UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

PHYSICS **5054/11**

Paper 1 Multiple Choice **May/June 2012**

1 hour

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

* 2 1 3 7 4 1 5 5 4 0 *

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.

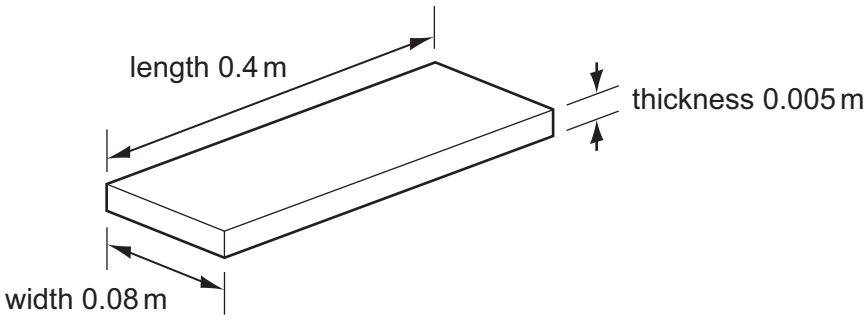
Each correct answer will score one mark. A mark will not be deducted for a wrong answer.
Any rough working should be done in this booklet.

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1 A manufacturer measures accurately the dimensions of a wooden floor tile.

The approximate dimensions of the tile are shown.



Which instruments are used to measure accurately each of these dimensions?

	length	thickness	width
A	metre rule	micrometer	vernier calipers
B	metre rule	vernier calipers	micrometer
C	micrometer	metre rule	vernier calipers
D	vernier calipers	micrometer	metre rule

2 Which pair of quantities includes one scalar and one vector?

A mass time

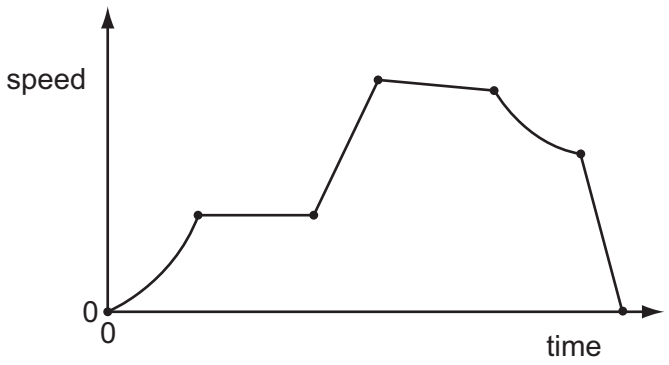
B temperature time

C temperature velocity

D velocity weight

3 The speed-time graph represents the journey of a car.

The dots separate different sections of the journey. There are six different sections.



How many sections represent the car moving with non-uniform acceleration?

A 0 **B** 1 **C** 2 **D** 3

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4 A steel ball is released just below the surface of thick oil in a cylinder.

During the first few centimetres of travel, what is the acceleration of the ball?

A constant and equal to $10\,m/s^2$

B constant but less than $10\,m/s^2$

C decreasing

D increasing

5 A hard stone hits the ground and comes to rest almost immediately.

As the stone hits the ground, what is the direction and the size of the force acting on the ground?

A downwards and equal to the weight of the stone

B downwards and larger than the weight of the stone

C upwards and equal to the weight of the stone

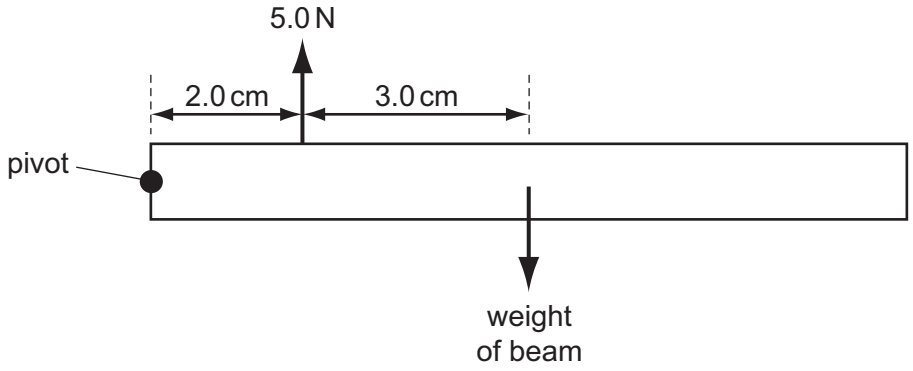
D upwards and larger than the weight of the stone

6 A car of mass 1500 kg is towing a trailer of mass 1100 kg along a level road. The acceleration of the car is $1.30\,m/s^2$.

Ignoring friction and air resistance, what is the driving force on the car?

A 1430 N **B** 1950 N **C** 2000 N **D** 3380 N

7 A beam pivoted at one end has a force of 5.0 N acting vertically upwards on it as shown. The beam is in equilibrium.

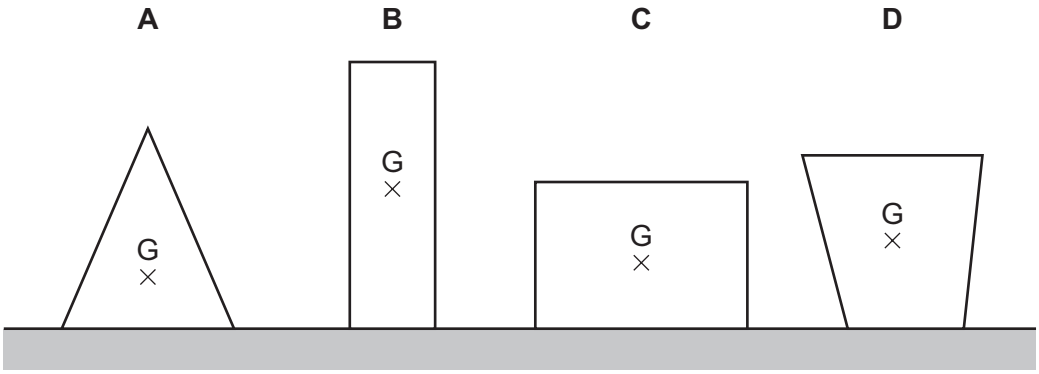


What is the weight of the beam?

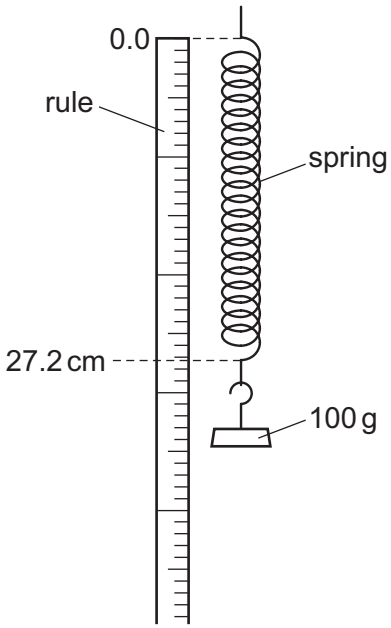
A 2.0 N **B** 3.0 N **C** 3.3 N **D** 5.0 N

8 Four objects of equal mass rest on a table. The centre of mass of each object is labelled G.

Which object is the least stable?



9 A 100 g mass is suspended from a spring next to a vertical metre rule. The top of the spring is level with the 0.0 cm mark. The bottom of the spring is level with the 27.2 cm mark.



The 100 g mass is replaced with a 600 g mass. The length of the spring is now 89.7 cm. The spring has not reached the limit of proportionality.

The 600 g mass is replaced with a 200 g mass. What is the length of the spring?

A 29.9 cm **B** 33.4 cm **C** 39.7 cm **D** 54.4 cm

10 A block of metal is taken from the Earth to the Moon. Which property of the block changes?

A density

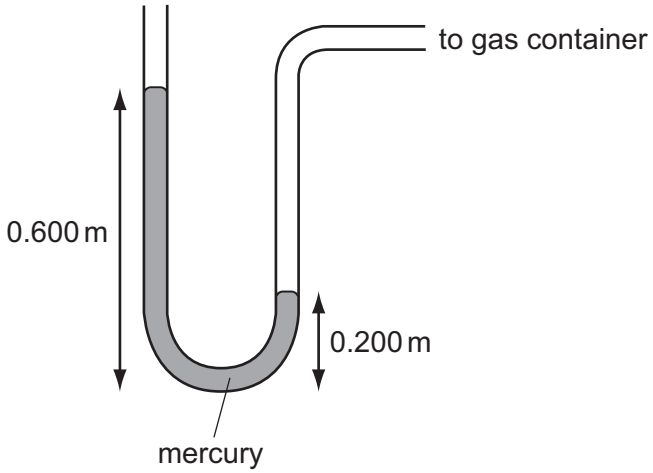
B mass

C volume

D weight

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11 The diagram shows a mercury manometer connected to a gas container.

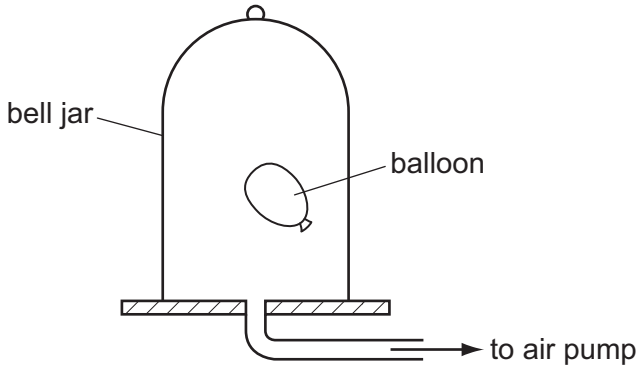


The density of mercury is 13 600 kg / m^3. The gravitational field strength g is 10 N / kg.

What is the pressure difference between the gas in the container and the atmosphere?

A 27 200 Pa **B** 40 800 Pa **C** 54 400 Pa **D** 81 600 Pa

12 A partially-inflated balloon is placed inside a bell jar. The bell jar is connected to an air pump.



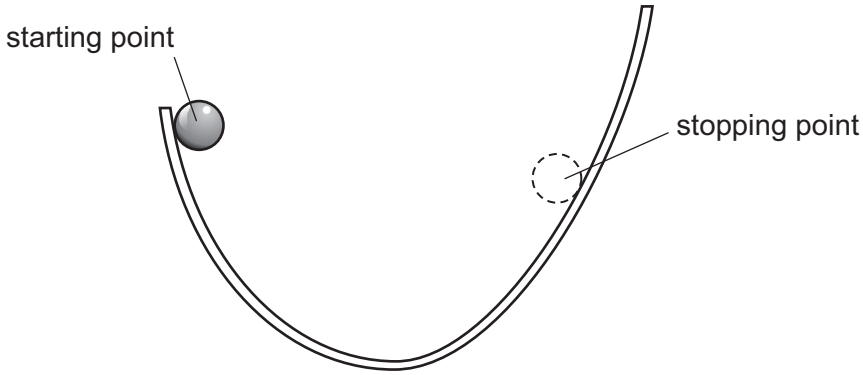
The air pump is switched on and air is removed from the bell jar.

What happens to the pressure and to the volume of the gas inside the balloon?

	pressure	volume
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

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13 A ball is held at rest on one side of a curved track.



The ball is released. It rolls down one side of the track and part of the way up the other side. It then stops, before rolling back down again. The height of the stopping point is less than that of the starting point.

What is the sequence of energy changes between starting and stopping for the first time?

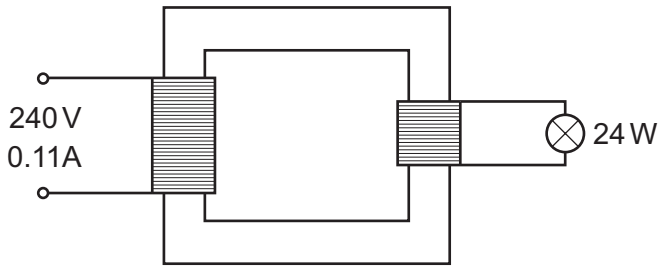
A potential energy → kinetic energy → potential energy

B potential energy → kinetic energy → heat → potential energy

C potential energy → heat → kinetic energy → potential energy

D potential energy → kinetic energy + heat → potential energy + heat

14 A transformer connected to a 240 V mains supply is used to light a 24 W lamp.



The input current to the transformer is 0.11 A and the input voltage is 240 V. The useful output power of the transformer is 24 W.

What is the efficiency of the transformer?

A 0.10 **B** 0.91 **C** 1.1 **D** 2.6

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15 A gas is enclosed in a container of fixed volume. It gains heat energy from an external source.

What happens to the molecules of the gas?

A They expand.

B They move faster inside the container.

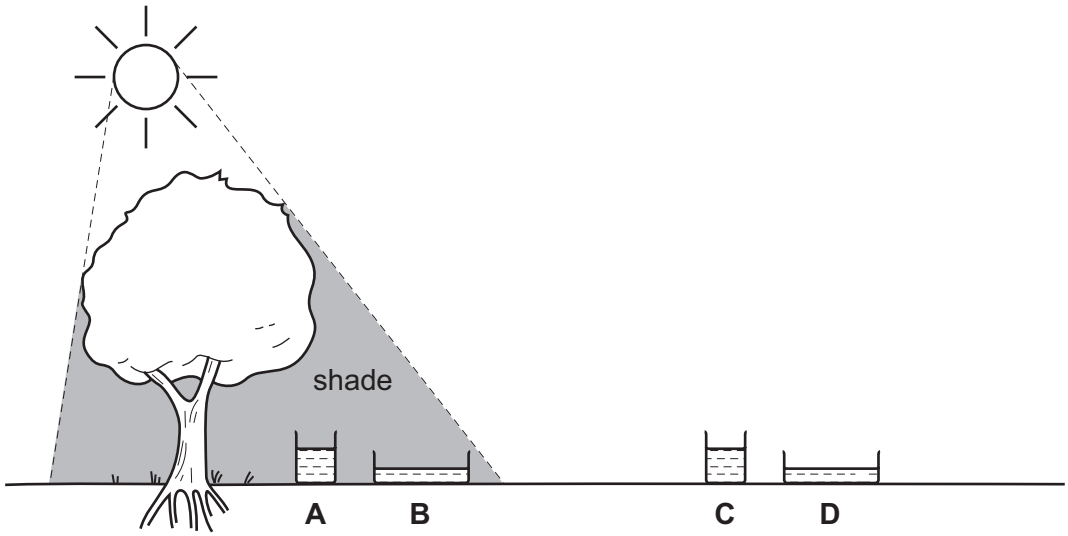
C They move further apart.

D They vibrate with greater frequency.

16 Four containers are filled with equal volumes of water at the same temperature.

Containers **A** and **B** are shaded by a tree. Sunlight falls on containers **C** and **D**.

From which container does all the water evaporate first?



17 A rod of metal is heated at one end.

Which statement best describes the conduction of heat through the metal?

A Atoms move from the hot end and hit electrons at the cold end.

B Atoms vibrate and hit atoms at the cold end.

C Free electrons move from the hot end and hit atoms further along the rod.

D Free electrons vibrate and pass energy to free electrons further along the rod.

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18 Many gas appliances such as ovens and heaters use a small flame to ignite the main burner.

To make sure that the small flame is burning, a temperature-measuring device is inserted into the flame.

What is the most suitable device to use?

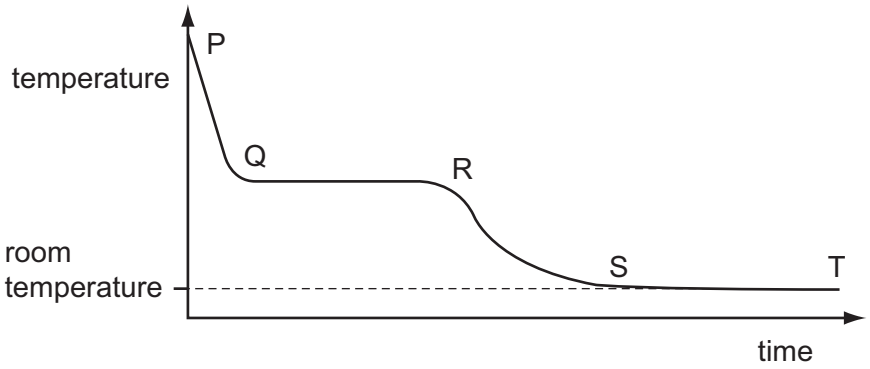
A a clinical thermometer

B a mercury manometer

C a thermocouple thermometer

D a water manometer

19 A hot liquid is allowed to cool. The graph shows the cooling curve.



In which part of the curve is latent heat released?

A PQ **B** QR **C** RS **D** ST

20 For the same temperature rise and the same original volume, which of the three states of matter expands the most and which state expands the least?

	expands most	expands least
A	gas	solid
B	liquid	gas
C	solid	gas
D	solid	liquid

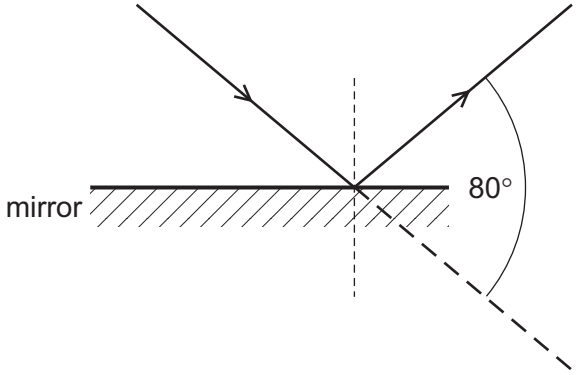
21 The speed of radio waves is c. A radio station transmits waves with a wavelength λ.

What is the frequency of the transmission?

A $\frac{c}{\lambda}$ **B** $\frac{\lambda}{c}$ **C** $\frac{1}{\lambda}$ **D** $c\lambda$

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22 Light is incident on a mirror and is reflected as shown.



What is the angle of incidence and the angle of reflection?

	angle of incidence / °	angle of reflection / °
A	40	40
B	40	50
C	50	40
D	50	50

23 Light is incident on one face of a glass block at an angle of incidence of 40°. The glass block is in air.

The refractive index of the glass is 1.46.

What is the angle of refraction inside the glass block?

A 26° **B** 27° **C** 58° **D** 70°

24 In a short-sighted eye, light from distant objects is not focused on the retina.

Where is this light focused and what type of lens is needed to correct the problem?

	where focused	lens needed
A	behind the retina	converging lens
B	behind the retina	diverging lens
C	in front of the retina	converging lens
D	in front of the retina	diverging lens

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25 Below are four statements about the uses of electromagnetic radiation.

Gamma rays are used in medical treatment.

Infra-red waves are used in sunbeds.

Microwaves are used in satellite television.

X-rays are used in intruder alarms.

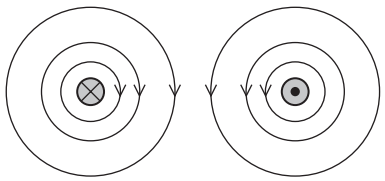
How many of these statements are correct?

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

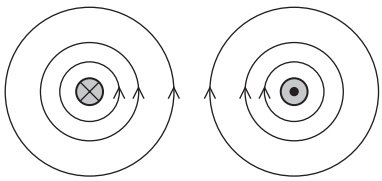
26 Two straight electrical conductors are parallel to one another. Each carries a current, one into the plane of the paper and one out of the plane of the paper.

Which diagram shows the magnetic field around the two wires?

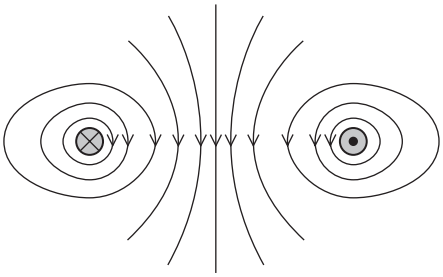
A



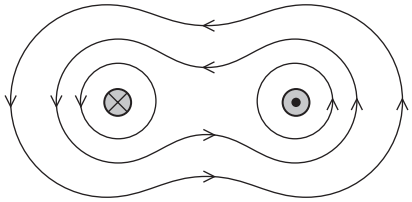
B



C



D



key

⊗ current into plane of paper

⊙ current out of plane of paper

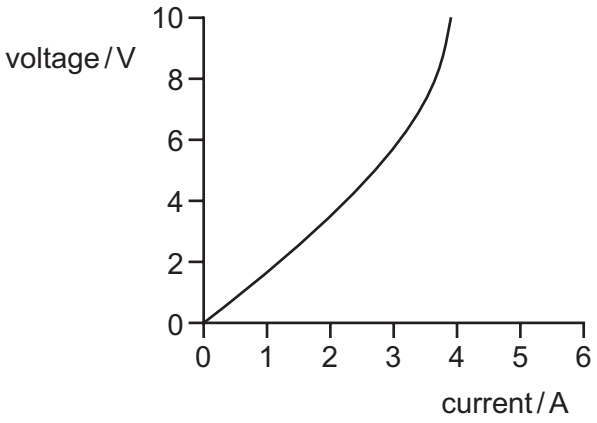
27 A polythene rod is rubbed with a duster. The duster then attracts small pieces of paper.

Are the rod and the duster charged or uncharged?

	rod	duster
A	charged	charged
B	charged	not charged
C	not charged	charged
D	not charged	not charged

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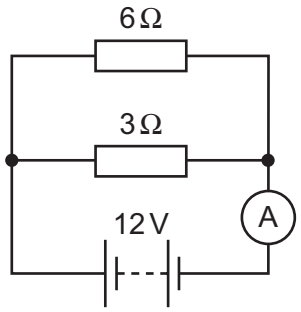
28 The voltage / current graph for a filament lamp is shown.



The voltage across the lamp increases. What happens to the temperature of the lamp and the resistance of the lamp?

	temperature	resistance
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

29 A 12 V battery is connected across a parallel arrangement of two resistors.



What is the reading on the ammeter?

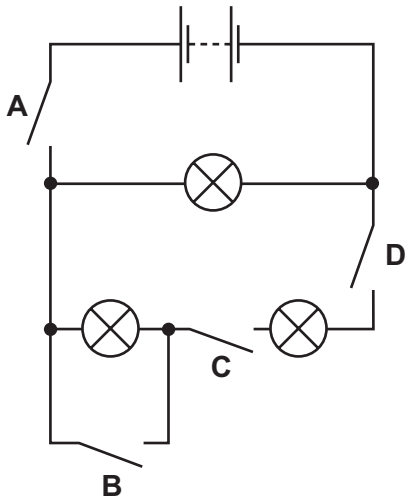
A 1.3 A **B** 2.0 A **C** 4.0 A **D** 6.0 A

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30 The circuit shown is set up and then all the switches are closed.

One switch is now opened and all the lamps are lit.

Which switch is opened?



31 A lamp connected to a 12 V supply converts energy at a rate of 36 W.

How much energy will be converted in 10 s?

A 30 J **B** 36 J **C** 120 J **D** 360 J

32 What causes the fuse to blow in a mains electrical circuit?

A a person touches the live wire

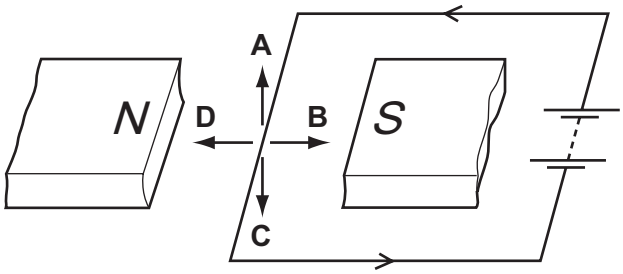
B a person touches the neutral wire

C the live wire touches the earth wire

D the neutral wire touches the earth wire

33 A current-carrying wire is placed between the poles of a magnet.

What is the direction of the force on the wire due to the current?



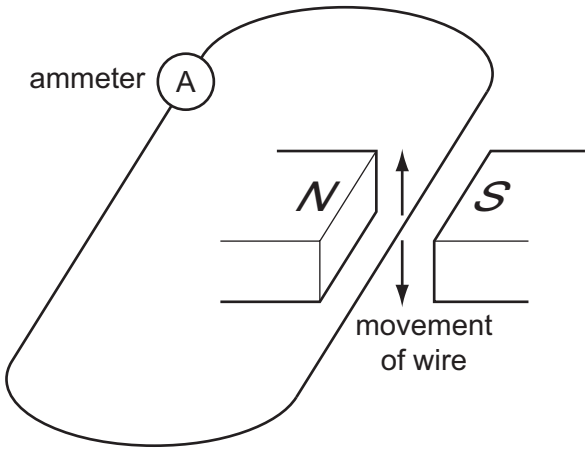
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34 A simple d.c. motor consists of a coil that rotates between the poles of a permanent magnet. The turning effect is increased by winding the coil on a metal cylinder.

Which metals are used to make the magnet and the cylinder?

	magnet	cylinder
A	iron	copper
B	iron	steel
C	steel	copper
D	steel	iron

35 A current is produced when a wire is moved between two magnets as shown.



Which device uses this effect?

A a battery

B a generator

C a motor

D an electromagnet

36 Why is a transformer used to connect a generator in a power station to a long-distance transmission line?

A to decrease the voltage and decrease the current

B to decrease the voltage and increase the current

C to increase the voltage and decrease the current

D to increase the voltage and increase the current

37 Which electrical component is used to store charge?

A capacitor

B relay

C resistor

D thermistor

38 The radioactive isotope radium-226 may be shown as $^{226}_{88}Ra$.

How many protons does an atom of radium contain?

A 44 **B** 88 **C** 138 **D** 226

39 When dealing with radioactive materials there are possible dangers.

Which statement is correct?

A Beta-particles can pass through skin and damage body cells.

B Materials that emit only alpha-particles must be kept in thick lead containers.

C Radioactive materials are safe to handle after two half-lives.

D Sources of gamma radiation are dangerous because they have long half-lives.

40 An isotope X is radioactive and has a half-life of 4 years. A sample initially contains 8000 atoms of X.

After how many years will the sample contain 1000 atoms of X?

A 4 **B** 8 **C** 12 **D** 16

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