



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

COMBINED SCIENCE

0653/11

Paper 1 Multiple Choice

October/November 2010

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, 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 printed on page **20**.

This document consists of **17** printed pages and **3** blank pages.



1 Which part of a plant cell contains starch grains?

- A cell wall
- B chloroplasts
- C nucleus
- D vacuole

2 When a plant cell is placed in a dilute solution of red dye, the contents of the cell do not become red.

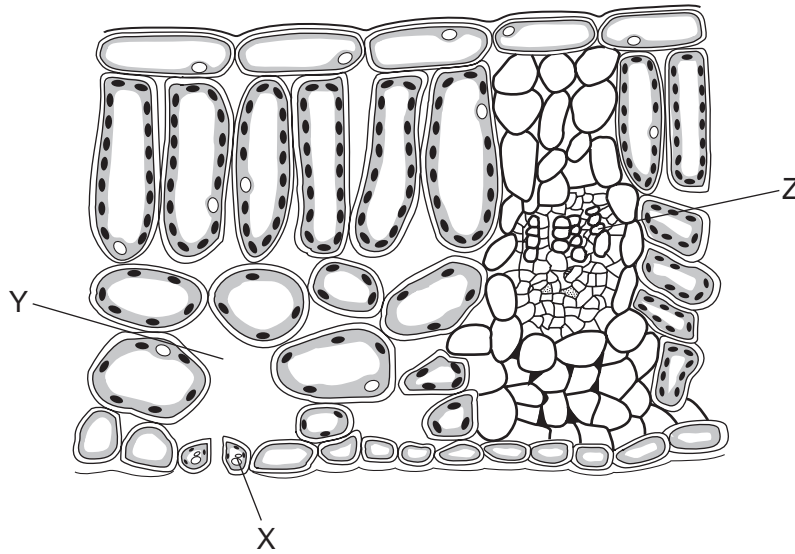
What prevents the dye molecules from entering the cell?

- A cell surface membrane
- B chloroplasts
- C cytoplasm
- D vacuole

3 Which is correct for all enzymes?

| | made of proteins | made inside cells |
|----------|------------------|-------------------|
| A | ✓ | ✓ |
| B | ✓ | x |
| C | x | ✓ |
| D | x | x |

4 The diagram shows a section through a leaf.



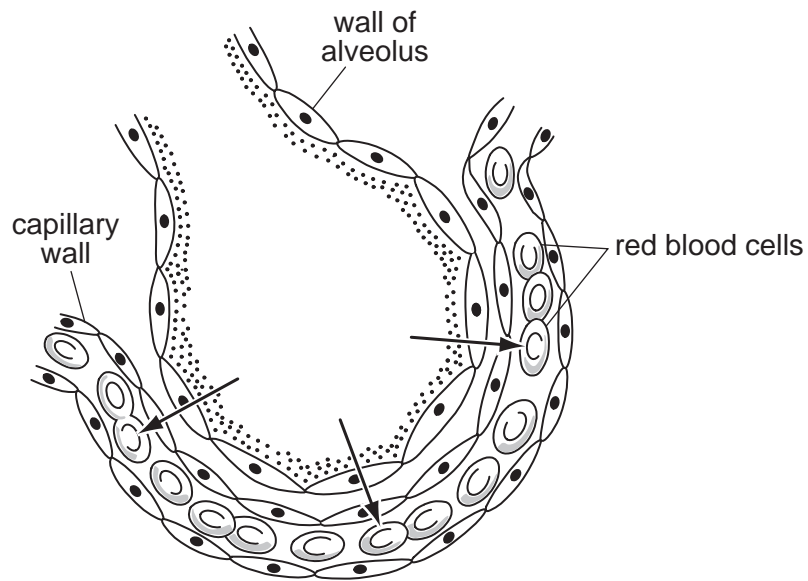
What are X, Y and Z?

| | X | Y | Z |
|----------|----------------|-----------|--------|
| A | epidermis cell | air space | phloem |
| B | epidermis cell | stoma | xylem |
| C | guard cell | air space | xylem |
| D | guard cell | stoma | phloem |

5 Which nutrient, when deficient in the diet, causes a lack of haemoglobin in red blood cells?

- A** calcium
- B** iron
- C** vitamin C
- D** vitamin D

6 The diagram shows an alveolus and one of its capillaries.



What moves in the direction shown by the arrows?

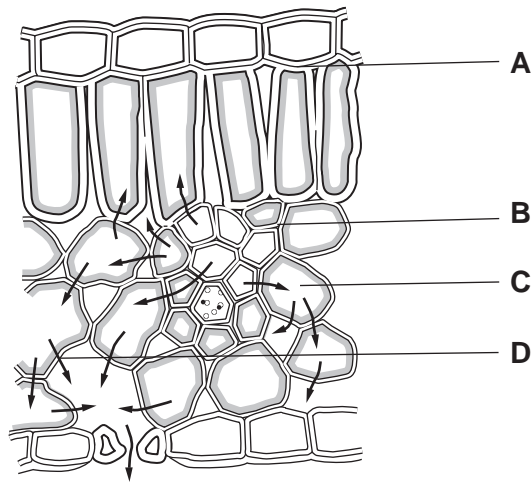
- A carbon dioxide
- B hydrogen
- C oxygen
- D water

7 Which blood vessel carries oxygenated blood away from the heart?

- A aorta
- B pulmonary artery
- C pulmonary vein
- D vena cava

8 The diagram shows a section through a leaf. The arrows show water movement.

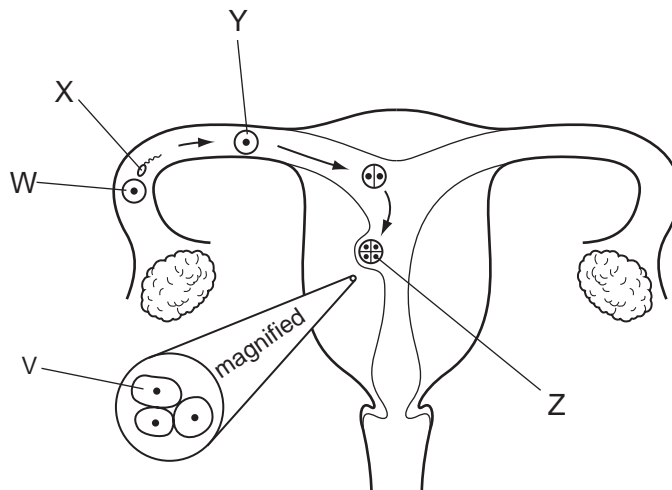
Where does the water evaporate?



9 What is the stimulus for insulin secretion and what is the effect of insulin on the liver?

| | stimulus for secretion | effect on the liver |
|----------|------------------------|--------------------------|
| A | high blood glucose | decreased glucose uptake |
| B | high blood glucose | increased glucose uptake |
| C | low blood glucose | decreased glucose uptake |
| D | low blood glucose | increased glucose uptake |

10 The diagram shows the uterus and stages in the formation and implantation of a human embryo.



Which cells are genetically identical?

- A** W and Z **B** X and V **C** X and Y **D** Y and Z

11 The table shows the names of plant reproductive structures.

Which does **not** link a structure with what it contains?

| | structure | what it contains |
|----------|-----------|------------------|
| A | anther | pollen grain |
| B | fruit | seed |
| C | seed | embryo |
| D | style | ovule |

12 Which variation amongst humans is **not** affected by diet?

- A** blood group
- B** bone strength
- C** height
- D** speed of wound healing

13 What will increase soil erosion?

- A** deforestation
- B** maintaining natural plant cover
- C** reducing grazing by livestock
- D** terracing of the land

14 Three students make statements about the differences between elements, compounds and mixtures.

Student 1 All elements exist only as atoms and not molecules.

Student 2 Compounds contain at least two elements.

Student 3 Mixtures consist only of compounds.

Which students are correct?

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

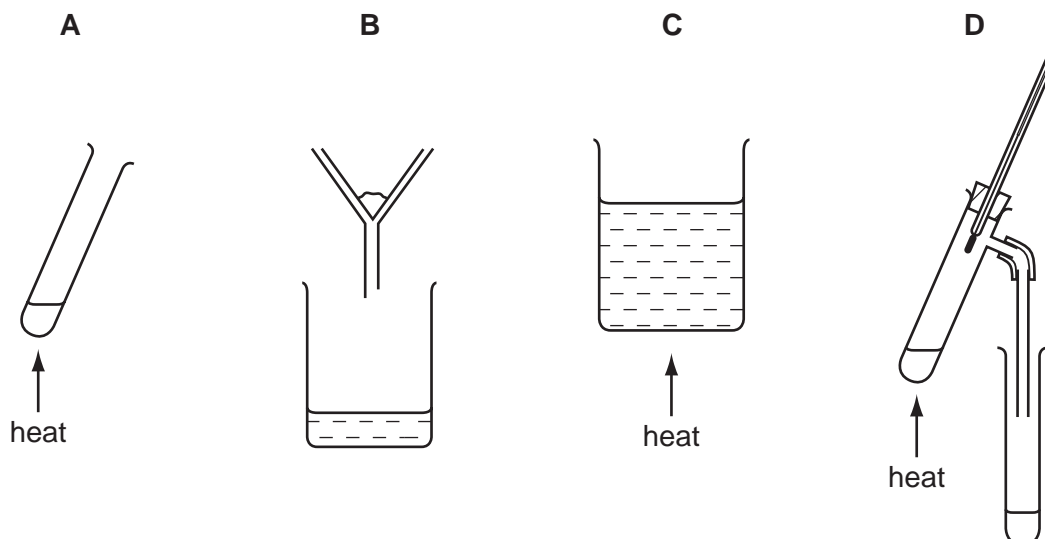
15 The table shows information about four different compounds.

Which compound contains ionic bonds?

| | formula of compound | elements present in compound |
|----------|---------------------|------------------------------|
| A | CO ₂ | carbon, oxygen |
| B | HCl | hydrogen, chlorine |
| C | NH ₃ | nitrogen, hydrogen |
| D | Na ₂ O | sodium, oxygen |

16 Aqueous copper(II) sulfate consists of copper(II) sulfate dissolved in water.

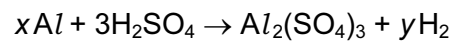
Which apparatus could **not** be used to remove water from this solution?



17 Which three elements are all transition elements?

- A** chlorine, bromine and iodine
- B** helium, neon and argon
- C** iron, cobalt and nickel
- D** lithium, sodium and potassium

18 The equation represents the reaction of aluminium with sulfuric acid.

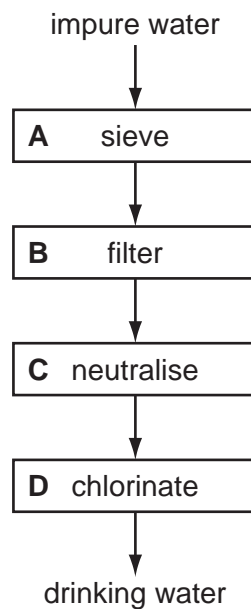


What are the correct values of x and y ?

| | x | y |
|----------|-----|-----|
| A | 2 | 3 |
| B | 2 | 6 |
| C | 3 | 3 |
| D | 3 | 6 |

19 The chart shows four stages in the purification of drinking water.

Which stage sterilises the water?



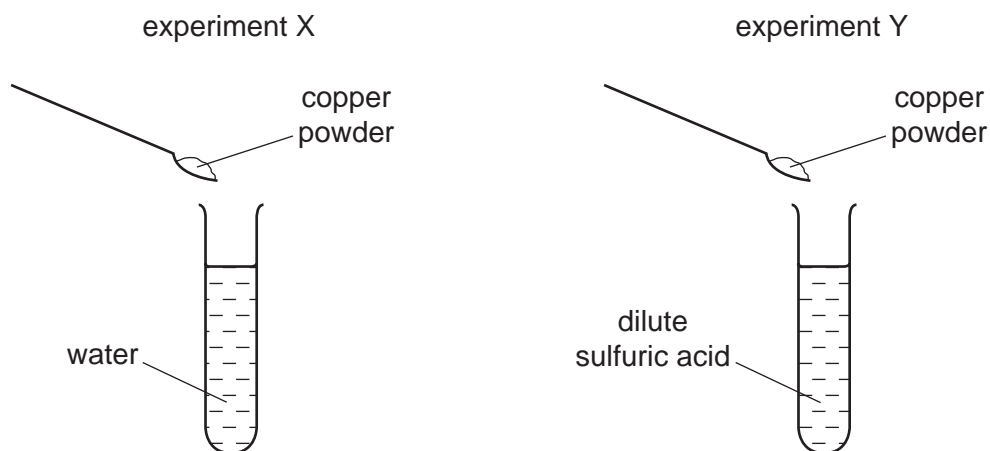
20 Aluminium occurs as aluminium oxide in the ore bauxite.

Which terms apply to the extraction of aluminium from aluminium oxide?

| | electrolysis | reduction |
|----------|--------------|-----------|
| A | ✓ | ✓ |
| B | ✓ | x |
| C | x | ✓ |
| D | x | x |

21 Aqueous copper(II) ions, $\text{Cu}^{2+}(\text{aq})$, are blue.

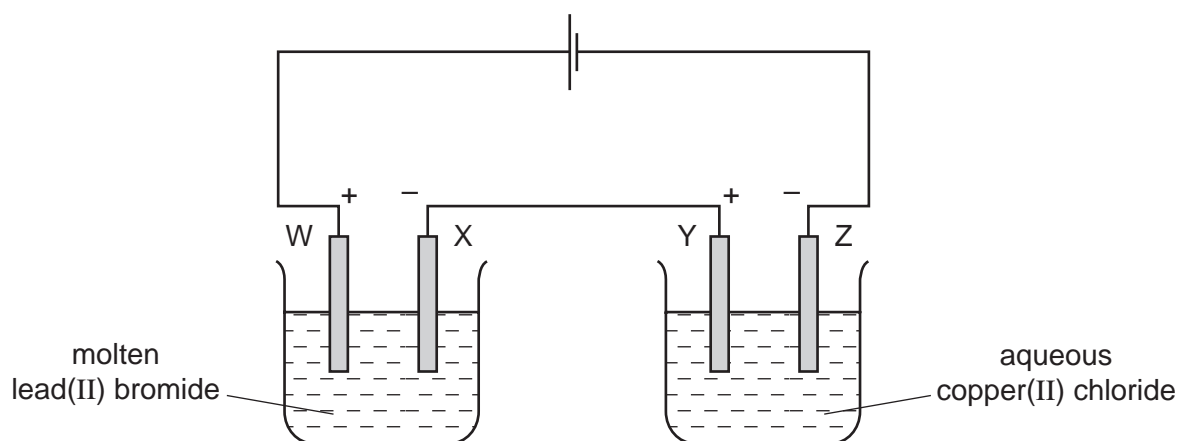
In separate experiments, X and Y, copper powder is added to a test-tube of liquid and the mixture stirred. At the end of each experiment some copper powder remains at the bottom of each tube.



What are the final colours of the liquids above the copper powder?

| | experiment X | experiment Y |
|----------|--------------|--------------|
| A | blue | blue |
| B | blue | colourless |
| C | colourless | blue |
| D | colourless | colourless |

22 An electrolysis circuit is set up using carbon electrodes as shown.

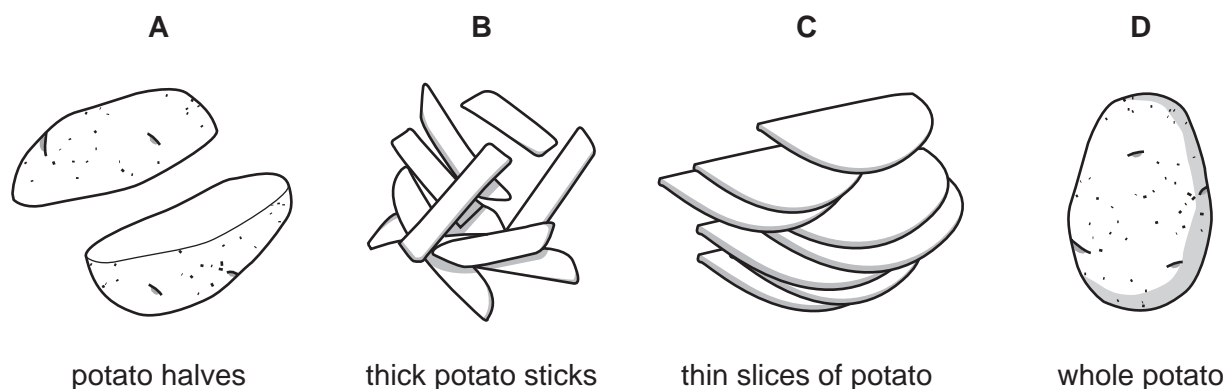


At which two electrodes would a Group VII element be formed?

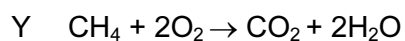
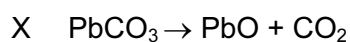
- A** W and Y **B** W and Z **C** X and Y **D** X and Z

23 A 250 g portion of potatoes is to be cooked in boiling water.

Which form of the potatoes will require the shortest cooking time?



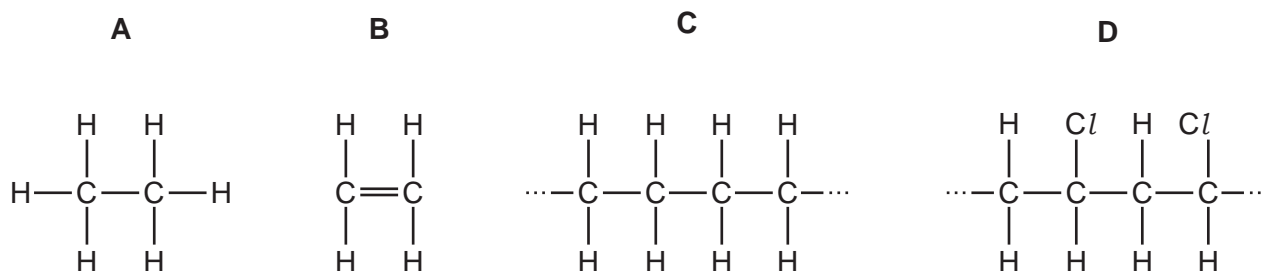
24 The equations for two reactions are shown.



Which types of reaction are X and Y?

| | X | Y |
|----------|-----------------------|-----------------------|
| A | combustion | neutralisation |
| B | combustion | thermal decomposition |
| C | thermal decomposition | combustion |
| D | thermal decomposition | neutralisation |

25 Which structure shows a polymer that is also a hydrocarbon?



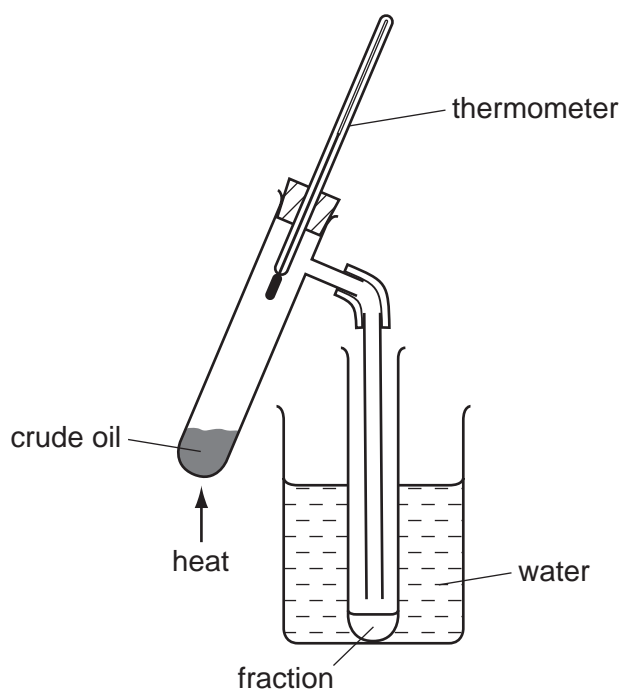
26 Two products, X and Y, are formed in the complete combustion of methane.

What are X and Y?

- A carbon and hydrogen
- B carbon and water
- C carbon dioxide and hydrogen
- D carbon dioxide and water

27 Crude oil (petroleum) is heated, using the apparatus shown.

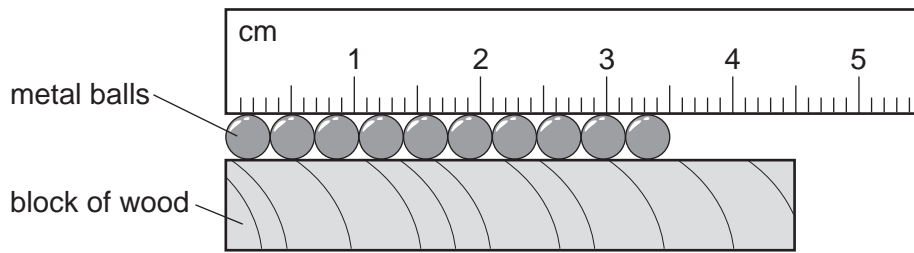
Four fractions, with different boiling point ranges, are collected.



Which term best describes crude oil?

- A a compound
- B an element
- C a mixture
- D a plastic

28 A ruler and a block of wood are used to find the diameter of some identical metal balls.



What is the diameter of a single ball?

- A** 3.5 mm **B** 4.5 mm **C** 3.5 cm **D** 4.5 cm

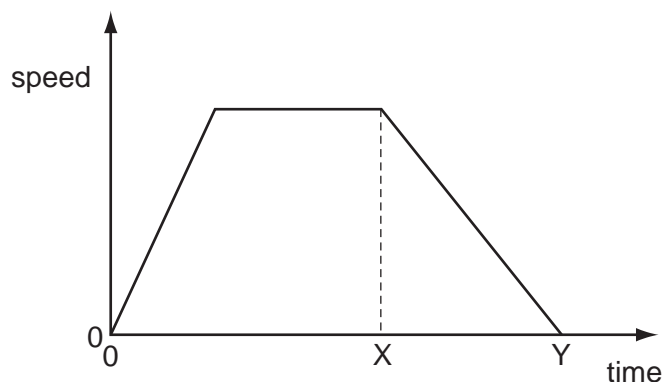
29 Which statement is correct?

- A** The mass of a bottle of water at the North Pole is different from its mass at the Equator.
B The mass of a bottle of water is measured in newtons.
C The weight of a bottle of water and its mass are both measured in kilograms.
D The weight of a bottle of water is one of the forces acting on the bottle.

30 Which substance in the table has the lowest density?

| | substance | mass / g | volume / cm ³ |
|----------|-----------|----------|--------------------------|
| A | nylon | 1.2 | 1.0 |
| B | cotton | 1.5 | 1.0 |
| C | olive oil | 1.8 | 2.0 |
| D | water | 2.0 | 2.0 |

- 31 The graph shows how the speed of an object changes over an interval of time.



Which statement describes the acceleration of the object between time X and time Y?

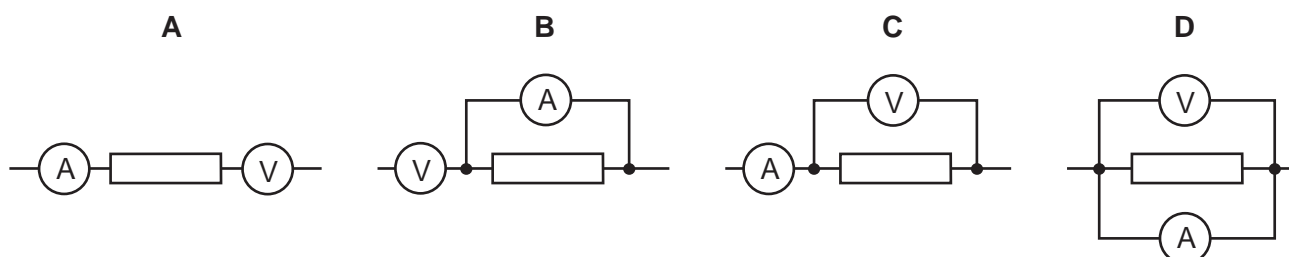
- A** It is constant.
B It is decreasing.
C It is increasing.
D It is zero.
- 32 In a hydroelectric power station, one form of energy is stored in a reservoir. This energy is then transferred in stages to another form, which is the output.

Which row gives the names for the stored energy and the output energy?

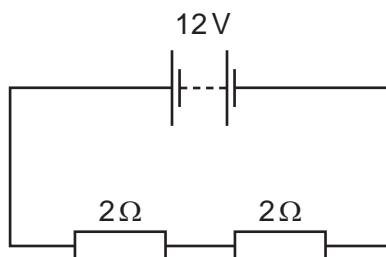
| | stored energy | output energy |
|----------|---------------|---------------|
| A | electrical | heat |
| B | electrical | kinetic |
| C | kinetic | electrical |
| D | potential | electrical |

- 33 The diagrams show part of an electric circuit containing an ammeter and a voltmeter.

Which arrangement should be used to measure the potential difference (p.d.) across the resistor and the current through it?



34 The diagram shows an electrical circuit.

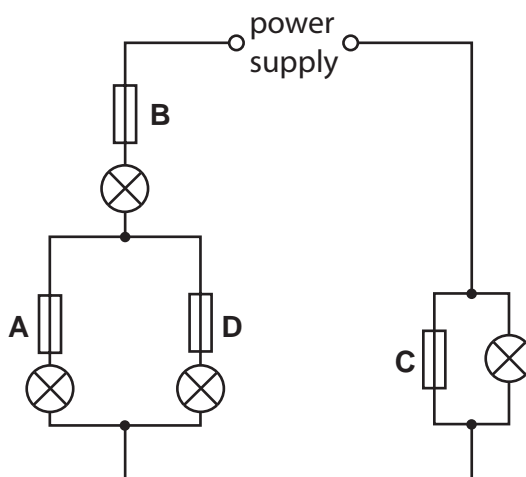


What is the current through the circuit?

- A 3A B 4A C 12A D 24A

35 In the circuit shown, only one of the fuses has blown, but none of the lamps is lit.

Which fuse has blown?



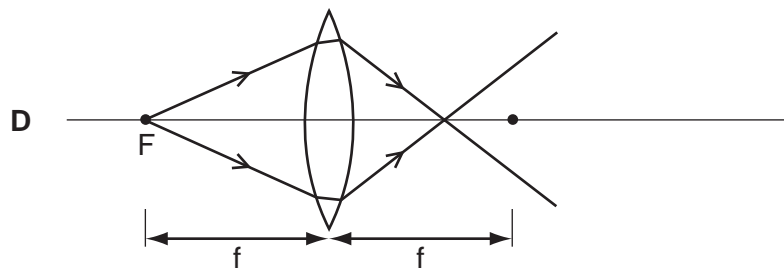
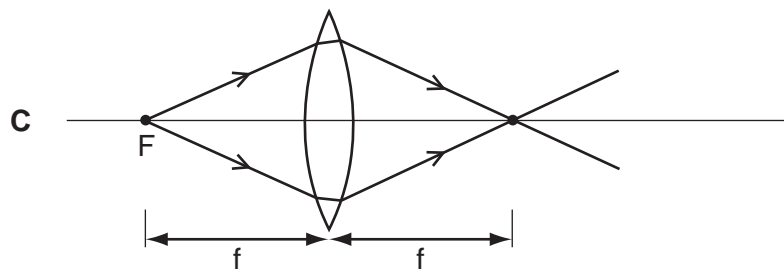
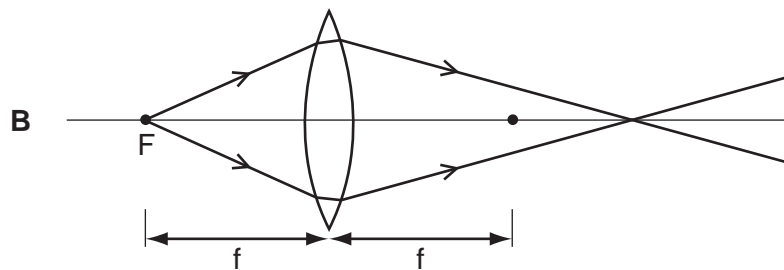
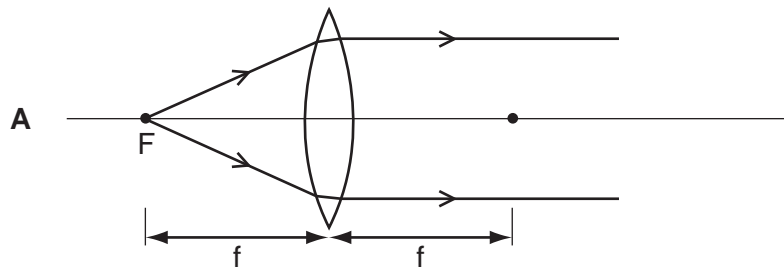
36 A camper sits beside a fire and quickly begins to feel warm. He pushes the end of a metal rod into the fire and after a while his hand feels the rod getting warm.

Which heat transfers are taking place?

| | heat transfer from fire through the air | heat transfer from fire through the rod |
|----------|---|---|
| A | conduction | convection |
| B | conduction | radiation |
| C | radiation | conduction |
| D | radiation | convection |

37 A source of light is placed at the focus F of a converging lens. The focal length of the lens is f .

Which diagram shows the path of the rays of light that pass through the lens?



38 The Sun heats the Earth by electromagnetic radiation.

Which region of the electromagnetic spectrum is responsible for most of this heating?

- A microwave
- B infra-red
- C ultraviolet
- D X-ray

- 39 A police car with its siren sounding is stationary in heavy traffic. A pedestrian notices that, although the loudness of the sound produced does not change, the pitch varies.

Which row in the table describes the amplitude and the frequency of the sound?

| | amplitude | frequency |
|----------|-----------|-----------|
| A | constant | constant |
| B | constant | varying |
| C | varying | constant |
| D | varying | varying |

- 40 Which row in the table describes alpha-particles?

| | electric charge | penetrates 1 cm of aluminium? |
|----------|-----------------|-------------------------------|
| A | negative | yes |
| B | negative | no |
| C | positive | yes |
| D | positive | no |

DATA SHEET
The Periodic Table of the Elements

| | | Group | | | | | | | | | | |
|------------------------------------|------------------------------------|-------------------------------------|------------------------------------|------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-----------------------------------|-------------------------------------|----------------------------------|-----------------------------------|---------------------------------|
| | | I | II | III | IV | V | VI | VII | VIII | IX | X | |
| | | 1 H Hydrogen 1 | | | | | | | | | | 4 He Helium 2 |
| 7 Li Lithium 3 | 9 Be Beryllium 4 | | | | | | | | | | | 19 F Fluorine 9 |
| 23 Na Sodium 11 | 24 Mg Magnesium 12 | 5 B Boron 5 | 11 B Boron 5 | 12 C Carbon 6 | 13 Al Aluminium 13 | 14 Si Silicon 14 | 15 P Phosphorus 15 | 16 S Sulfur 16 | 17 Cl Chlorine 17 | 18 Ar Argon 18 | 20 Ne Neon 10 | |
| 39 K Potassium 19 | 40 Ca Calcium 20 | 65 Zn Zinc 30 | 70 Ga Gallium 31 | 73 Ge Germanium 32 | 75 As Arsenic 33 | 76 Se Selenium 34 | 77 Br Bromine 35 | 78 Kr Krypton 36 | 84 Kr Krypton 36 | 86 Rn Radon 86 | 88 Ra Radium 88 | |
| 85 Rb Rubidium 37 | 86 Sr Strontium 38 | 89 Y Yttrium 39 | 91 Zr Zirconium 40 | 93 Nb Niobium 41 | 94 Mo Molybdenum 42 | 96 Tc Technetium 43 | 101 Ru Ruthenium 44 | 103 Rh Rhodium 45 | 106 Pd Palladium 46 | 108 Ag Silver 47 | 112 Cd Cadmium 48 | |
| 133 Cs Caesium 55 | 137 Ba Barium 56 | 139 La Lanthanum 57 | 178 Hf Hafnium 72 | 181 Ta Tantalum 73 | 184 W Tungsten 74 | 186 Re Rhenium 75 | 190 Os Osmium 76 | 192 Ir Iridium 77 | 195 Pt Platinum 78 | 197 Au Gold 79 | 201 Hg Mercury 80 | |
| 226 Fr Francium 87 | 226 Ra Radium 88 | 227 Ac Actinium 89 | † | † | † | † | † | † | † | † | † | |

| | | | | | | | | | | | | |
|-----------------------------------|--|-------------------------------------|--------------------------------------|-------------------------------------|-------------------------------------|--------------------------------------|--------------------------------------|---------------------------------------|------------------------------------|--|-------------------------------------|---------------------------------------|
| 140 Ce Cerium 58 | 141 Pr Praseodymium 59 | 144 Nd Neodymium 60 | 146 Pm Promethium 61 | 150 Sm Samarium 62 | 152 Eu Europium 63 | 157 Gd Gadolinium 64 | 162 Dy Dysprosium 66 | 165 Ho Holmium 67 | 167 Er Erbium 68 | 169 Tm Thulium 69 | 173 Yb Ytterbium 70 | 175 Lu Lutetium 71 |
| 232 Th Thorium 90 | 232 Pa Protactinium 91 | 238 U Uranium 92 | 238 Np Neptunium 93 | 238 Pu Plutonium 94 | 238 Am Americium 95 | 238 Cm Curium 96 | 238 Bk Berkelium 97 | 238 Cf Californium 98 | 238 Fm Fermium 100 | 238 Md Mendelevium 101 | 238 No Nobelium 102 | 238 Lr Lawrencium 103 |

| | | |
|---|----------|---|
| a | X | b |
|---|----------|---|

* 58-71 Lanthanoid series
† 90-103 Actinoid series

a = relative atomic mass
X = atomic symbol
b = proton (atomic) number

The volume of one mole of any gas is 24 dm³ at room temperature and pressure (r.t.p.).

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