Cambridge
O Level

Cambridge International Examinations
Cambridge Ordinary Level

PHYSICS **5054/11**

Paper 1 Multiple Choice **October/November 2017**

1 hour

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

* 4 6 2 9 7 1 9 2 9 0 *

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.
Do not use staples, paper clips, 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.

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1 Which list contains only scalar quantities?

A acceleration, displacement, velocity

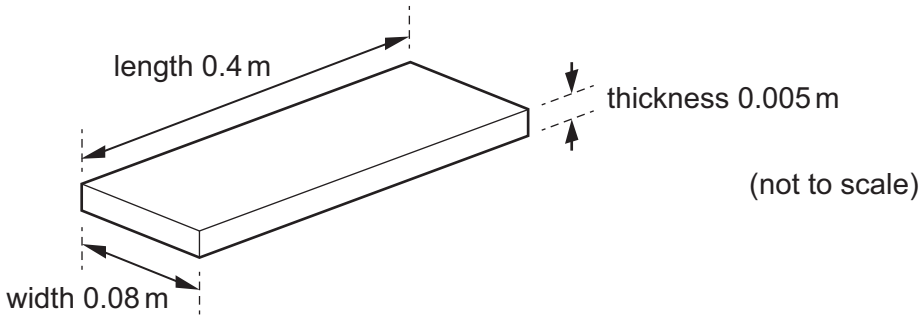
B distance, force, speed

C force, length, time

D length, mass, speed

2 A manufacturer measures the three dimensions of a wooden floor tile using three different instruments.

The approximate dimensions of the tile are shown.

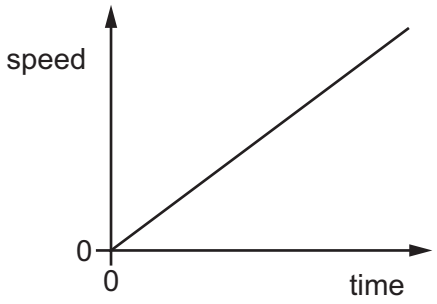


Which instruments are used to measure accurately each of these dimensions?

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

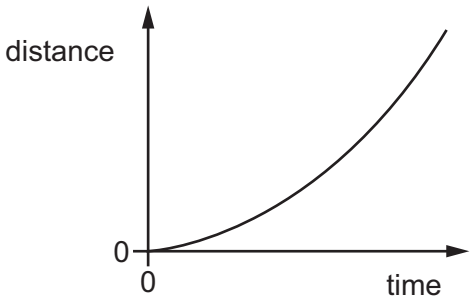
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3 The speed-time graph represents a short journey.

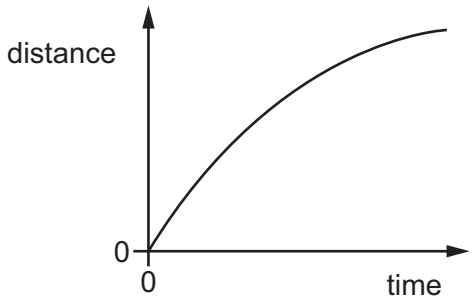


Which distance-time graph represents the same journey?

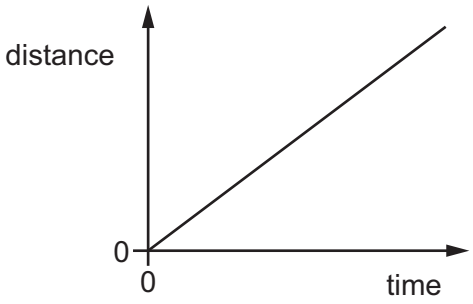
A



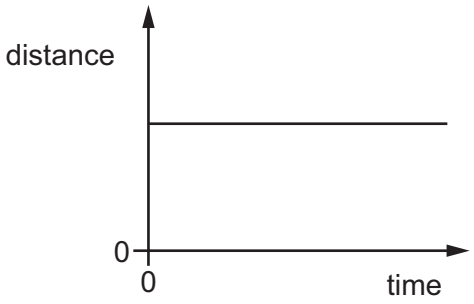
B



C



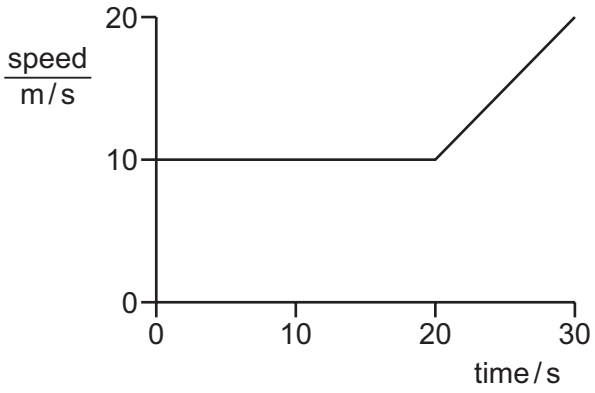
D



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[Turn over

4 An object travels for 20 s with a constant speed of 10 m / s. For the next 10 s, it accelerates uniformly to 20 m / s.



What is the total distance travelled by the object in the 30 s?

A 300 m **B** 350 m **C** 400 m **D** 450 m

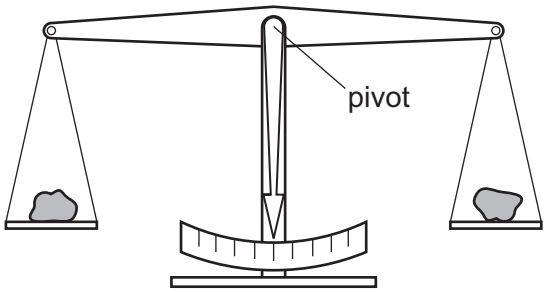
5 A skydiver falls at terminal velocity. He then opens his parachute.

Which row gives the direction of the resultant force on the skydiver and the direction of the acceleration of the skydiver immediately after the parachute opens?

	resultant force	acceleration
A	downwards	downwards
B	downwards	upwards
C	upwards	downwards
D	upwards	upwards

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6 The diagram shows two objects on a beam balance.



The beam balance is in equilibrium.

Which quantities may be different?

A the masses of the two objects

B the moments about the pivot of the two objects

C the volumes of the two objects

D the weights of the two objects

7 A metal wire is suspended from a support and loads of different mass are attached to the lower end.

The table shows how the extension of the wire depends on the mass of the load.

mass / kg	0	2.0	4.0	6.0	8.0	10.0
extension / mm	0	0.35	0.70	1.05	1.50	2.05

Between which values of mass does the limit of proportionality lie?

A 0 and 2.0 kg

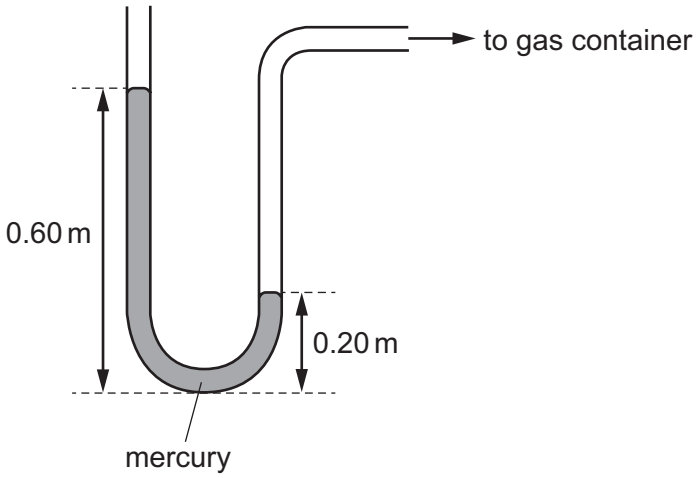
B 4.0 kg and 6.0 kg

C 6.0 kg and 8.0 kg

D 8.0 kg and 10.0 kg

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



The density of mercury is 14 000 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 28 000 Pa **B** 42 000 Pa **C** 56 000 Pa **D** 84 000 Pa

9 An astronaut on the Moon drops a tool box of mass 3.0 kg. It falls from rest and its kinetic energy as it hits the surface is 0.96 J.

At which speed does the tool box hit the surface of the Moon?

A 0.46 m / s **B** 0.57 m / s **C** 0.64 m / s **D** 0.80 m / s

10 A car travels a distance of 200 m in 20 s. The engine of the car provides a driving force of 1000 N.

What is the power output of the engine?

A 0.25 W **B** 4.0 W **C** 100 W **D** 10 000 W

11 A gas is heated in a closed container of constant volume.

What happens to the molecules of the gas?

A They collide with the walls with less force.

B They expand.

C They move faster.

D They move further apart.

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12 Scientists believe that some lakes are shrinking because of evaporation.

What increases the rate of evaporation?

A a decrease in the surface area

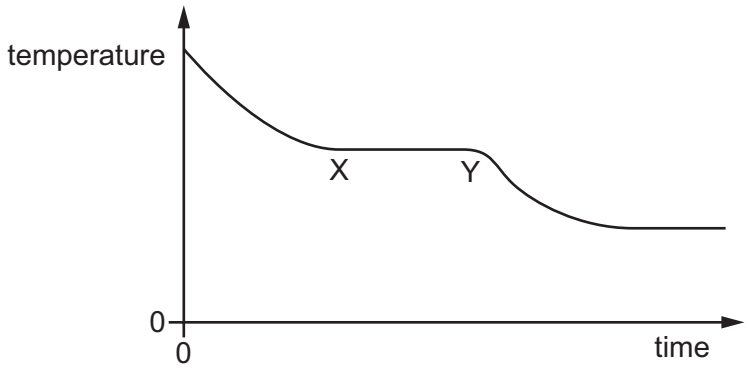
B a fall in water temperature

C an increase in the depth of the lake

D wind blowing across the surface

13 Solid wax is melted in a boiling tube and then allowed to cool.

The graph shows the cooling curve.



What is happening between points X and Y?

A The liquid is at its boiling point.

B The liquid is turning to solid.

C The solid has reached room temperature.

D The solid is turning to liquid.

14 During boiling and during melting, a substance either takes in energy or gives out energy.

Which row gives the energy transfer corresponding to the change of state?

	during boiling	during melting
A	gives out energy	gives out energy
B	gives out energy	takes in energy
C	takes in energy	gives out energy
D	takes in energy	takes in energy

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[Turn over

15 The temperature of a 50 g mass of a metal is raised by 40 °C. The specific heat capacity of the metal is 0.40 J / (g °C).

How much thermal energy is supplied?

A 0.32 J **B** 0.50 J **C** 500 J **D** 800 J

16 In which substance is the conduction of thermal energy mainly due to the movement of electrons?

A air

B ice

C iron

D water

17 Four similar metal plates are the same distance from a heater that emits infra-red radiation.

The plates are painted dull black, dull white, shiny black and shiny white.

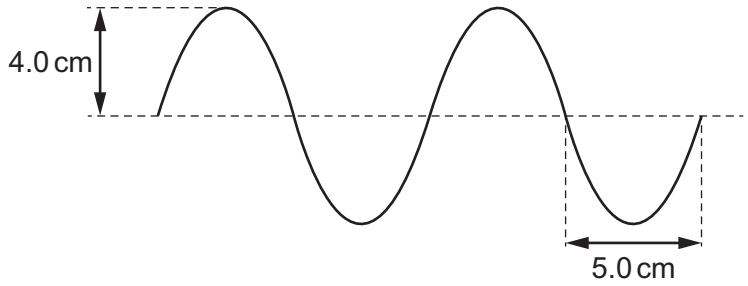
Which plate absorbs the most radiation and which plate reflects the most radiation?

	absorbs most radiation	reflects most radiation
A	dull black	dull white
B	dull black	shiny white
C	shiny black	dull black
D	shiny white	dull black

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18 A wave is travelling in water in a glass-sided tank.

The diagram shows a side view of the wave at one instant.



What are the amplitude and the wavelength of the wave?

	amplitude / cm	wavelength / cm
A	4.0	5.0
B	4.0	10
C	8.0	5.0
D	8.0	10

19 An earthquake wave travels through the solid surface of the Earth from east to west. The solid surface vibrates in a north-south direction.

How can the earthquake wave be described?

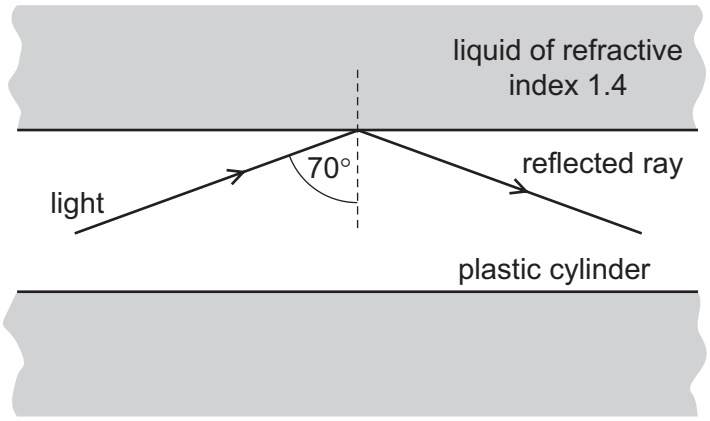
A electromagnetic

B longitudinal

C sound

D transverse

20 A solid plastic cylinder is immersed in a liquid of refractive index 1.4. Light travelling in the plastic cylinder strikes the inside surface at an angle of incidence of 70°. The light undergoes total internal reflection.



What are the values of the critical angle in the plastic and the refractive index of the plastic?

	critical angle in plastic	refractive index of plastic
A	greater than 70°	greater than 1.4
B	greater than 70°	less than 1.4
C	less than 70°	greater than 1.4
D	less than 70°	less than 1.4

21 What is the name and shape of the lens used to correct short sight?

	name of lens	shape of lens
A	converging	
B	converging	
C	diverging	
D	diverging	

22 An object is placed in front of a converging lens. The lens forms a magnified image of the object on a screen.

Which statement is correct?

A The distance between the object and the lens is greater than the focal length.

B The image formed is a virtual image.

C The image is the right way up.

D The lens is acting as a magnifying glass.

23 A type of electromagnetic radiation possesses the following properties.

- It is ionising.
- Its frequency is higher than the frequency of microwaves.
- It is not detected by the human eye.

What is this radiation?

A gamma rays

B infra-red

C light

D radio waves

24 Which row gives the speed of sound in air, in water and in steel?

	speed in air m/s	speed in water m/s	speed in steel m/s
A	330	1500	6000
B	330	6000	1500
C	6000	330	1500
D	6000	1500	330

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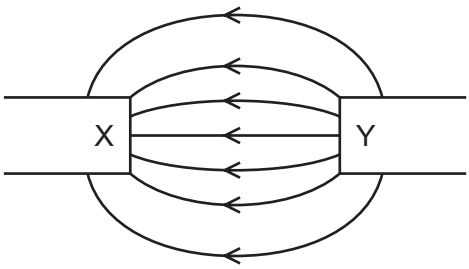
[Turn over

25 As a sound wave travels from one medium to another, its wavelength increases.

What happens to the frequency and to the speed of the sound?

	frequency	speed
A	decreases	decreases
B	decreases	increases
C	stays constant	decreases
D	stays constant	increases

26 The diagram shows the pattern and the direction of the magnetic field between two magnetic poles X and Y.

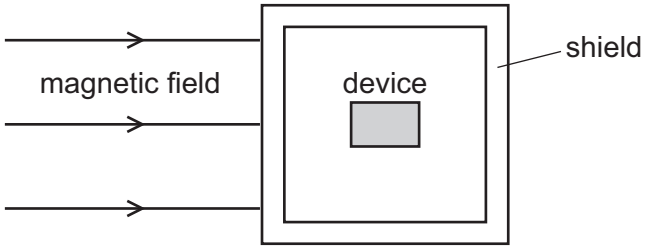


Which types of pole are X and Y?

	X	Y
A	N-pole	N-pole
B	N-pole	S-pole
C	S-pole	N-pole
D	S-pole	S-pole

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27 The diagram shows a sensitive device surrounded by a shield that prevents the magnetic field from reaching the device.



How does the shield protect the device?

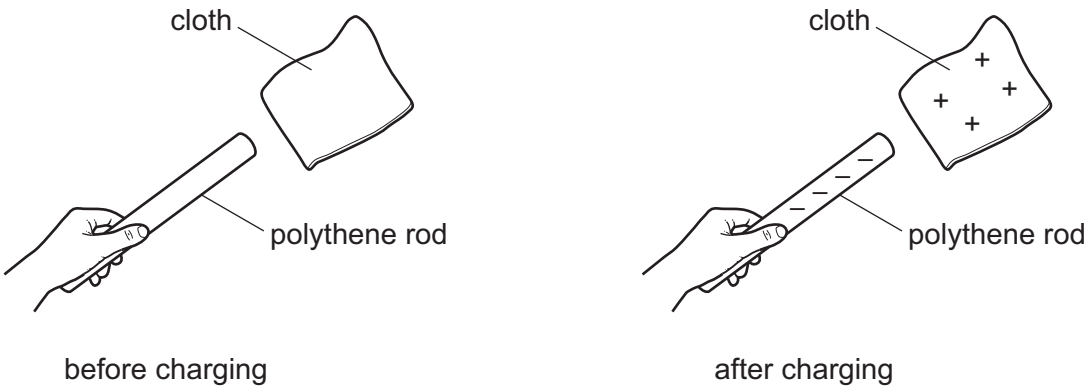
A It channels the magnetic field around the shield until it emerges on the right-hand side.

B Its left-hand side absorbs the magnetic field.

C Its left-hand side reflects the magnetic field.

D Its left-hand side scatters the magnetic field in all directions.

28 A polythene rod is charged by rubbing it with a cloth.



Which statement explains why the cloth is charged?

A Electrons move from the cloth to the rod.

B Electrons move from the rod to the cloth.

C Protons move from the cloth to the rod.

D Protons move from the rod to the cloth.

29 What is *electromotive force (e.m.f.)*?

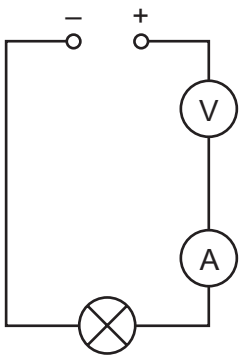
A $\frac{\text{charge}}{\text{work done}}$ **B** $\frac{\text{charge}}{\text{time}}$ **C** $\frac{\text{work done}}{\text{charge}}$ **D** $\frac{\text{work done}}{\text{time}}$

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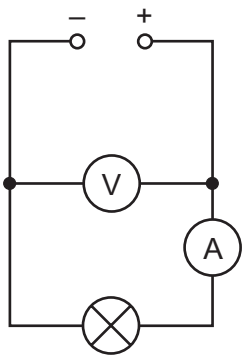
30 In a circuit, a voltmeter is used to measure the potential difference across a lamp. An ammeter is used to measure the current in the lamp.

Which diagram shows the circuit?

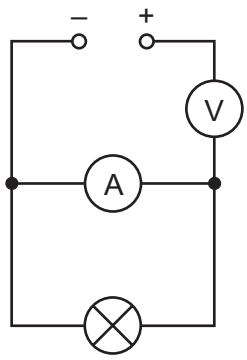
A



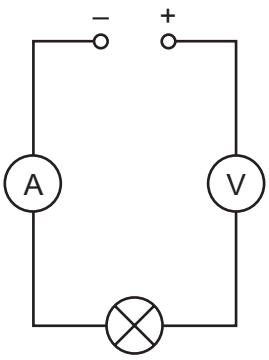
B



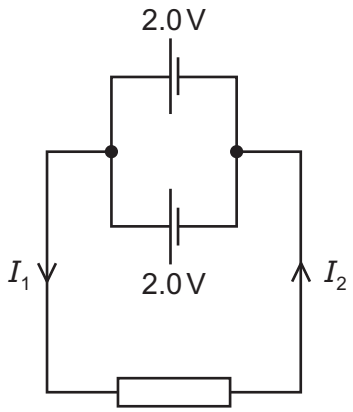
C



D



31 The battery in a circuit contains two identical cells connected in parallel.

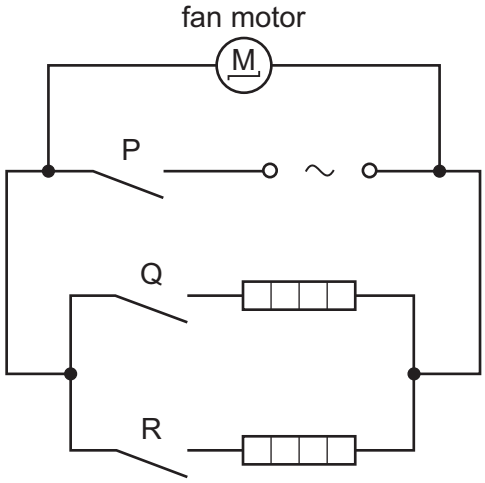


Which row shows the relationship between currents I_1 and I_2 and gives the electromotive force (e.m.f.) of the battery?

	relationship	e.m.f. / V
A	$I_1 > I_2$	2.0
B	$I_1 > I_2$	4.0
C	$I_1 = I_2$	2.0
D	$I_1 = I_2$	4.0

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32 The diagram shows the circuit for a hair-dryer.



The fan motor has a power rating of 0.10 kW and the heaters each have a rating of 0.40 kW. The cost of electricity is 8.0 cents / kW h.

What is the cost of running the hair-dryer for two hours with switches P and Q closed and switch R open?

A 1.6 cents **B** 4.0 cents **C** 6.4 cents **D** 8.0 cents

33 Why are the metal casings of electrical appliances earthed?

A to complete the circuit

B to ensure the casing is not at a dangerous voltage

C to ensure the fuse blows when the current in the appliance is too large

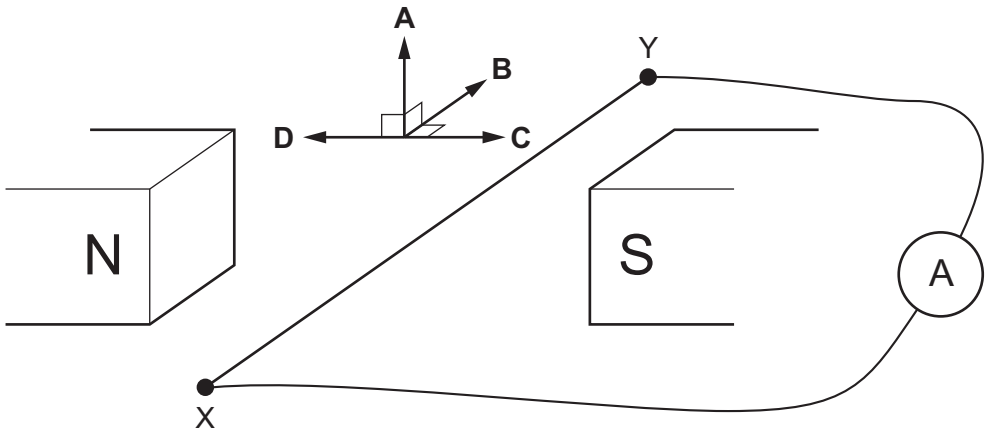
D to protect the appliance from overheating

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34 The diagram shows a wire XY lying between the poles of a magnet.

The ends of the wire are connected to a sensitive ammeter. The wire is moved and a reading is registered.

In which direction is the wire moved?



35 Which particles are emitted by a hot metal filament?

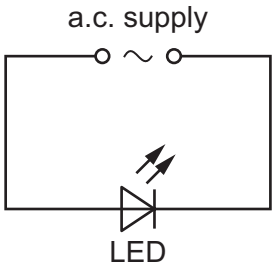
A alpha-particles

B electrons

C neutrons

D protons

36 A light-emitting diode (LED) is connected to an alternating current (a.c.) supply.



The LED flashes on and off.

What is the direction of the current in the LED when it emits light?

A towards the left only

B towards the right only

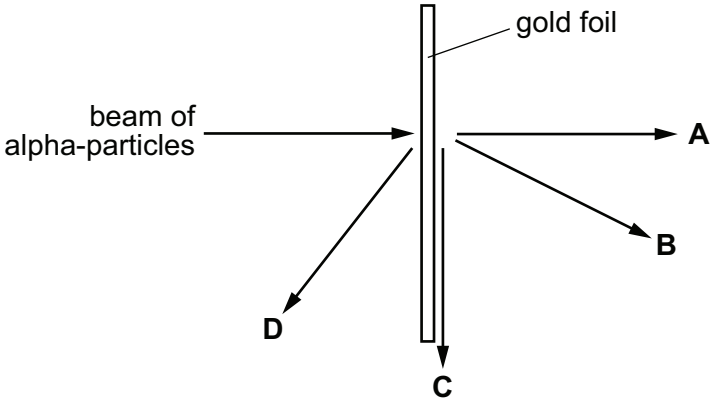
C towards the left or towards the right

D there is no current in the LED

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37 A narrow beam of alpha-particles is fired at a thin piece of gold foil.

What is the final direction of the largest number of alpha-particles?



38 A nucleus of phosphorus $^{32}_{15}P$ emits a beta-particle to form a new nucleus.

What is the nucleon number and what is the proton number of the new nucleus?

	nucleon number (mass number)	proton number (atomic number)
A	28	13
B	31	14
C	31	15
D	32	16

39 How does a nucleus of the isotope chlorine-37 differ from a nucleus of the isotope chlorine-35?

A It contains one more neutron and one more electron.

B It contains one more proton and one more electron.

C It contains two more neutrons.

D It contains two more protons.

40 Which types of radiation may be emitted by radioactive decay?

A alpha-particles and gamma rays

B microwaves and infra-red

C radio waves and microwaves

D ultra-violet and X-rays

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