron at maximum power for 10 hours?

- A** 17 cents              **B** 70 cents              **C** 84 cents              **D** 220 cents
- 11 Which particles are emitted by the hot filament of a cathode ray oscilloscope and which type of field is used to accelerate them?

|          | particles | type of field |
|----------|-----------|---------------|
| <b>A</b> | electrons | electric      |
| <b>B</b> | electrons | magnetic      |
| <b>C</b> | protons   | electric      |
| <b>D</b> | protons   | magnetic      |

12 Which of the following equations represents the decay of the nuclide  ${}^{226}_{88}\text{Ra}$  by the emission of an alpha particle?



13 A nucleus of the element cobalt may be represented by the symbol  ${}^{59}_{27}\text{Co}$ .

What is the structure of a neutral atom of cobalt?

|          | number of protons | number of neutrons | number of electrons |
|----------|-------------------|--------------------|---------------------|
| <b>A</b> | 27                | 59                 | 27                  |
| <b>B</b> | 59                | 27                 | 59                  |
| <b>C</b> | 27                | 32                 | 27                  |
| <b>D</b> | 59                | 32                 | 59                  |

14 Solution **X** contains a simple salt.

The table shows the results of some tests on solution **X**.

| test                                 | result of test          |
|--------------------------------------|-------------------------|
| addition of aqueous sodium hydroxide | green precipitate forms |
| addition of acidified barium nitrate | white precipitate forms |

What is the name of the salt in solution **X**?

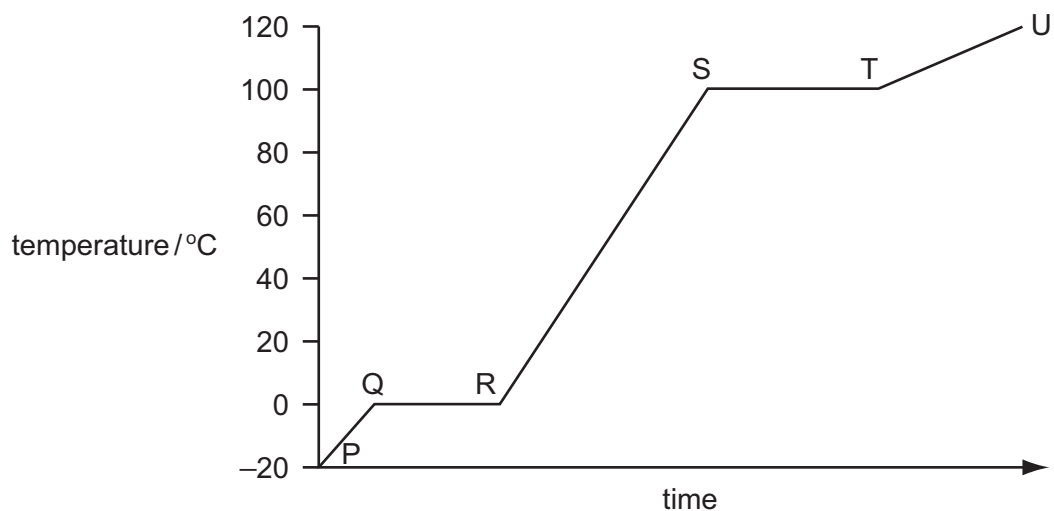
**A** copper(II) carbonate

**B** copper(II) chloride

**C** iron(II) sulphate

**D** iron(III) sulphate

15 The graph shows the change in temperature with time when ice at  $-20^{\circ}\text{C}$  is heated to  $120^{\circ}\text{C}$ .



Which entry in the table shows the correct change taking place between the points?

|          | points | change                                       |
|----------|--------|--|
| <b>A</b> | P to Q | average energy of particles remains constant |
| <b>B</b> | Q to R | ice melting                                  |
| <b>C</b> | S to T | average energy of particles increasing       |
| <b>D</b> | T to U | water boiling                                |

16 The table gives data about three different particles.

| particle         | nucleon number | number of protons | number of neutrons | number of electrons |
|------------------|----------------|-------------------|--------------------|---------------------|
| $\text{Al}$      | 27             | 13                | <b>X</b>           | 13                  |
| $\text{F}^-$     | 19             | <b>Y</b>          | 10                 | 10                  |
| $\text{Mg}^{2+}$ | 24             | 12                | 12                 | <b>Z</b>            |

What are the correct values of **X**, **Y** and **Z**?

|          | <b>X</b> | <b>Y</b> | <b>Z</b> |
|----------|----------|----------|----------|
| <b>A</b> | 13       | 9        | 10       |
| <b>B</b> | 13       | 10       | 12       |
| <b>C</b> | 14       | 10       | 12       |
| <b>D</b> | 14       | 9        | 10       |

17 Which substance does **not** have a macromolecular structure?

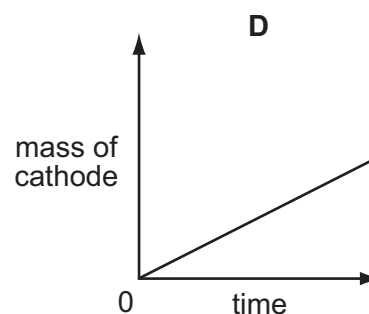
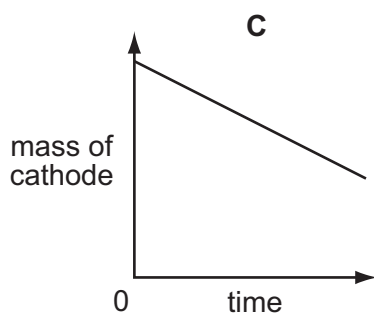
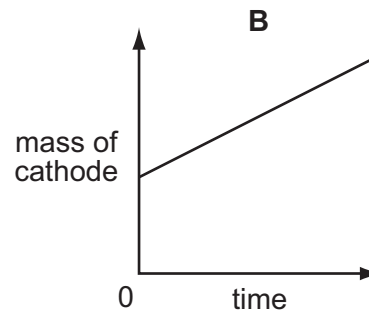
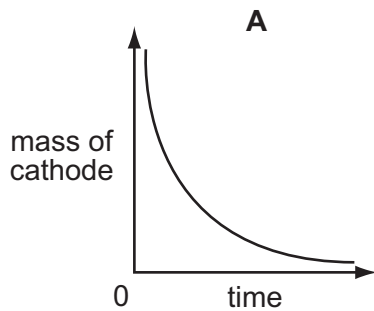
- A diamond
- B graphite
- C silicon(IV) oxide (silica)
- D sodium chloride

18 Which solution of sodium chloride has the greatest concentration?

- A 0.10 mol NaCl in 0.10 dm<sup>3</sup> of solution
- B 0.10 mol NaCl in 1.00 dm<sup>3</sup> of solution
- C 0.01 mol NaCl in 100 cm<sup>3</sup> of solution
- D 0.01 mol NaCl in 1000 cm<sup>3</sup> of solution

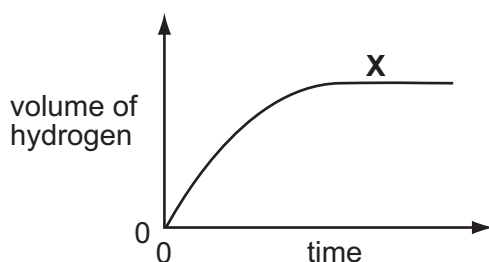
19 Aqueous copper(II) sulphate is electrolysed using copper electrodes. The current is constant and the cathode (negative electrode) is weighed at regular intervals.

Which graph is obtained when the mass of the cathode is plotted against time?





- 20 Zinc reacts with an excess of dilute sulphuric acid. The graph shows how the volume of hydrogen given off changes with time.



Why is the graph horizontal at **X**?

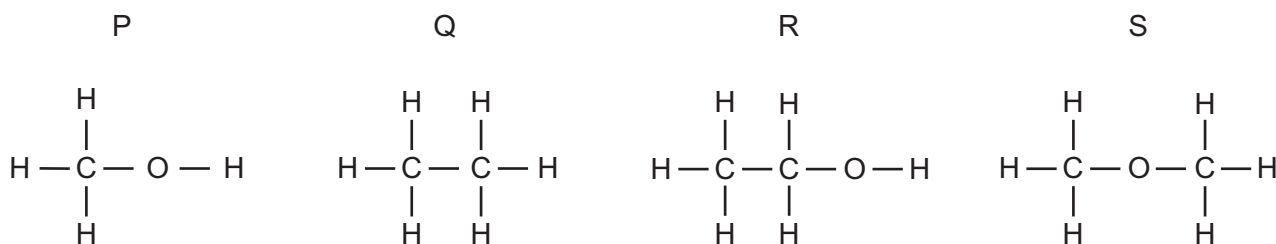
- A** All the sulphuric acid has reacted.
- B** All the zinc has reacted.
- C** Hydrogen is being produced at a constant rate.
- D** The reaction is beginning to slow down.
- 21 A sample of pond water has a pH value of 9.
- This means that the water is
- A** weakly acidic.
- B** neutral.
- C** weakly alkaline.
- D** strongly alkaline.
- 22 Which substance removes impurities from iron ore in the blast furnace?
- A** carbon
- B** limestone
- C** sand
- D** slag
- 23 Which three compounds, when mixed for use as a fertiliser, provide the three essential elements needed for plant growth?

|          | 1                 | 2                 | 3                  |
|----------|-------------------|-------------------|--------------------|
| <b>A</b> | ammonium nitrate  | calcium phosphate | potassium chloride |
| <b>B</b> | ammonium nitrate  | calcium phosphate | sodium nitrate     |
| <b>C</b> | ammonium sulphate | calcium hydroxide | potassium chloride |
| <b>D</b> | ammonium sulphate | sodium nitrate    | potassium chloride |

24 Which process would remove **all** the impurities from impure water?

- A chlorination
- B distillation
- C filtration
- D neutralisation

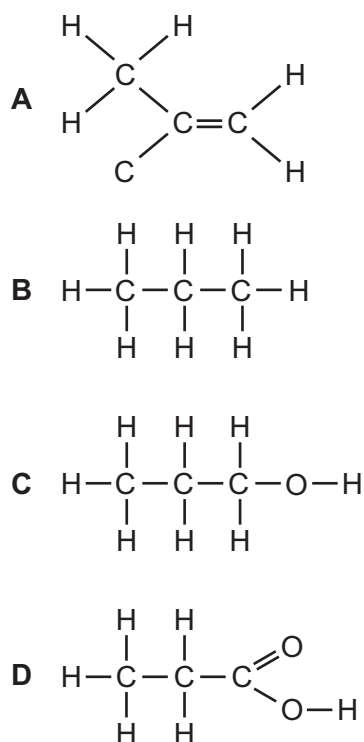
25 The diagrams show the structures of four organic molecules.



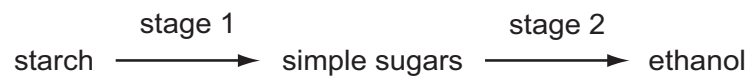
Which two are members of the same homologous series?

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

26 Which of the following will decolourise aqueous bromine?



27 Ethanol is produced from starch as follows

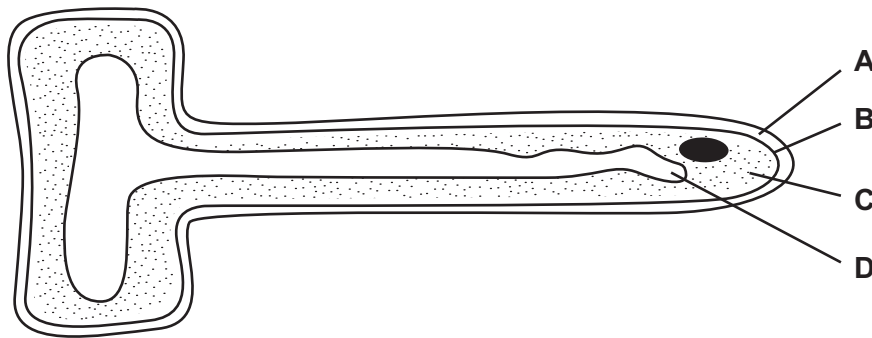


Which terms are used to describe these two stages?

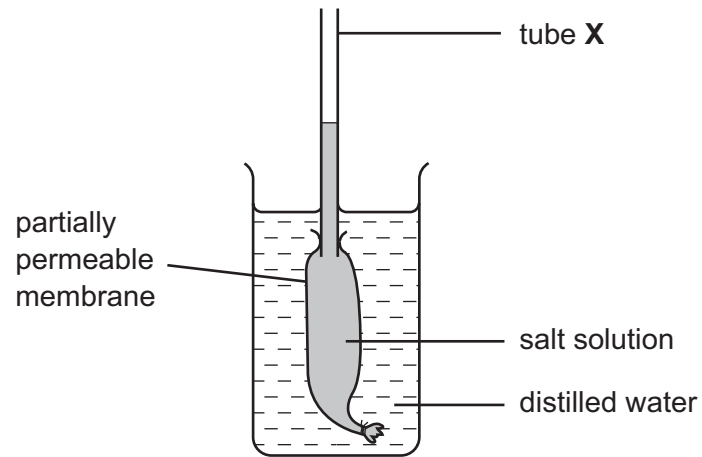
|          | stage 1        | stage 2      |
|----------|----------------|--------------|
| <b>A</b> | cracking       | oxidation    |
| <b>B</b> | fermentation   | distillation |
| <b>C</b> | hydrolysis     | fermentation |
| <b>D</b> | polymerisation | hydrolysis   |

28 The diagram shows a root hair cell.

Which structure controls the uptake of nitrate ions into the cell?



29 An experiment to investigate osmosis is set up as shown.

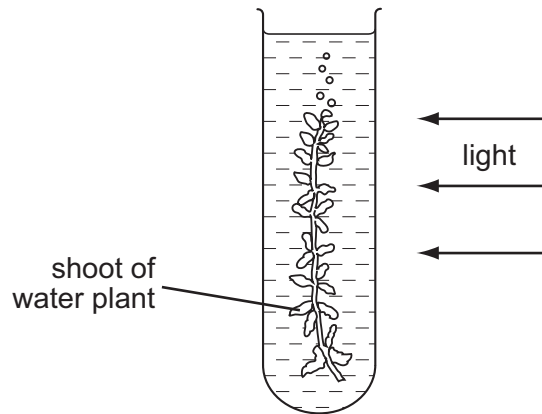


What happens to the volume of the liquid in tube **X** and the concentration of the salt solution?

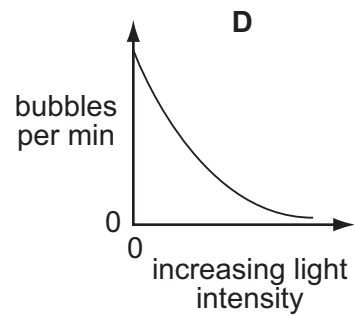
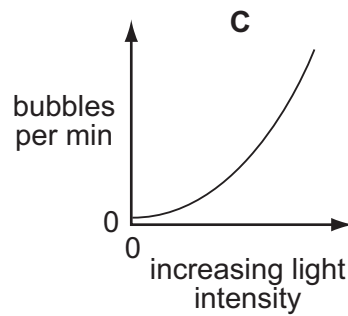
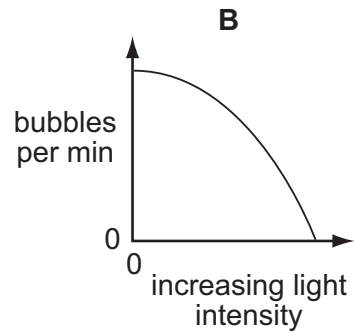
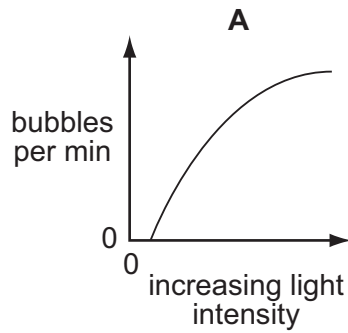
|          | volume of the liquid in tube <b>X</b> | concentration of salt solution |
|----------|---------------------------------------|--------------------------------|
| <b>A</b> | decreases                             | decreases                      |
| <b>B</b> | decreases                             | increases                      |
| <b>C</b> | increases                             | decreases                      |
| <b>D</b> | increases                             | increases                      |

- 30 The diagram shows an investigation into the effect of the intensity of light on the rate of photosynthesis. The rate is measured by counting the number of bubbles released per minute.

The experiment is repeated using different light intensities.



Which graph shows the result of the investigation?

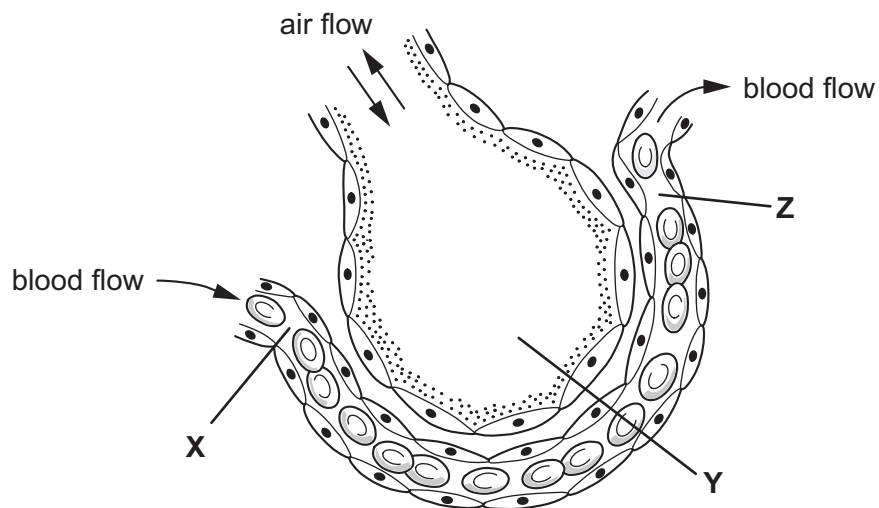


- 31 The table shows the recommended daily intake of energy and of iron for females at four different ages: 6 months, 5 years, 25 years and 75 years.

Which shows the recommended daily intake for the 25 year old?

|          | energy / MJ | iron / mg |
|----------|-------------|-----------|
| <b>A</b> | 2.7         | 4.3       |
| <b>B</b> | 6.5         | 6.1       |
| <b>C</b> | 7.6         | 8.7       |
| <b>D</b> | 8.1         | 14.8      |

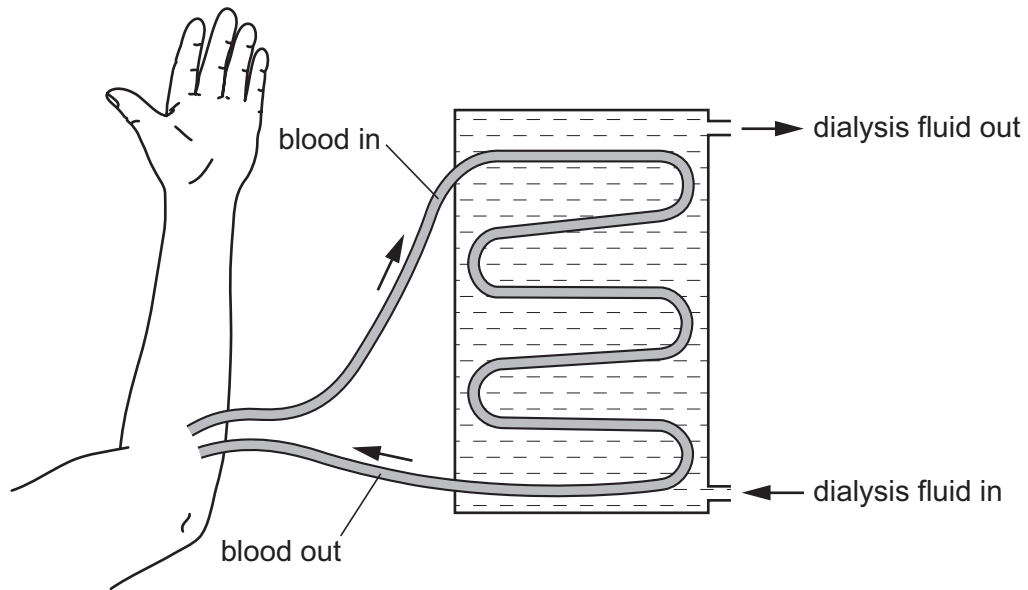
- 32 The diagram shows a section through an alveolus and a blood capillary.



What are the oxygen concentrations in X, Y and Z?

|          | X    | Y    | Z    |
|----------|------|------|------|
| <b>A</b> | high | low  | high |
| <b>B</b> | high | low  | low  |
| <b>C</b> | low  | high | high |
| <b>D</b> | low  | high | low  |

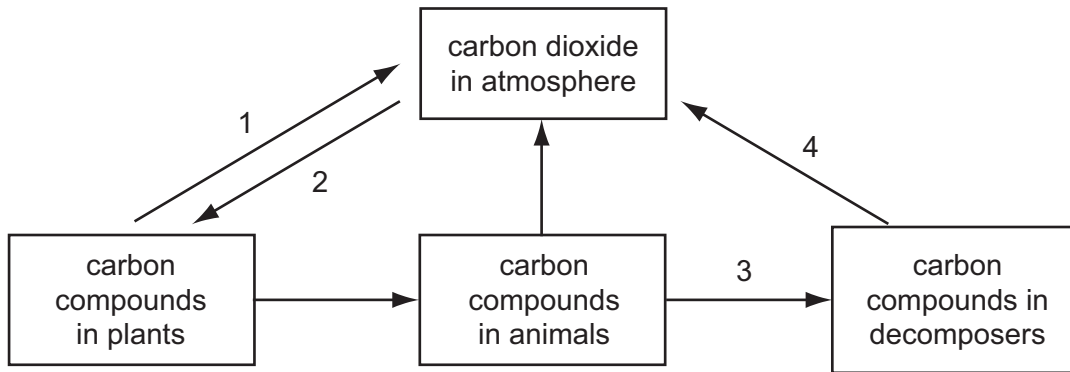
33 The diagram shows a kidney machine.



Which substance must be at the same concentration in the dialysis fluid and in the blood?

- A glucose
  - B salt
  - C urea
  - D water
- 34 Which disease can be cured by antibiotics?
- A AIDS
  - B diabetes
  - C emphysema
  - D gonorrhoea
- 35 What is the principal source of energy input to biological systems?
- A carbohydrates from plants
  - B light from the Sun
  - C nutrients from the soil
  - D oxygen from the air

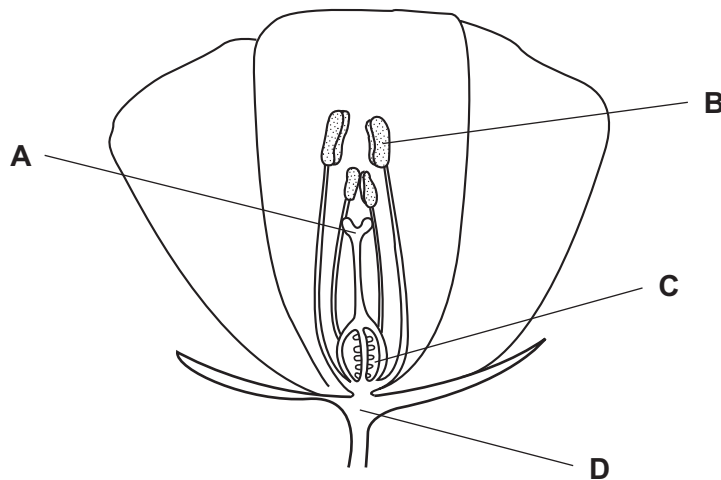
36 The diagram shows part of the carbon cycle.



Which numbered arrows represent respiration?

- A 1 and 3
  - B 1 and 4
  - C 2 and 3
  - D 2 and 4
- 37 What is an effect of releasing untreated sewage into the environment?
- A death of fish from lack of oxygen
  - B increased carbon dioxide in the atmosphere
  - C increased sulphur dioxide in the atmosphere
  - D using up of soil minerals
- 38 The diagram shows a flower cut in half.

Which part must receive pollen grains before fertilisation can take place?





39 How are sperms different from egg cells in size and in number?

|          | size    | number |
|----------|---------|--------|
| <b>A</b> | larger  | fewer  |
| <b>B</b> | larger  | more   |
| <b>C</b> | smaller | fewer  |
| <b>D</b> | smaller | more   |

40 Some normal fruit flies are subjected to radiation in a laboratory. As a result, they produce offspring with unusual characteristics, such as white eyes.

What causes this?

- A** continuous variation
- B** discontinuous variation
- C** dominance
- D** mutation





