

UNIVERSITY OF CAMBRIDGE LOCAL EXAMINATIONS SYNDICATE

**Joint Examination for the School Certificate
and General Certificate of Education Ordinary Level**

PHYSICS

5054/1

PAPER 1 Multiple Choice

OCTOBER/NOVEMBER SESSION 2002

1 hour

Additional materials:

Multiple Choice answer sheet

Soft clean eraser

Soft pencil (type B or HB is recommended)

TIME 1 hour

INSTRUCTIONS TO CANDIDATES

Do not open this booklet until you are told to do so.

Write your name, Centre number and candidate number on the answer sheet in the spaces provided unless this has already been done for you.

There are **forty** questions in 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 very carefully the instructions on the answer sheet.

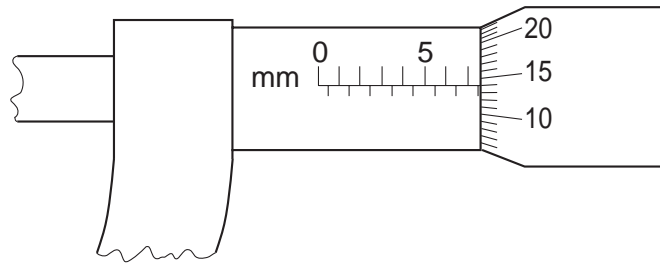
INFORMATION FOR CANDIDATES

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 question paper consists of 16 printed pages.

- 1 The diagram shows a micrometer scale.



Which reading is shown?

- A** 5.64 mm **B** 7.14 mm **C** 7.16 mm **D** 7.64 mm
- 2 What **must** change when a body is accelerating?
- A** the force acting on the body
B the mass of the body
C the speed of the body
D the velocity of the body
- 3 A car driver takes a total of two hours to make a journey of 75 km. She has a coffee break of half an hour and spends a quarter of an hour stationary in a traffic jam.
- At what average speed must she travel during the rest of the time if she wants to complete the journey in the two hours?
- A** 38 km/h
B 50 km/h
C 60 km/h
D 75 km/h

- 4 In a laboratory on Earth, balances show that an object has a mass of 2 kg and a weight of 20 N.

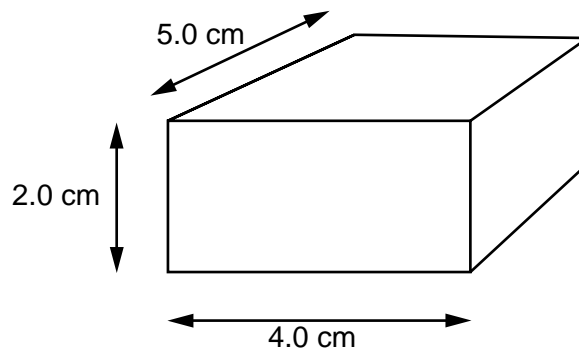
The same balances and object are then taken to the Moon, where the gravitational field strength is less than on the Earth.

Are the mass and weight of the object the same, or less, than before?

| | <i>mass</i> | <i>weight</i> |
|--|-------------|---------------|
|--|-------------|---------------|

- | | | |
|----------|------|------|
| A | less | less |
| B | less | same |
| C | same | less |
| D | same | same |

- 5 The diagram shows a material with dimensions 5 cm × 4 cm × 2 cm. It has a mass of 100 g.



What is the density of the material?

- A** 0.40 g/cm³
B 2.5 g/cm³
C 5.0 g/cm³
D 10 g/cm³
- 6 When a block of wood of mass 2 kg is pushed along the horizontal flat surface of a bench, the friction force measured is 4 N.

When the block is pushed along the same bench with a force of 10 N, it moves with a constant

- A** speed of 3 m/s.
B speed of 5 m/s.
C acceleration of 3 m/s².
D acceleration of 5 m/s².

- 7 When two forces are combined, the size of the resultant depends on the angle between the two forces.

Which of the following can **not** be the magnitude of the resultant when forces of magnitude 3 N and 4 N are combined?

A 1 N B 3 N C 7 N D 8 N

- 8 A man weighs 600 N. He runs up stairs of total height 4 metres in 3 seconds.

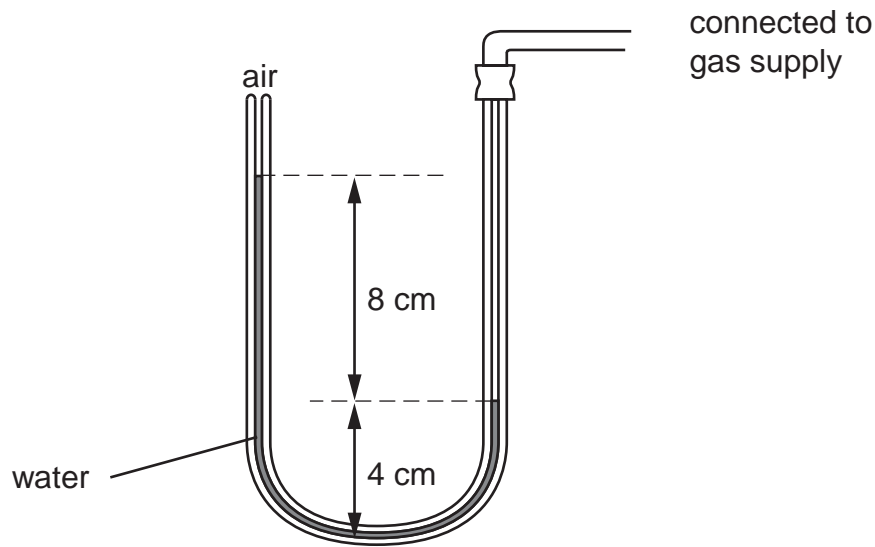
How much power is exerted by the man?

A 450 W B 800 W C 2400 W D 7200 W

- 9 Which of the following does **not** affect the pressure beneath the surface of a liquid?

- A area of the liquid surface
- B density of the liquid
- C depth of the liquid
- D strength of the gravitational field

- 10 A manometer is connected to a gas supply.



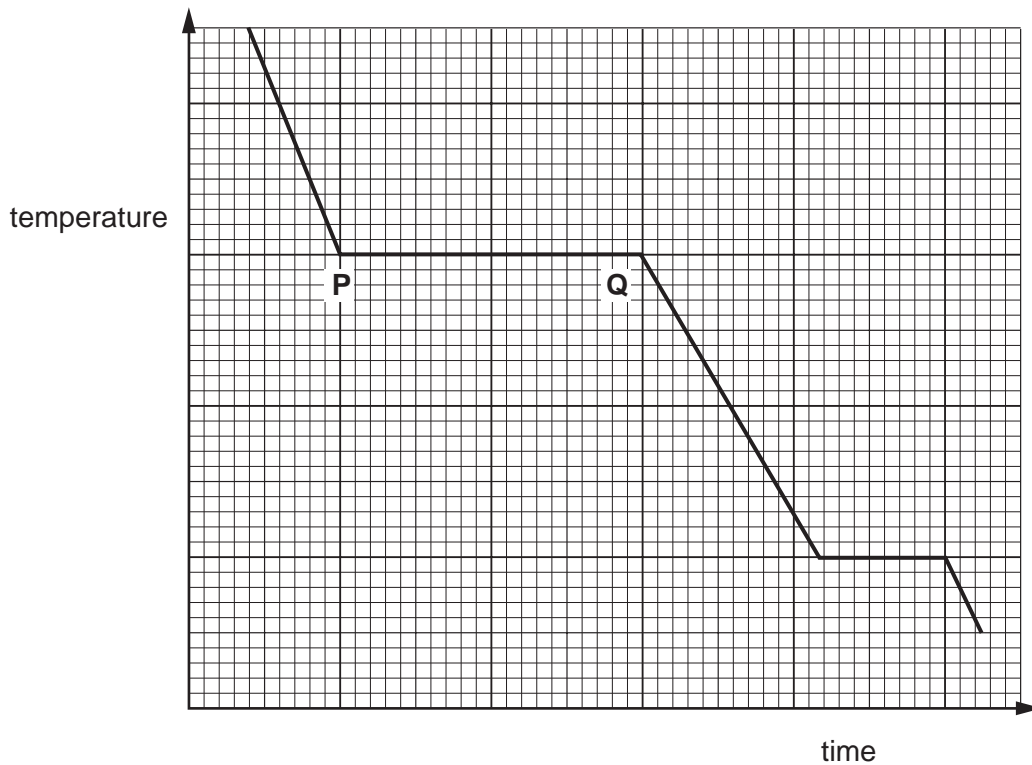
Pressure can be measured in cm of water.

What is the pressure of the gas?

- A 8 cm of water more than atmospheric pressure
 B 12 cm of water more than atmospheric pressure
 C 8 cm of water less than atmospheric pressure
 D 12 cm of water less than atmospheric pressure
- 11 A liquid evaporates rapidly.
 Why does it cool?
- A Air molecules remove heat by contact with the liquid surface.
 B Energy is lost by convection currents.
 C Fewer molecules are left in the liquid.
 D Some of the most energetic molecules leave the liquid.
- 12 When ice melts to become water, which force must be overcome?
- A the attraction between electrons and the nucleus
 B the attraction between the atoms in a molecule
 C the force between molecules
 D the force of gravity

- 13 A substance is heated in an enclosed space until it becomes a gas.

After the heater is removed, the temperature is recorded at regular intervals. The graph shows temperature plotted against time.



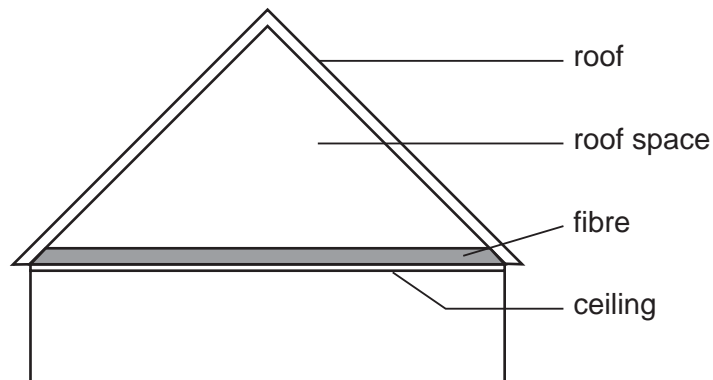
What does the section **PQ** represent?

- A boiling
 - B condensing
 - C melting
 - D solidifying
- 14 A student is given a thermometer that reads 1°C in pure melting ice and 101°C in pure boiling water. She uses it to measure the temperature of some water before and after it is heated.

The increase in temperature of the water calculated from her results is

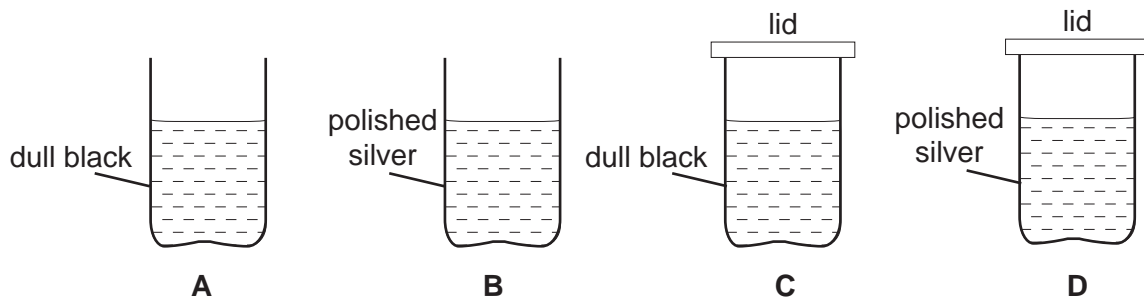
- A 1°C too low.
- B correct.
- C 1°C too high.
- D 2°C too high.

- 15 Fibre is used for home insulation in a cold country, as shown in the diagram.



Heat cannot easily escape through the ceiling because the fibre

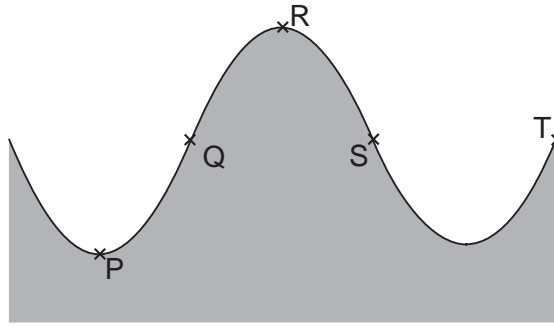
- A traps air.
 - B is warm.
 - C is tightly packed.
 - D heats the roof space.
- 16 The diagram shows four similar cans. Each can contains the same volume of water initially at 80 °C. After five minutes, which can will contain the **coolest** water?



- 17 Which line in the table correctly shows examples of transverse and longitudinal waves?

| | transverse | longitudinal |
|---|------------|--------------|
| A | gamma-rays | sound |
| B | infra-red | water waves |
| C | radio | light |
| D | sound | X-rays |

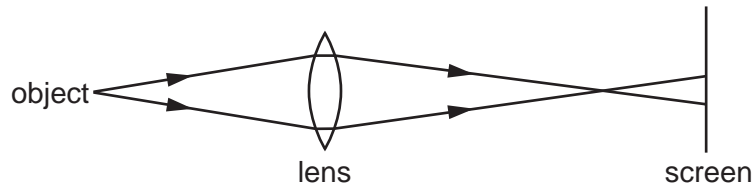
18 The diagram shows waves travelling on the sea.



Which points are one wavelength apart?

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

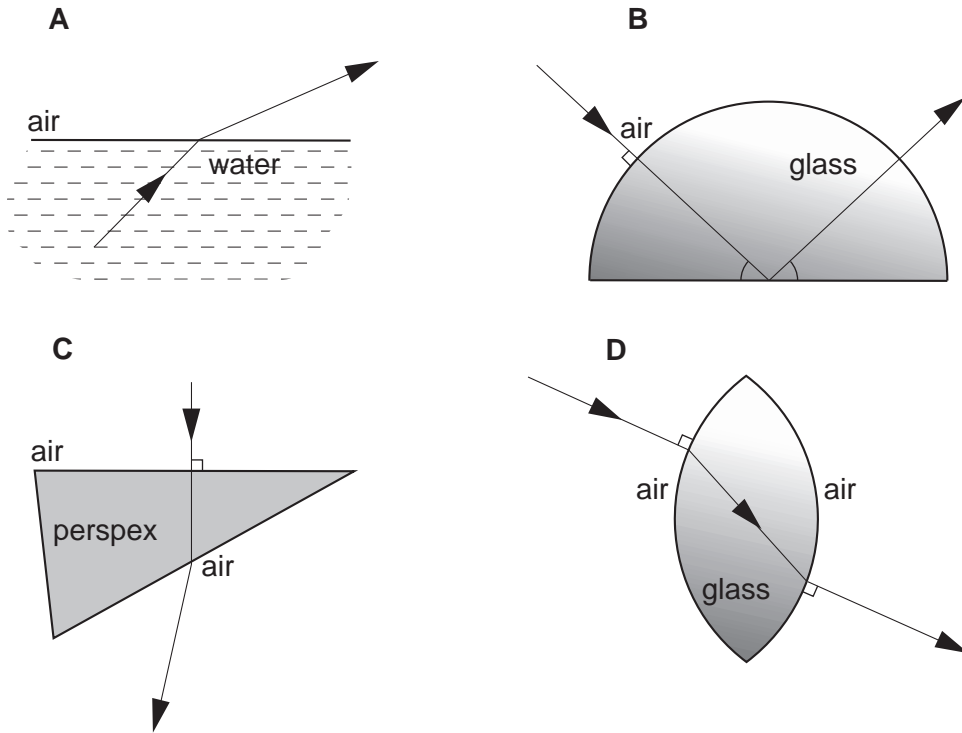
19 A lens forms a blurred image of an object on a screen.



How can the image be made sharp and in focus on the screen?

- A** by moving the object away from the lens and screen
B by moving the screen away from the lens and object
C by using a brighter object at the same position
D by using a lens of longer focal length at the same position

20 In which of the diagrams is the path of the light ray **not** correct?



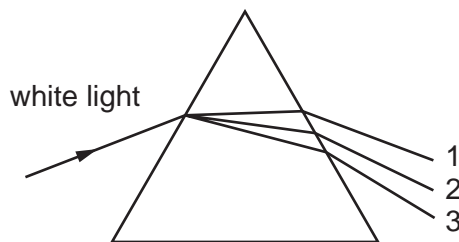
21 Radio waves, visible light and X-rays are all part of the electromagnetic spectrum.

What is the correct order of increasing wavelength?

shortest —————→ *longest*

- A radio waves visible light X-rays
- B radio waves X-rays visible light
- C X-rays radio waves visible light
- D X-rays visible light radio waves

22 A spectrum is formed when white light passes through a prism.

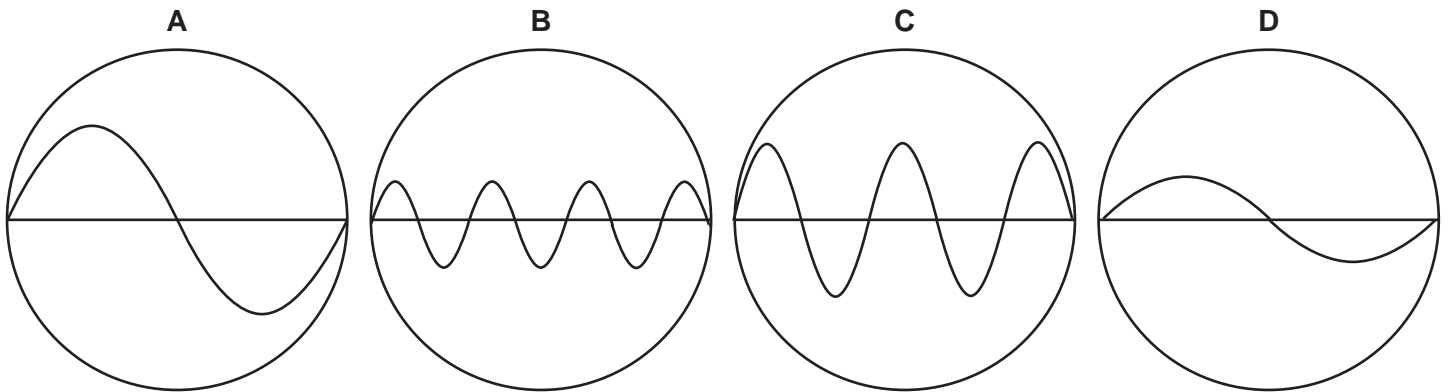


In which position are the colours green, red and yellow seen?

| | 1 | 2 | 3 |
|----------|-------|--------|--------|
| A | green | red | yellow |
| B | green | yellow | red |
| C | red | green | yellow |
| D | red | yellow | green |

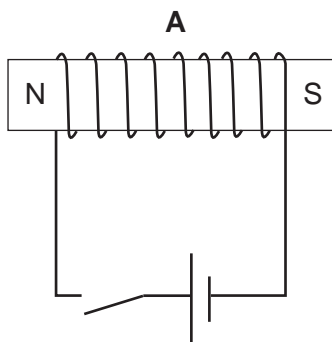
23 The diagrams represent sound waves displayed on an oscilloscope.

Assuming the controls of the oscilloscope remain the same for each sound, which diagram represents the quietest sound with the highest frequency?

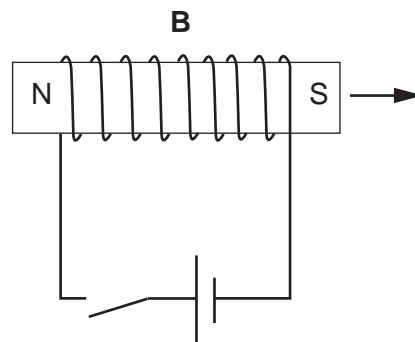


24 A permanent magnet can be demagnetised by using a solenoid and switching the current on then off.

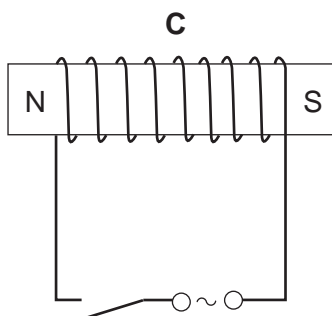
Which diagram shows the most effective method of producing demagnetisation?



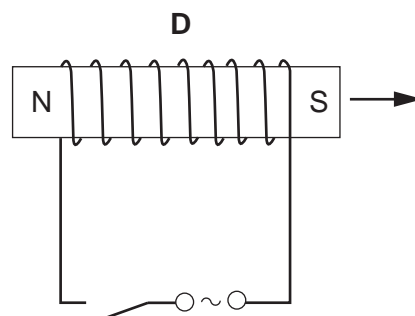
magnet left in place



magnet withdrawn before switching off



magnet left in place



magnet withdrawn before switching off

25 Four processes are used to charge an isolated metal sphere.

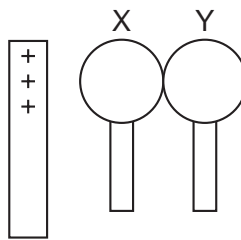
- P The sphere is earthed by touching it.
- Q The earth connection is removed from the sphere.
- R A charged rod is brought close to the sphere.
- S The charged rod is removed.

In which order should these processes be carried out to charge the sphere?

first ————— *last*

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

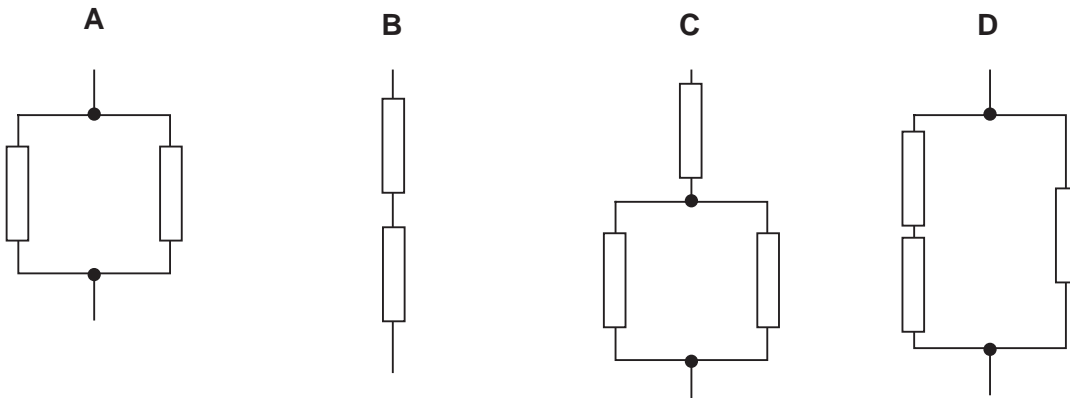
26 Two insulated metal spheres X and Y are initially in contact. While a positively charged rod is near X the spheres are moved apart. After this action X has a negative charge.



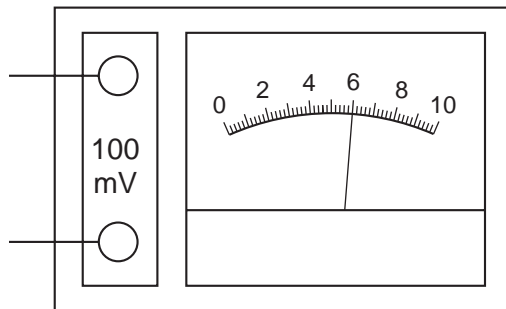
The charge on Y will be

- A negative and smaller than that on X.
- B negative and the same size as that on X.
- C positive and smaller than that on X.
- D positive and the same size as that on X.

27 Which combination of identical resistors gives the **lowest** total resistance?



28 The diagram shows a voltmeter adapted to measure a range from 0–100 mV. The voltmeter is measuring the potential difference in a circuit.



What is the reading on the voltmeter?

- A** 0.06 mV **B** 0.6 mV **C** 6 mV **D** 60 mV

29 In an a.c. electric circuit in a house, the switch for any device is always connected to the 'live' lead.

Why is this?

- A** No current ever flows in the neutral lead of the device.
B The device will be shorted if the switch is in the earth lead.
C The device can never be switched off if the switch is in the neutral lead.
D The device can only be isolated (made safe) if the switch is in the live lead.

- 30 A house-owner replaced a failed fuse for the lights of the house. When the lights were switched on, the new fuse also failed. The house-owner then used another fuse with a higher rating than the previous two.

Why was this not a sensible thing to do?

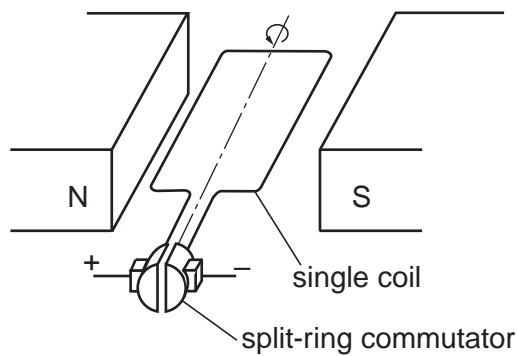
- A Fuses allow the circuit to work only if the rating is exactly right.
 - B The fuse has already melted because the rating was too high.
 - C Using a fuse with too high a rating would cause electric shocks.
 - D A fuse with a higher rating might allow the circuit to work, but the fault would not be corrected.
- 31 The diagram shows a beam of electrons entering a magnetic field. The direction of the field is into the page.



What will be the initial direction of the deflection of the electrons as the beam passes through the field?

- A into the page
- B out of the page
- C towards the bottom of the page
- D towards the top of the page

32 The diagram shows a two-pole single-coil electric motor.



The split-ring commutator reverses the current in the coil as it rotates.

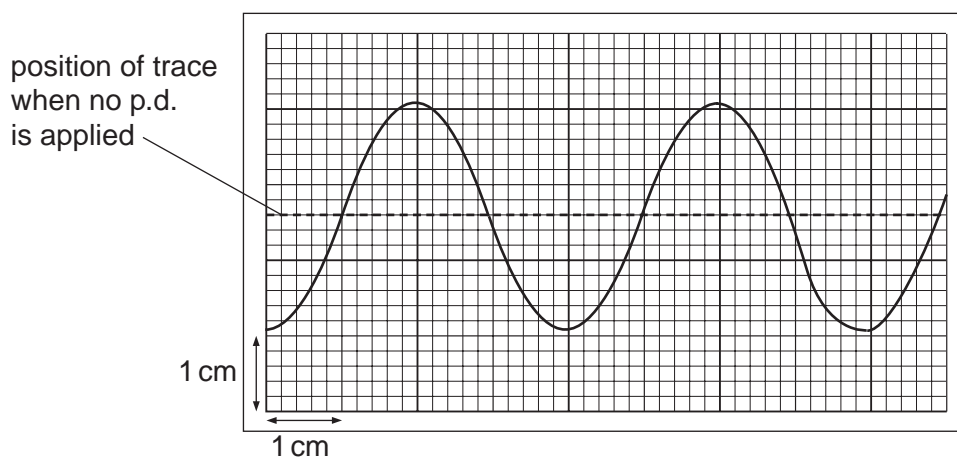
How many times is the current reversed if the coil is rotated once?

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

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

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

- 34 The diagram shows a trace on an oscilloscope set at 5 V/cm on the vertical axis.



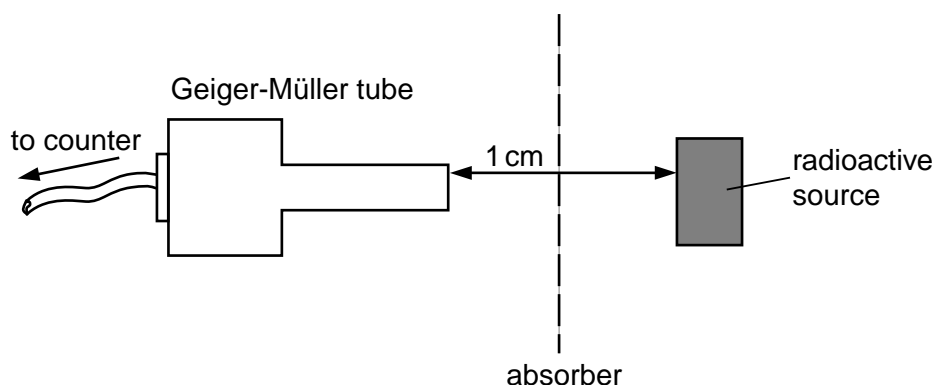
What is the maximum value of the potential difference being measured?

- A** 1.5 V **B** 3.0 V **C** 7.5 V **D** 15 V
- 35 A $24\ \Omega$ resistor is to be connected in series with a 12 V battery.
- What is the power loss in the resistor?
- A** 0.5 W **B** 6 W **C** 12 W **D** 24 W
- 36 Which of the following occurs in the decay of a radioactive nucleus?
- A** The nucleus absorbs another nucleus.
B The nucleus absorbs at least one form of radiation.
C The nucleus always splits into two equal fragments.
D The nucleus emits at least one form of radiation.
- 37 The table shows the possible properties of radioactive emissions.

Which emission could be a beta-particle?

| emission | charged | deflected in a magnetic field | level of ionisation |
|----------|---------|-------------------------------|---------------------|
| A | no | yes | none |
| B | yes | yes | none |
| C | yes | yes | weak |
| D | yes | no | weak |

38 A pupil investigates the penetrating power of radiation from a radioactive source.



The table shows her results.

| | |
|-----------------------------------------------------|-----------------------|
| background count | 25 counts per minute |
| count with source only | 630 counts per minute |
| count with source and paper absorber | 630 counts per minute |
| count with source and aluminium absorber 3 mm thick | 180 counts per minute |

The source emits

- A alpha and beta-particles.
- B beta-particles and gamma-rays.
- C beta-particles only.
- D gamma-rays only.

39 Which particle is positively charged?

- A alpha-particle
- B beta-particle
- C electron
- D neutron

40 Atoms P and Q are isotopes.

How does the composition of neutral atom P compare with neutral atom Q?

| | number of protons | number of neutrons | number of electrons |
|---|-------------------|--------------------|---------------------|
| A | different | different | different |
| B | different | same | same |
| C | same | different | same |
| D | same | same | different |