

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
General Certificate of Education Ordinary Level

**PHYSICS**

**5054/01**

Paper 1 Multiple Choice

May/June 2005

**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.

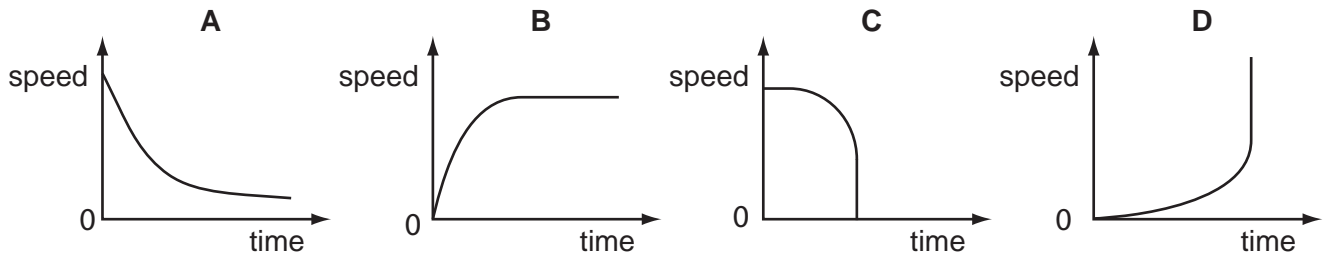
Any rough working should be done in this booklet.

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

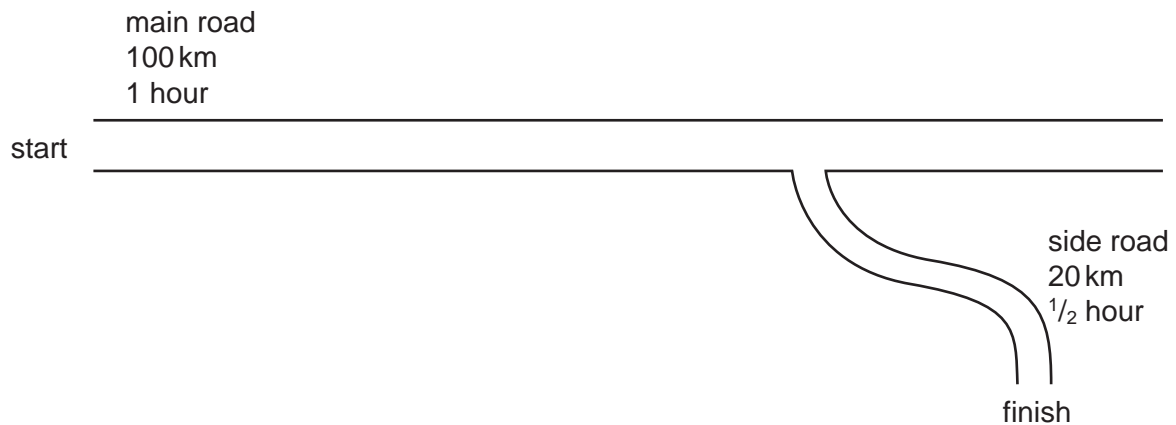


- 1 Which instrument is used to measure the internal diameter of a pipe with a single measurement?
- A** manometer  
**B** measuring cylinder  
**C** micrometer  
**D** vernier calipers

- 2 Which graph represents the motion of a body falling vertically that reaches a terminal velocity?



- 3 A car takes 1 hour to travel 100 km along a main road and then  $\frac{1}{2}$  hour to travel 20 km along a side road.



What is the average speed of the car for the whole journey?

- A** 60 km/h  
**B** 70 km/h  
**C** 80 km/h  
**D** 100 km/h

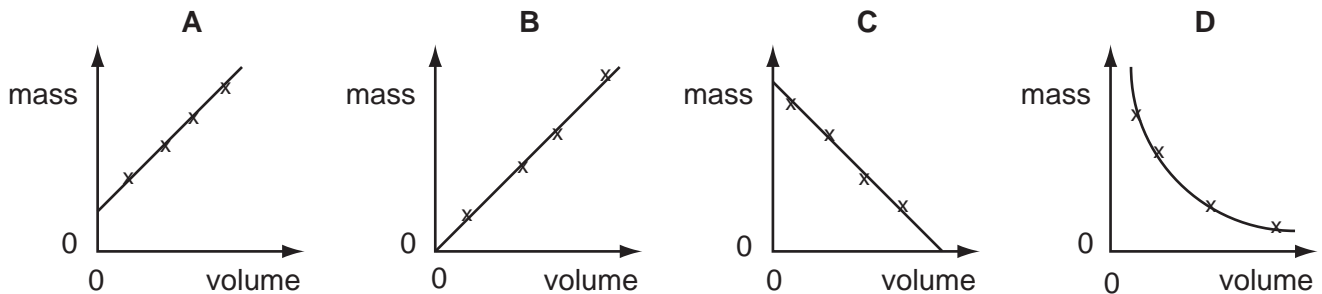
- 4 At a point on the surface of the Earth, the gravitational field strength is  $9.8 \text{ N/kg}$ .

Which pair of values for mass and weight are correct for an object placed at this point?

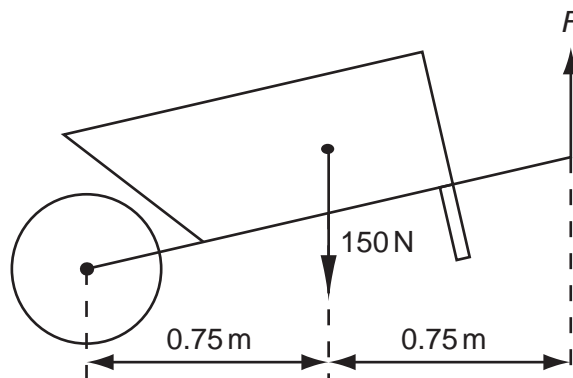
	mass/kg	weight/N
<b>A</b>	9.8	10
<b>B</b>	10	9.8
<b>C</b>	10	98
<b>D</b>	98	10

- 5 Some students measure the masses and the volumes of different sized samples of a type of wood.

Which graph shows their results?



- 6 The diagram shows a wheelbarrow and its load, which have a total weight of  $150 \text{ N}$ . This is supported by a vertical force  $F$  at the ends of the handles.

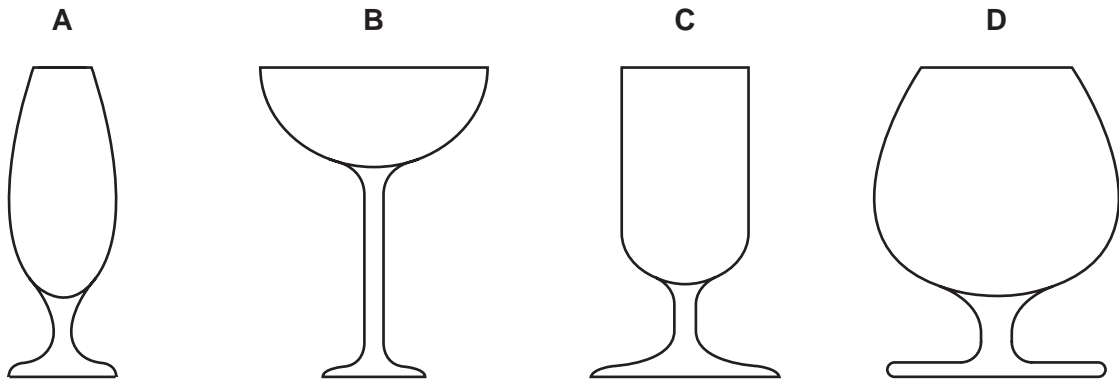


What is the value of  $F$ ?

- A**  $75 \text{ N}$       **B**  $150 \text{ N}$       **C**  $225 \text{ N}$       **D**  $300 \text{ N}$

- 7 The diagrams show the cross-sections of different glasses.

Which one is the least stable when filled with a liquid?



- 8 The table shows how the extension of a spring varies with load.

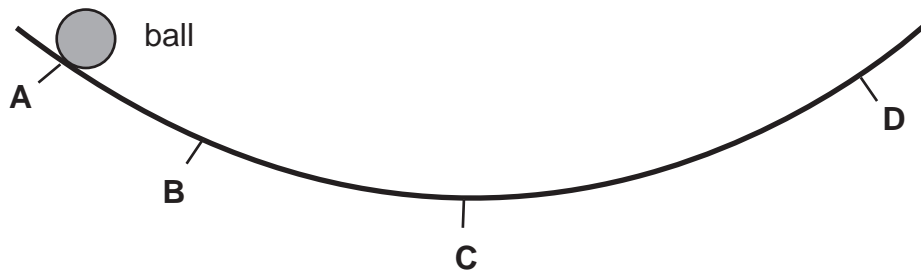
load / N	0	2	4	6	8	10	12	14	16
extension / cm	0	3	6	9	12	15	20	27	38

Between which two loads would you find the limit of proportionality?

- A** 0 N and 2 N
- B** 8 N and 10 N
- C** 10 N and 12 N
- D** 14 N and 16 N
- 9 Which is the correct statement about force and velocity?
- A** Force and velocity are both scalars.
- B** Force and velocity are both vectors.
- C** Force is a scalar, velocity is a vector.
- D** Force is a vector, velocity is a scalar.

- 10 The diagram shows a curved curtain rail that has a steel ball rolling on it. The ball is released at point A.

At which point does the ball have maximum kinetic energy?



- 11 The speed of light is  $3 \times 10^8$  m/s.

What is the energy equivalent of 2 kg of matter?

- A  $2 \times 3 \times 10^8$  J  
 B  $2000 \times 3 \times 10^8$  J  
 C  $\frac{1}{2} \times 2 \times (3 \times 10^8)^2$  J  
 D  $2 \times (3 \times 10^8)^2$  J
- 12 What does **not** affect the pressure at a point beneath the surface of a liquid?
- A area of the liquid surface  
 B density of the liquid  
 C depth of the point below the surface  
 D strength of the gravitational field

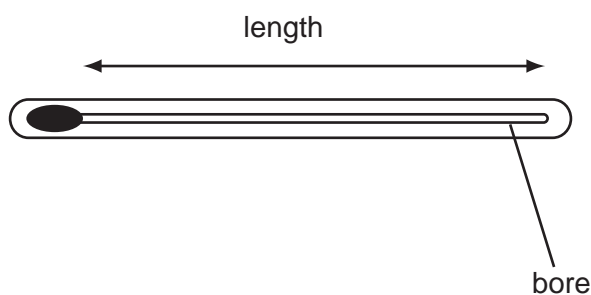
- 13 A small table weighing 40 N stands on four legs, each having an area of  $0.001 \text{ m}^2$ .

What is the pressure of the table on the floor?

- A  $400 \text{ N/m}^2$     B  $1000 \text{ N/m}^2$     C  $10\,000 \text{ N/m}^2$     D  $40\,000 \text{ N/m}^2$
- 14 Which factors increase the rate of evaporation of a liquid?

	increasing its temperature	increasing its surface area	increasing its depth
A	yes	yes	yes
B	yes	yes	no
C	yes	no	yes
D	no	yes	yes

- 15 Four mercury-in-glass thermometers are made with different dimensions.



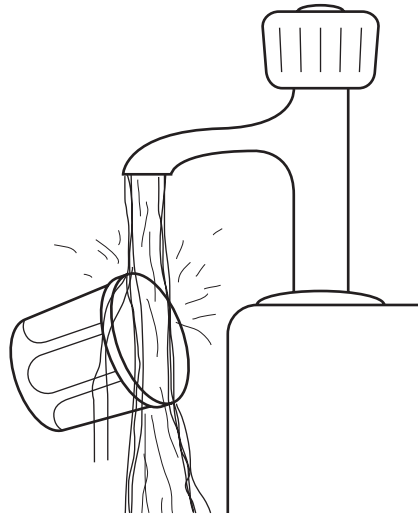
Which will have the greatest sensitivity?

- A 10 cm long and bore 0.75 mm wide
  - B 15 cm long and bore 0.50 mm wide
  - C 25 cm long and bore 0.10 mm wide
  - D 30 cm long and bore 0.25 mm wide
- 16 In an experiment to find the specific heat capacity of a metal, it is found that 5200 J is needed to raise the temperature of a 2 kg block by 20 °C.

What value for the specific heat capacity is given by these results?

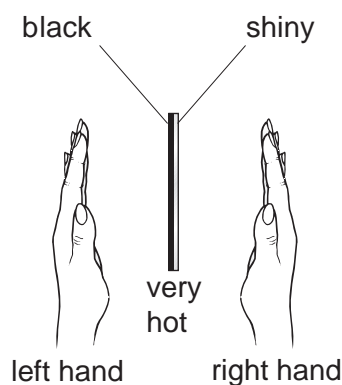
- A 130 J/(kg °C)
- B 520 J/(kg °C)
- C 52 000 J/(kg °C)
- D 104 000 J/(kg °C)

- 17 A person cannot unscrew the lid of a pot of jam. He finds that the lid can be unscrewed after it has been held under hot, running water for a few seconds.



Why is this?

- A The air pressure in the jar falls.
  - B The glass expands.
  - C The jam melts.
  - D The lid expands.
- 18 The diagram shows a thick copper plate that is very hot. One side is black, the other is shiny. A student places her hands the same distance from each side as shown.



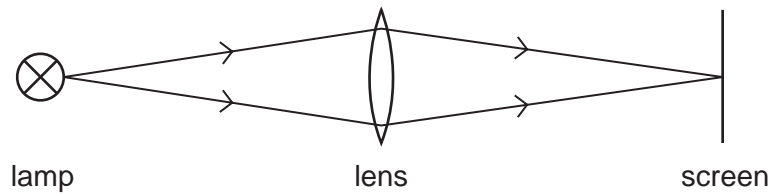
Her left hand feels warmer than her right hand.

Which statement is the correct conclusion from the experiment?

- A The black side is hotter than the shiny one.
- B The black side radiates more heat.
- C The shiny side radiates more heat.
- D The shiny side is cooling down faster than the black side.

19 Which diagram shows an example of a longitudinal wave?

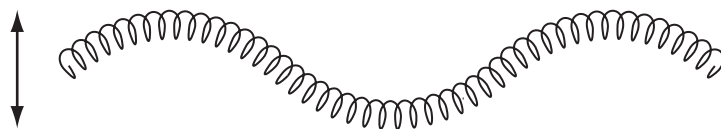
A light travelling from a lamp to a screen



B a spring pushed backwards and forwards



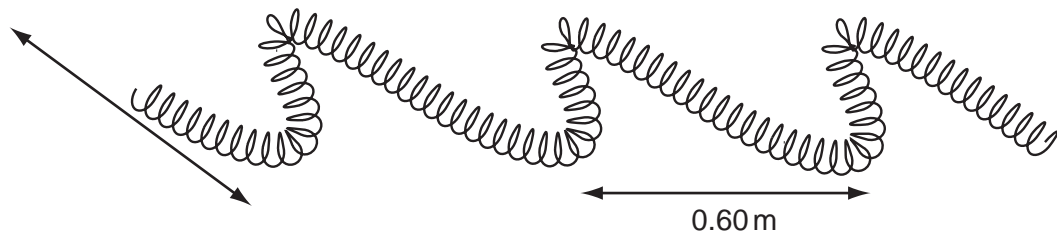
C a spring pushed up and down



D a water ripple caused by a dipper moving up and down



20 The diagram shows part of a spring that is shaken from side to side to produce a wave.



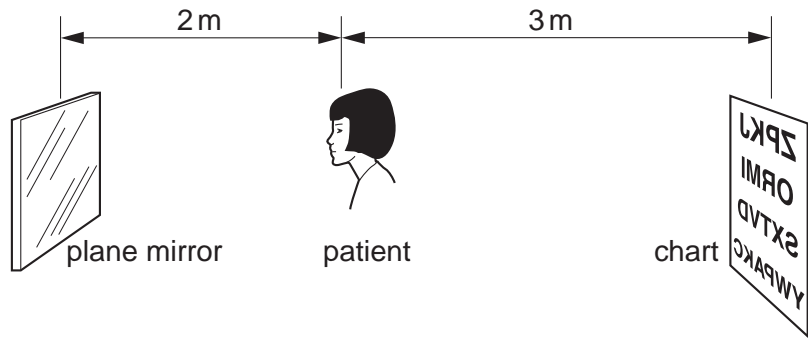
The distance between successive peaks is 0.60 m and the frequency is 2.5 Hz.

How long does it take for a wave to travel 3.0 m along the spring?

- A 0.20 s      B 0.50 s      C 2.0 s      D 5.0 s



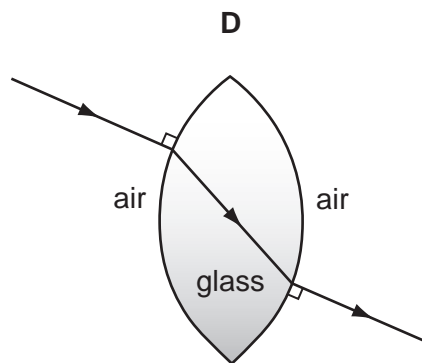
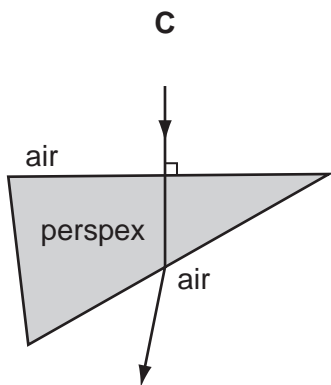
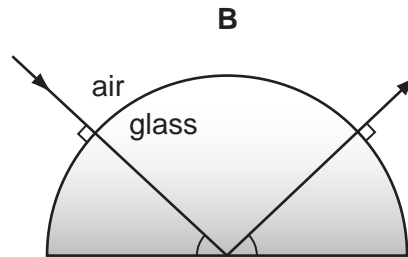
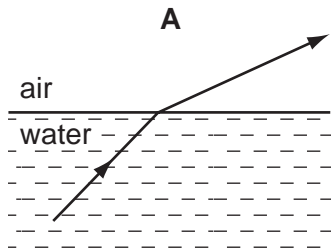
21 The diagram shows a patient having her eyes tested. A chart with letters on it is placed behind her and she sees the chart reflected in a plane mirror.



How far away from the patient is the image of the chart?

- A 2 m
- B 4 m
- C 5 m
- D 7 m

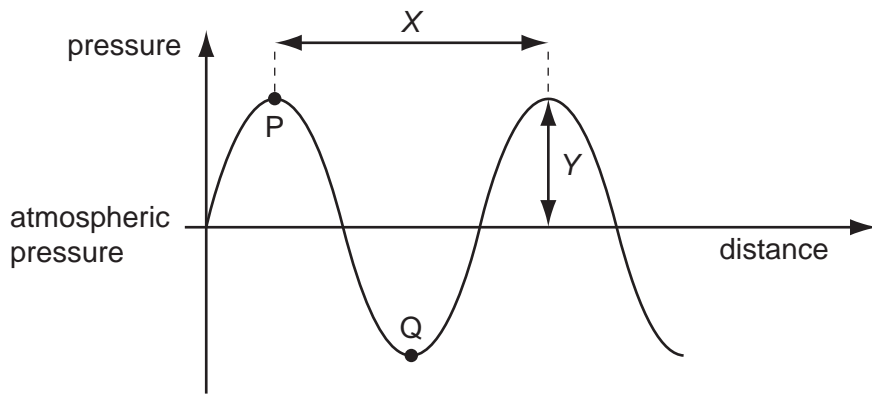
22 In which diagram is the path of the light ray **not** correct?



23 Which statement is true for all electromagnetic waves?

- A They are longitudinal.
- B They can be seen.
- C They have the same frequency in air.
- D They travel at the same speed in a vacuum.


24 The graph shows, at one instant, the pressure variation along a sound wave.

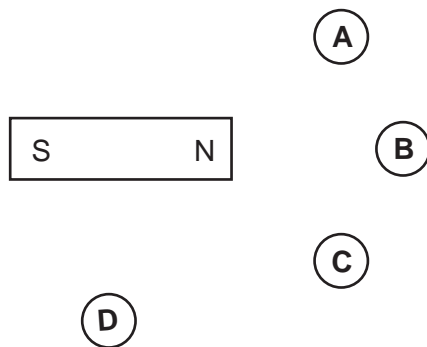


Which point on the diagram represents a rarefaction and what is the wavelength of the sound wave?

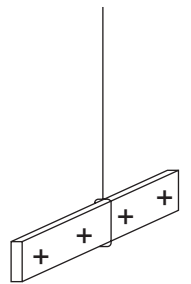
	rarefaction at	wavelength is
<b>A</b>	P	X
<b>B</b>	P	Y
<b>C</b>	Q	X
<b>D</b>	Q	Y

25 Four plotting compasses are placed near a bar magnet. You may ignore any effects of the Earth's magnetic field.

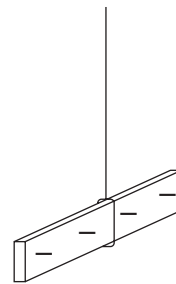
In which position does the compass appear like this,  ?



- 26 The diagram shows a positively charged acetate strip and a negatively charged polythene strip that are freely suspended.



acetate strip



polythene strip

Two rods **X** and **Y** are brought up in turn to these two strips. Rod **X** attracts the acetate strip but repels the polythene strip. Rod **Y** does not repel either the acetate strip or the polythene strip.

Which type of charge is on each rod?

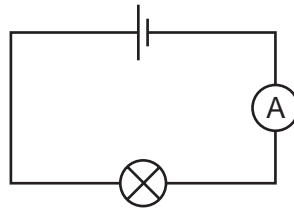
	rod <b>X</b>	rod <b>Y</b>
<b>A</b>	negative	positive
<b>B</b>	negative	uncharged
<b>C</b>	positive	negative
<b>D</b>	positive	uncharged

- 27 A cell is connected to a resistor.

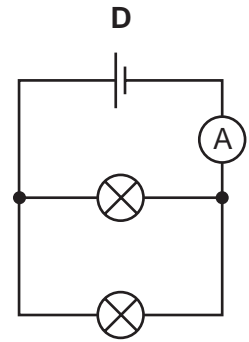
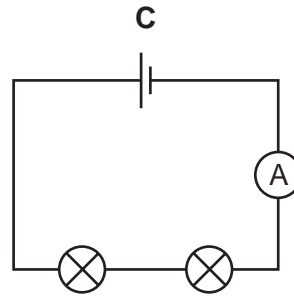
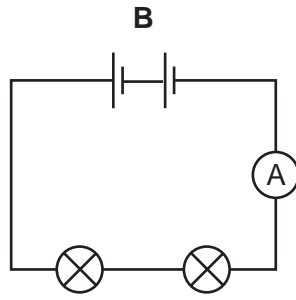
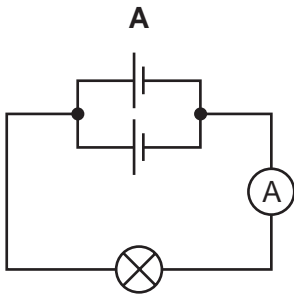
What is the e.m.f. of the cell equal to?

- A** The potential difference across the resistor for each unit of current.
- B** The power produced in the circuit for each unit of charge that passes.
- C** The work done in the circuit for each unit of charge that passes.
- D** The work done in the circuit for each unit of current.

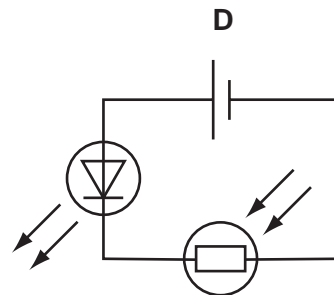
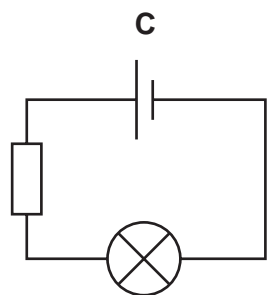
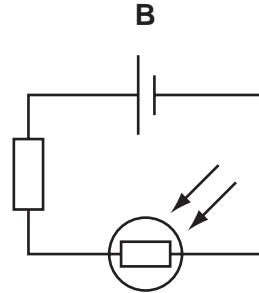
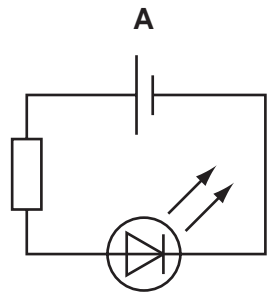
28 A cell is connected in series with an ammeter and a lamp. The current is 1 A.



In which circuit, using identical cells, lamps and ammeters, is the current reading 2 A?

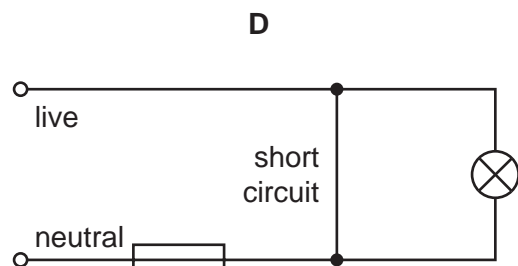
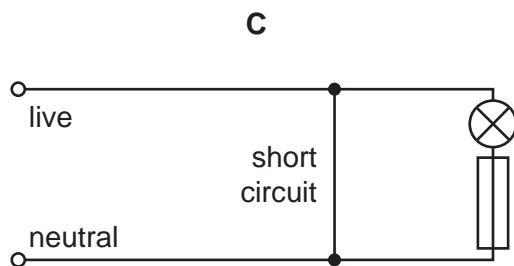
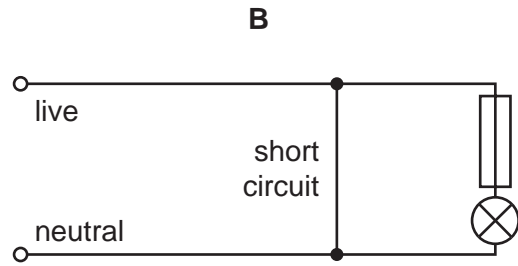
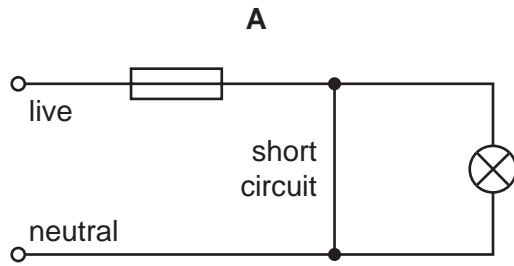


29 Which circuit contains a cell, a light-emitting diode and a fixed resistor?

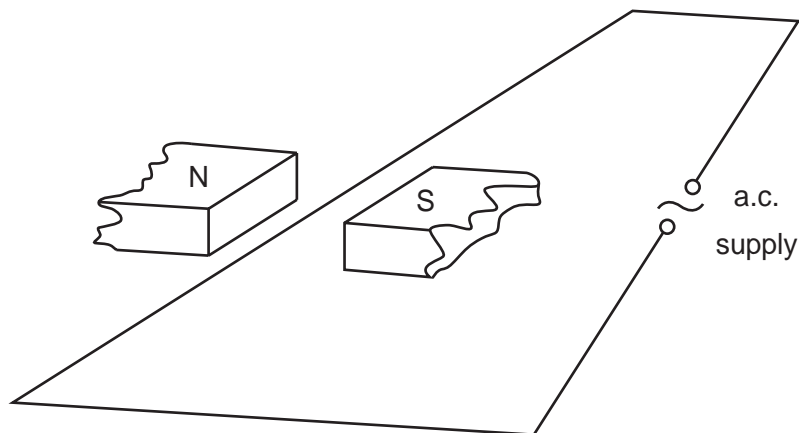


30 In each of the circuits below, a short circuit occurs.

In which circuit would the fuse blow and make the circuit safe to repair?



31 An alternating current is passed through a wire stretched between the poles of a magnet.



Which way will the wire move?

- A** left and right
- B** right only
- C** up and down
- D** up only

32 **X** and **Y** are wires carrying electric currents at right angles to the page. **P**, **Q** and **R** are plotting compasses. Any effect of the Earth's magnetic field has been ignored.

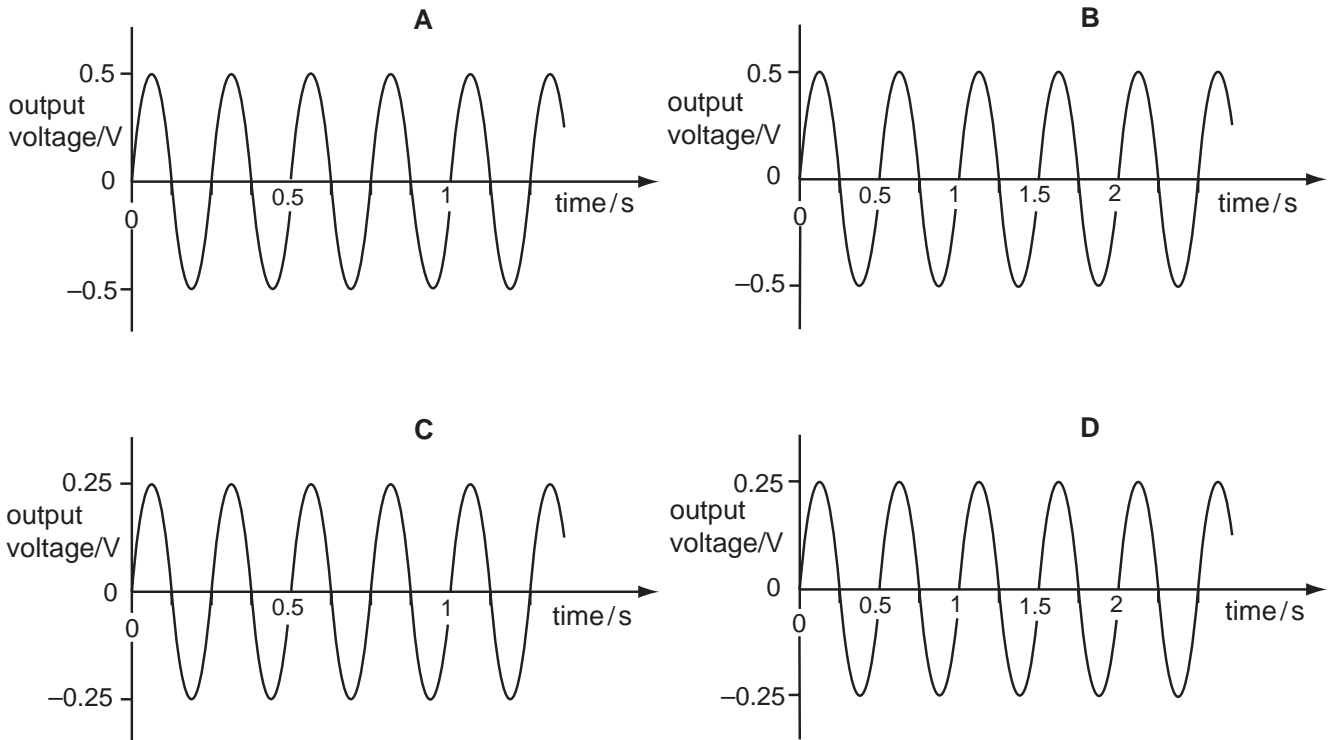


What is true about the direction and size of the currents?

	direction of currents	size of currents
<b>A</b>	same	larger in <b>X</b> than in <b>Y</b>
<b>B</b>	same	smaller in <b>X</b> than in <b>Y</b>
<b>C</b>	different	larger in <b>X</b> than in <b>Y</b>
<b>D</b>	different	smaller in <b>X</b> than in <b>Y</b>

33 A girl turns the handle of a small a.c. generator four times each second. The generator produces a maximum output voltage of 0.5 V.

Which of the following graphs best shows this?



34 Which statement about the action of a transformer is correct?

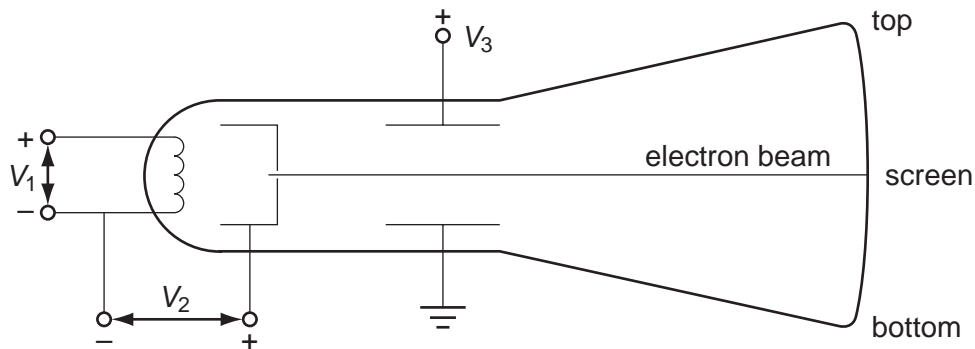
- A An e.m.f. is induced in the secondary coil when an alternating voltage is applied to the primary coil.
- B An e.m.f. is induced in the secondary coil when there is a steady direct current in the primary coil.
- C The current in the secondary coil is always larger than the current in the primary coil.
- D The voltage in the secondary coil is always larger than the voltage in the primary coil.

35 Electrical energy is transmitted at high alternating voltages.

What is **not** a valid reason for doing this?

- A At high voltage, a.c. is safer than d.c.
- B For a given power, there is a lower current with a higher voltage.
- C There is a smaller power loss at higher voltage and lower current.
- D The transmission lines can be thinner with a lower current.

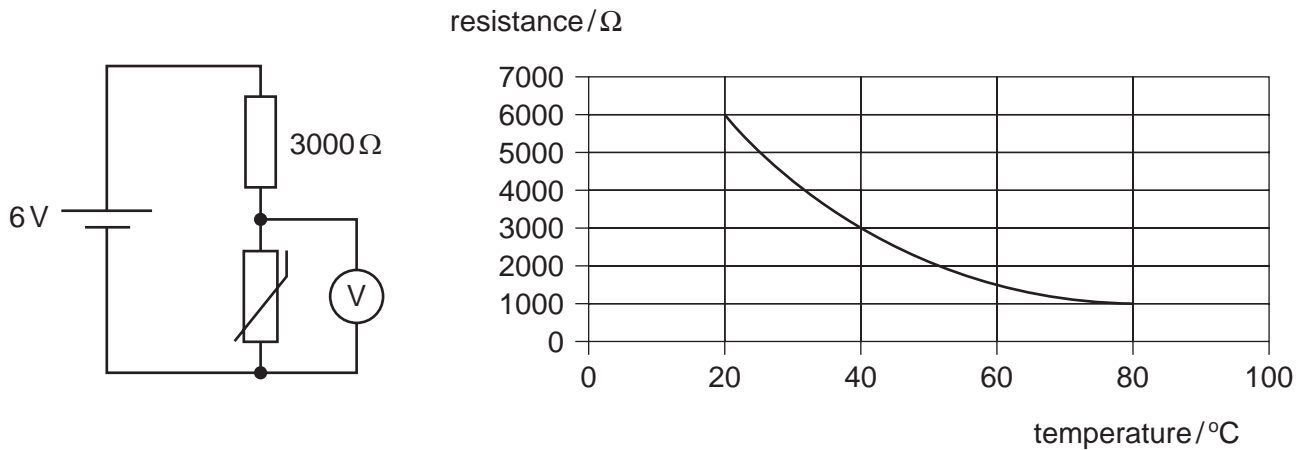
36 The diagram shows some of the important parts of the tube of a cathode-ray oscilloscope.



Which change in voltage results in the position of the spot on the screen moving towards the top?

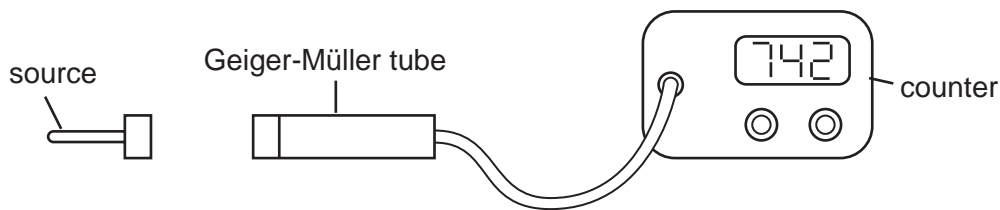
- A decreasing  $V_1$
- B decreasing  $V_3$
- C increasing  $V_2$
- D increasing  $V_3$

- 37 A thermistor is connected in a circuit with a 6 V cell, a  $3000\ \Omega$  resistor and a voltmeter, as shown. The graph shows how the resistance of the thermistor varies with temperature.



What is the temperature of the thermistor when the voltmeter reads 2 V?

- A** 20°C      **B** 40°C      **C** 60°C      **D** 80°C
- 38 A radioactive source is placed 3 cm from a Geiger-Müller tube in air. The average count rate is 742 counts/minute.



Then, in three experiments, measurements are taken with sheets of different materials placed between the source and the tube. The results are recorded in the table.

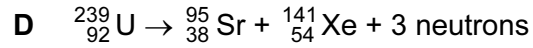
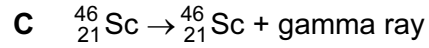
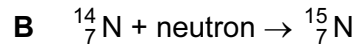
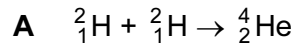
material of sheet between source and tube	thin card	aluminium foil	thick lead
average count rate / counts per minute	273	275	68

Which types of radiation does the source emit?

- A** alpha and beta only  
**B** alpha and gamma only  
**C** beta and gamma only  
**D** alpha, beta and gamma



39 Which equation shows a nuclear fission reaction?



40 Between 1909 and 1911, Geiger and Marsden carried out experiments in which alpha particles were fired at metal foil. Most of the alpha particles passed through the foil with small deflections, but some were deflected through a large angle.

These results suggest that

A atoms contain clouds of electrons through which some alpha particles cannot pass.

B atoms contain neutrons that alpha particles bounce off.

C atoms have positive and negative charges spread throughout their volume.

D atoms have positive charges concentrated in a small volume.





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