UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

PHYSICS **5054/11**

Paper 1 Multiple Choice **May/June 2013**

1 hour

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

9093782875

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.
DO **NOT** WRITE IN ANY BARCODES.

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.

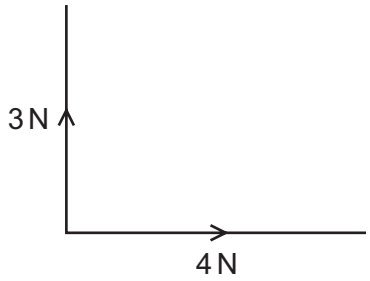
Read the instructions on the Answer Sheet very carefully.

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.
Electronic calculators may be used.

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

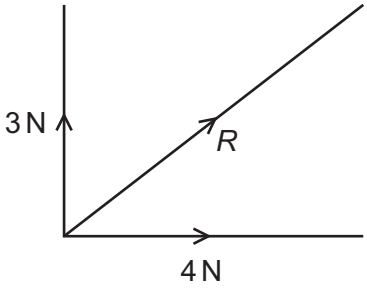
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1 Forces of 3 N and 4 N act as shown in the diagram.

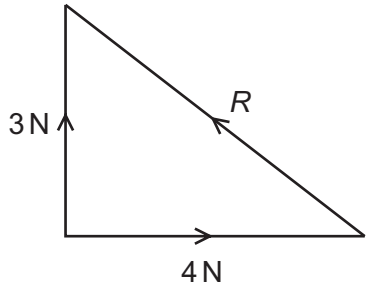


Which diagram shows the resultant *R* of these two forces?

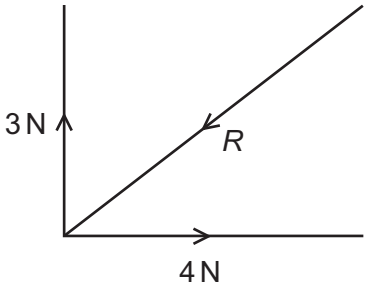
A



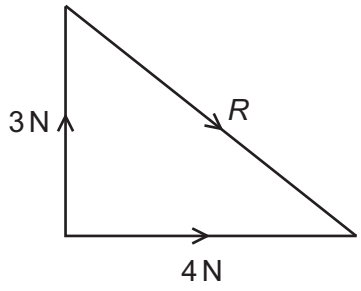
B



C

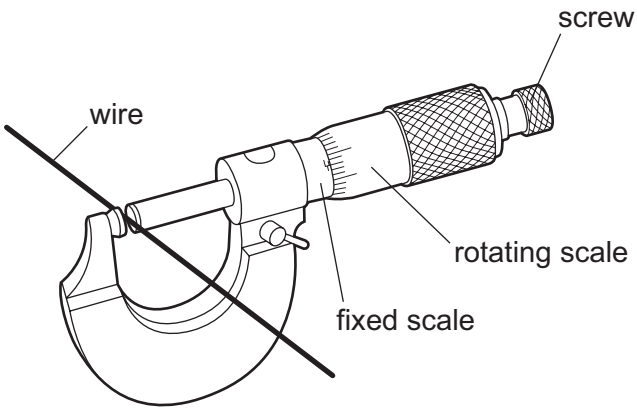


D



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2 A micrometer is used to measure the diameter of a uniform wire.



What is done to obtain an accurate answer?

A Find the reading and add or subtract the zero error.

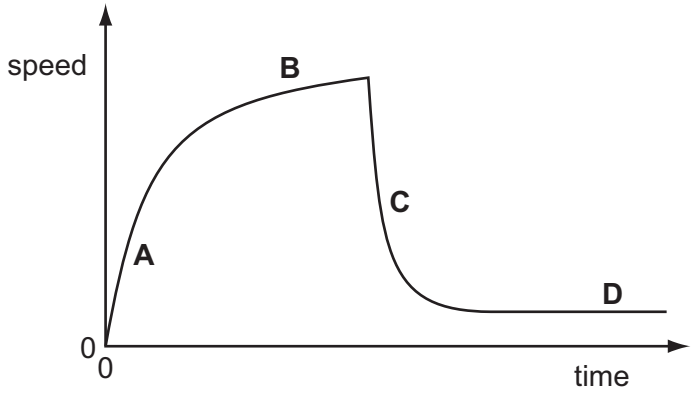
B Make the micrometer horizontal.

C Subtract the fixed scale reading from the rotating scale reading.

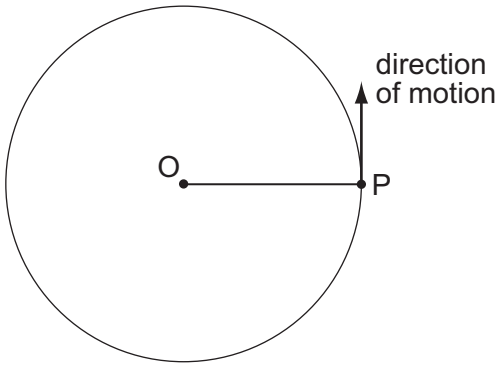
D Subtract the rotating scale reading from the fixed scale reading.

3 The speed-time graph for a falling skydiver is shown below. As he falls, the skydiver spreads out his arms and legs and then opens his parachute.

Which part of the graph shows the skydiver falling with terminal velocity?



4 A particle P is moving in a horizontal circle about O. P moves at constant speed.



Which statement is true?

A A force of constant size acts on P in the direction of motion.

B A force of constant size acts on P towards O.

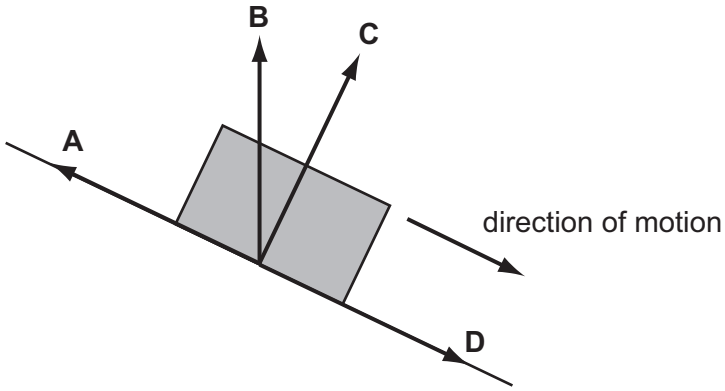
C The force on P varies in size as it moves around the circle.

D There is no resultant force acting on P.

5 A body slides down a frictionless slope as shown.

As the body presses on the surface, the surface pushes back on the body. The force of the surface on the body is sometimes called the reaction force.

In which direction does the reaction force act?



6 Paper is sold in packets labelled $80\,g/m^2$. This means that a sheet of paper of area $10\,000\,cm^2$ has a mass of 80 g.

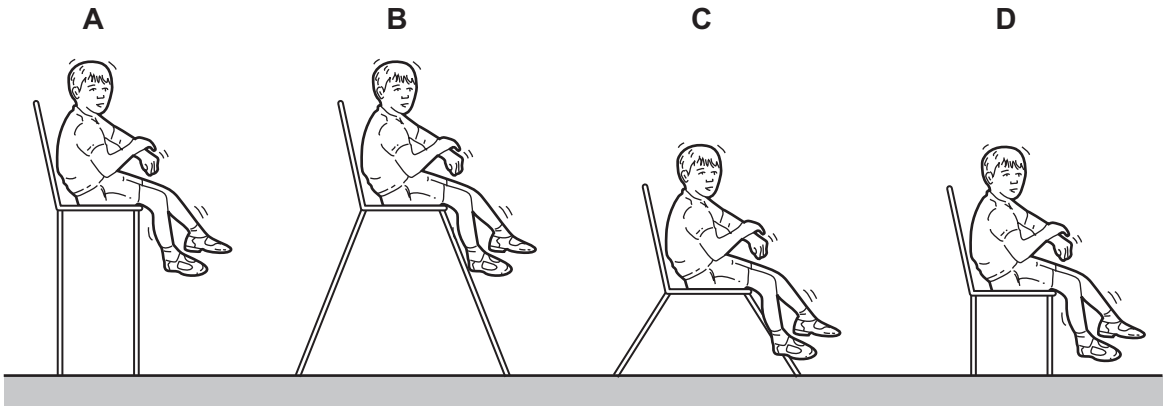
The thickness of each sheet is 0.11 mm.

What is the density of the paper?

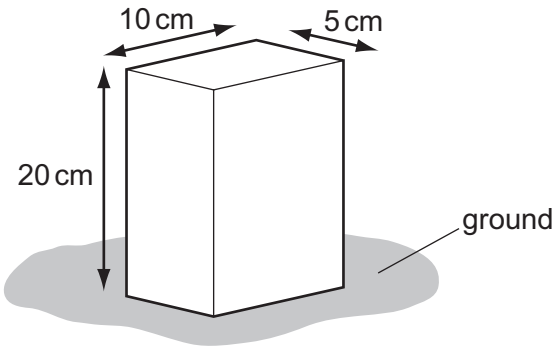
A $0.073\,g/cm^3$ **B** $0.088\,g/cm^3$ **C** $0.73\,g/cm^3$ **D** $0.88\,g/cm^3$

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7 Which chair is the **least** stable if the child moves?



8 A brick of weight 80 N stands upright on the ground as shown.



What is the pressure it exerts on the ground?

A 0.080 N / cm^2 **B** 0.40 N / cm^2 **C** 0.80 N / cm^2 **D** 1.6 N / cm^2

9 An airtight container holds a fixed mass of gas. Its pressure and volume are measured on four occasions when the temperature is 20 °C.

The results are shown in the table. Three sets of readings are correct.

Which set of readings is **not** correct?

	pressure / kPa	volume / cm^3
A	120	36
B	100	48
C	80	60
D	60	80

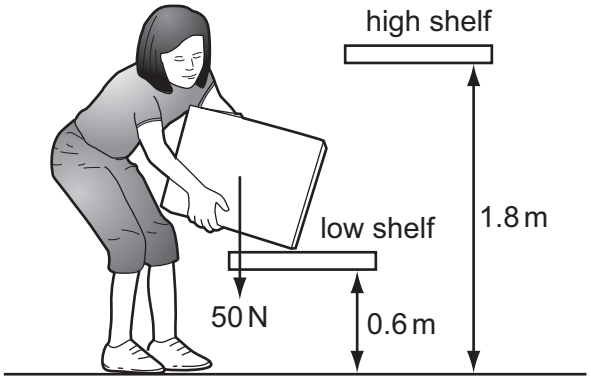
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10 Energy is released in some power stations and in the Sun by either nuclear fission or nuclear fusion.

Which type of nuclear reaction applies in each case?

	power station	Sun
A	fission	fission
B	fission	fusion
C	fusion	fission
D	fusion	fusion

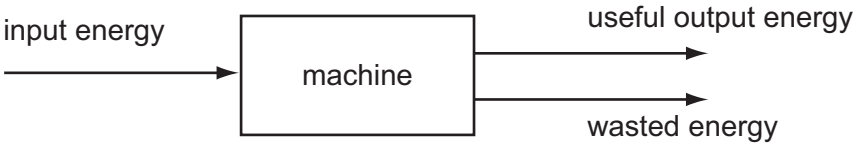
11 The diagram shows a girl lifting a box of weight 50 N from a low shelf to a high shelf.



How much work is done on the box?

A 30 J **B** 60 J **C** 90 J **D** 120 J

12 The diagram shows the energy transfer through a machine.



The machine is 50% efficient.

Which equation is correct?

A input energy = useful output energy

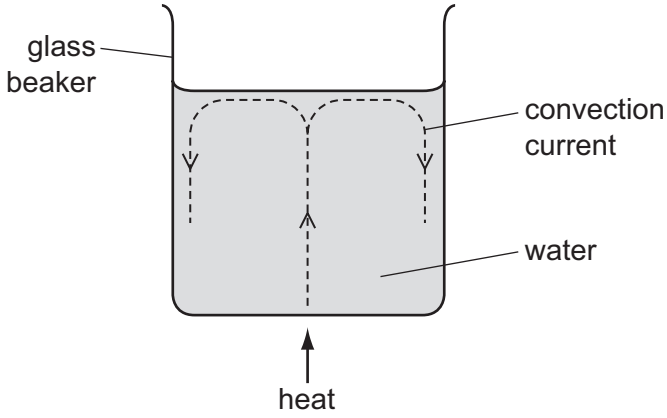
B useful output energy = input energy + wasted energy

C wasted energy = input energy + useful output energy

D wasted energy = useful output energy

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13 A glass beaker contains water. When the centre of the base of the beaker is heated, a convection current is set up.



Which statement explains this?

A The evaporation of water causes water molecules to rise to the surface.

B The expansion of water molecules causes them to rise to the surface.

C The water above the heat source rises because it becomes less dense.

D The water at the sides sinks because it becomes less dense.

14 Two identical metal plates are painted, one matt (dull) white and the other matt black. These are placed at equal distances from a radiant heater as shown. The heater is turned on for five minutes.



Which metal plate absorbs more energy and which plate emits more energy in this time?

	absorbs more	emits more
A	black	black
B	black	white
C	white	black
D	white	white

15 Using an electric kettle, 200 g of water at 100 °C is converted into steam at 100 °C in 300 seconds.

The specific latent heat of steam is 2250 J / g.

What is the average electrical power used?

A $\frac{2250}{300 \times 200}$ W

B $\frac{200 \times 2250}{300}$ W

C $\frac{300 \times 2250}{200}$ W

D $200 \times 300 \times 2250$ W

16 When a gas in a container of fixed volume is heated, the pressure of the gas increases.

Which statement explains this?

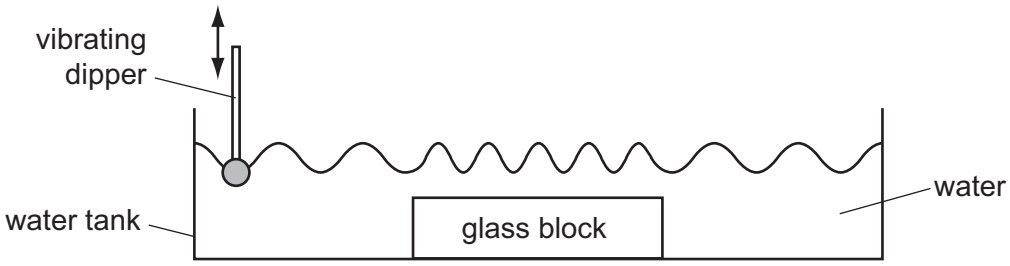
A The molecules expand and get heavier, so they hit each other harder.

B The molecules have less room to move, so they collide with each other more frequently.

C The molecules hit the walls harder and less frequently.

D The molecules move faster, so they collide with the walls more frequently.

17 A ripple tank is used to show wave behaviour. The dipper vibrates up and down at a constant frequency.



What happens to the frequency and to the speed of the wave as it reaches the glass block?

	frequency	speed
A	decreases	decreases
B	decreases	increases
C	remains the same	decreases
D	remains the same	increases

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18 A wave has a frequency of 10 kHz.

Which pair of values of its speed and wavelength is possible?

	speed / m/s	wavelength / m
A	330	0.33
B	330	33
C	3.0×10^8	30
D	3.0×10^8	3.0×10^4

19 Which characteristics describe an image formed by a vertical plane mirror?

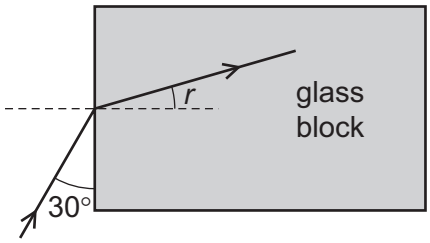
A real and inverted

B virtual and not inverted

C real and larger than the object

D virtual and smaller than the object

20 A ray of light meets the face of a glass block at an angle of 30° as shown.



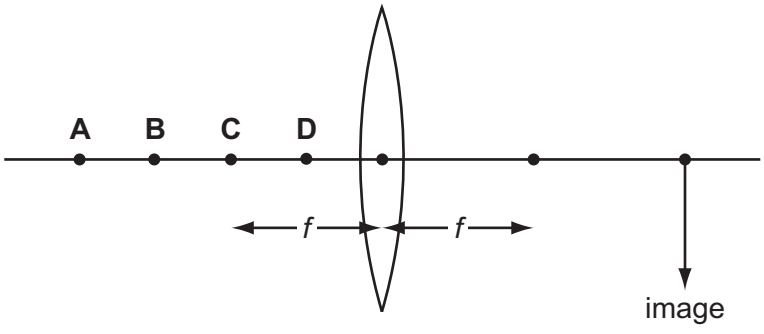
The refractive index of the glass is 1.5.

What is the angle of refraction *r* inside the glass block?

A 19° **B** 20° **C** 35° **D** 40°

21 The diagram shows a thin converging lens of focal length *f*.

Where must an object be placed to produce a real image in the position shown?



22 Which wave property has the same value for all X-rays travelling in air?

A amplitude

B frequency

C speed

D wavelength

23 Which range is the approximate range of audible frequencies for a human?

A 0.2 Hz → 200 Hz

B 2 Hz → 2000 Hz

C 20 Hz → 20 000 Hz

D 200 Hz → 2 000 000 Hz

24 Which row correctly compares the speeds of sound in air, liquid and solid?

	highest→ lowest		
A	air	liquid	solid
B	air	solid	liquid
C	liquid	air	solid
D	solid	liquid	air

25 A guitar string is made to vibrate.

What makes the pitch of the note rise?

A a decrease in the amplitude of vibration

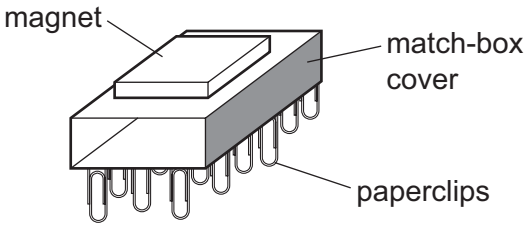
B a decrease in the frequency of vibration

C an increase in the amplitude of vibration

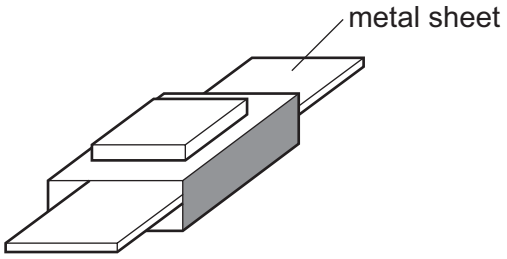
D an increase in the frequency of vibration

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26 A teacher sticks a magnet to the top surface of a match-box cover. The bottom surface is placed in a small tray of iron paperclips. As the match-box cover is lifted up, a large number of paperclips are held on the bottom surface.



Sheets of metal are placed inside the match-box cover, between the magnet and the paperclips.



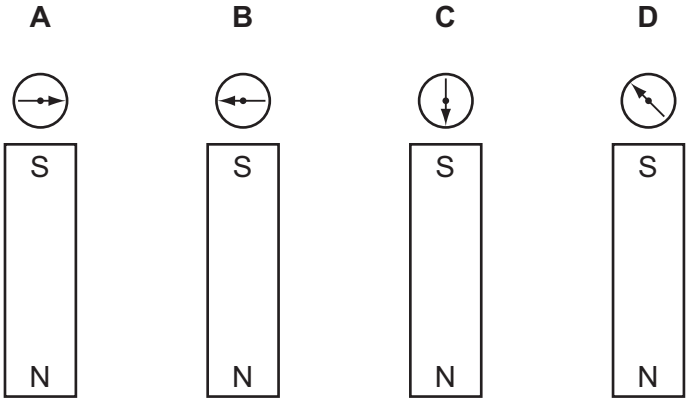
When sheet X is placed inside, the paperclips stay attached. When sheet Y is placed inside, all the paperclips fall off.

Which metals are the sheets made from?

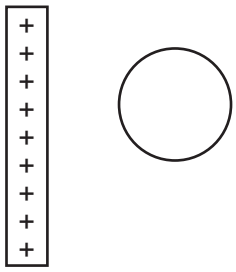
	sheet X	sheet Y
A	aluminium	copper
B	copper	iron
C	iron	aluminium
D	iron	copper

27 The diagrams show a small compass close to a strong bar magnet.

Which diagram shows the correct compass direction?

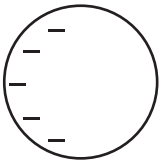


28 A positively-charged rod is held close to, but not touching, an isolated metal sphere.

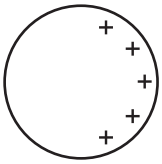


Which diagram shows the charges that are induced on the sphere?

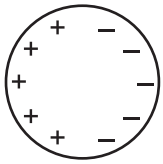
A



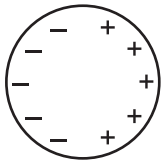
B



C



D



29 A lightning flash carries 40 C of charge and lasts for 5.0 ms.

What is the average current in the flash?

A 0.20 A **B** 8.0 A **C** 200 A **D** 8000 A

30 Which of the following is equivalent to 1 V?

A 1 J / A

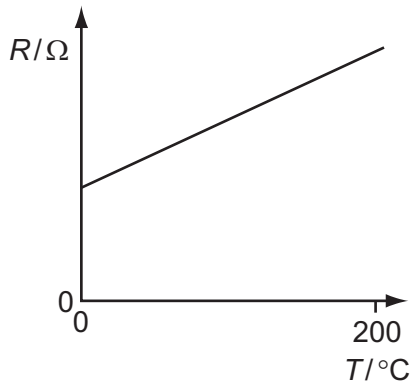
B 1 J / C

C 1 J / s

D 1 J / W

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31 The electrical resistance of a metal wire varies with temperature as shown.



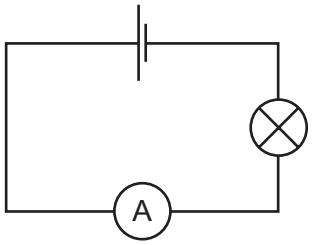
The resistance of the wire at 0 °C is 1.00 Ω and at 100 °C is 1.40 Ω.

What is the resistance of the wire at 200 °C?

A 1.80 Ω **B** 1.96 Ω **C** 2.00 Ω **D** 2.80 Ω

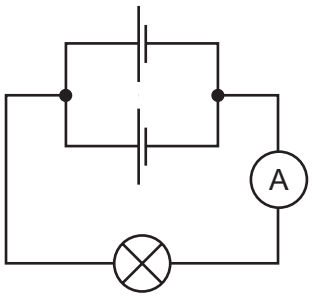
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32 A cell is connected in series with an ammeter and a lamp. The reading on the ammeter is 1 A.

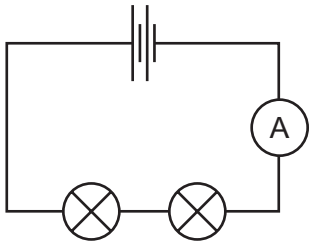


In which circuit, using identical lamps, ammeters and cells, is the reading on the ammeter 2 A?

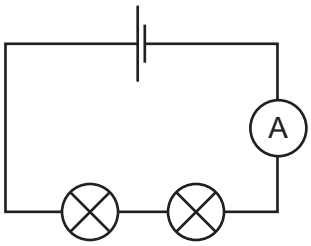
A



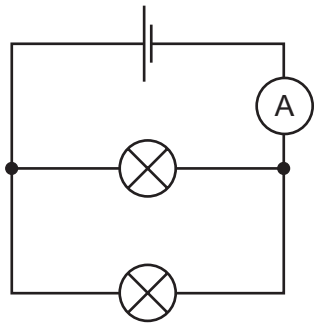
B



C

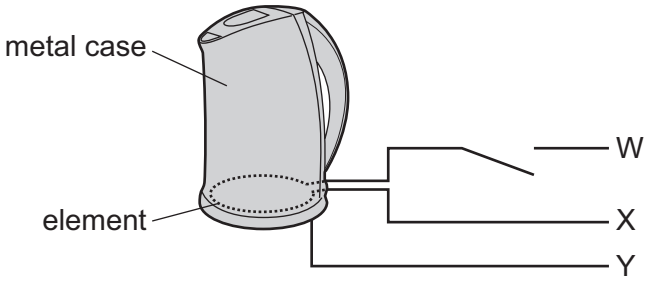


D



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33 The diagram represents part of a household circuit containing an electric kettle.

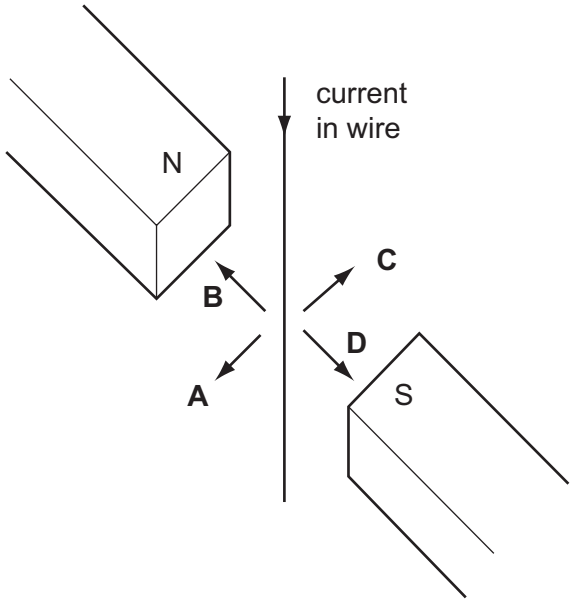


Which row correctly identifies the wires W, X and Y?

	W	X	Y
A	earth	live	neutral
B	live	neutral	earth
C	live	earth	neutral
D	neutral	live	earth

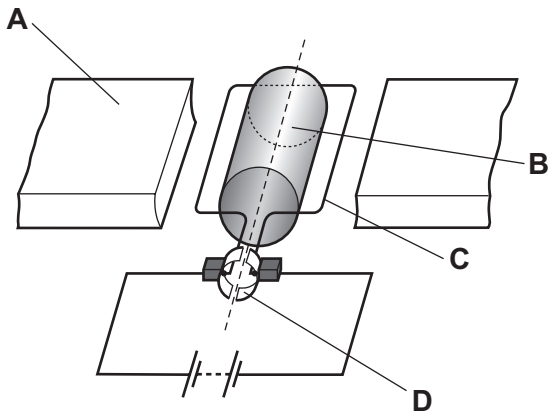
34 A wire hangs between the poles of a magnet.

When there is a current in the wire, in which direction does the wire move?

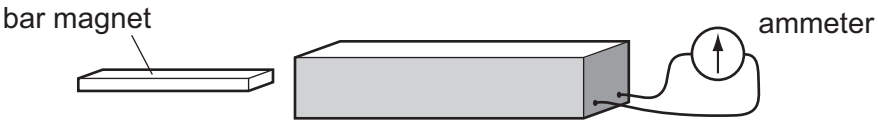


35 The diagram shows a simple d.c. motor.

Which labelled part is the commutator?



36 Two leads emerging from a box are connected to a sensitive ammeter.



When a bar magnet moves towards the open end of the box, the needle of the ammeter deflects to the right. When the bar magnet stops, the needle returns to zero.

What is inside the box?

A a coil alone

B a coil connected in series with a cell

C a light-dependent resistor (LDR) alone

D an LDR in series with a cell

37 What is used in a cathode-ray oscilloscope to cause the vertical movement of the trace?

A a horizontal electric field

B a horizontal magnetic field

C a vertical electric field

D a vertical magnetic field

38 Which component stores energy in a time-delay circuit?

A capacitor

B circuit breaker

C light-dependent resistor

D thermistor

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39 A school keeps radioactive sources for use in radioactivity experiments in a laboratory.

The background radiation is measured at the start of an experiment.

Which statement is correct?

A The background radiation is caused by the school's radioactive sources in the laboratory.

B The background radiation is present when there are no radioactive sources in the laboratory.

C The background radiation is radiation that is not detected in radioactivity experiments.

D The background radiation is the same in laboratories in different countries.

40 Which nuclides have the same number of neutrons in a nucleus?

A $^{12}_{5}\mathrm{B}$ and $^{12}_{6}\mathrm{C}$

B $^{1}_{1}\mathrm{H}$ and $^{2}_{1}\mathrm{H}$

C $^{12}_{6}\mathrm{C}$ and $^{13}_{7}\mathrm{N}$

D $^{14}_{6}\mathrm{C}$ and $^{14}_{7}\mathrm{N}$

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