UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

PHYSICS **5054/12**

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)

2403220594

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.

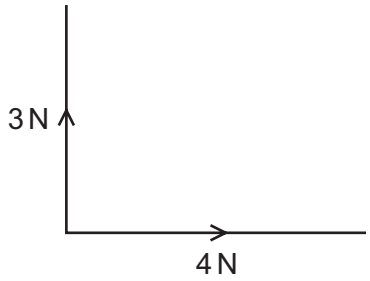
Read the instructions on the Answer Sheet very carefully.

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 **14** printed pages and **2** blank pages.

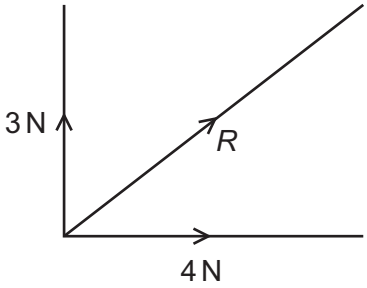
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1 Forces of 3 N and 4 N act as shown in the diagram.

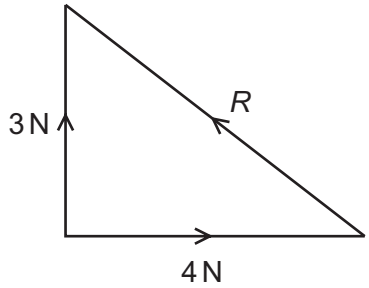


Which diagram shows the resultant *R* of these two forces?

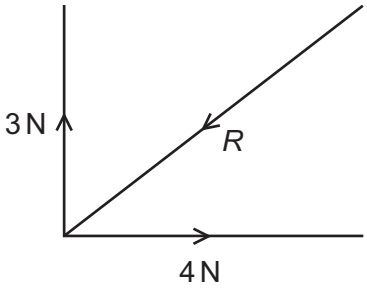
A



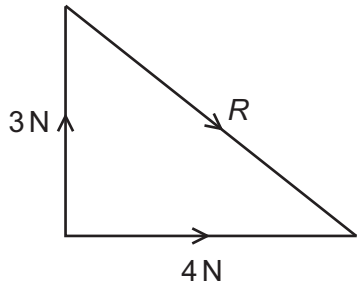
B



C



D



2 Before marking the finishing line on a running track, a groundsman measures out its 100 m length.

Which instrument is the most appropriate for this purpose?

A measuring tape

B metre rule

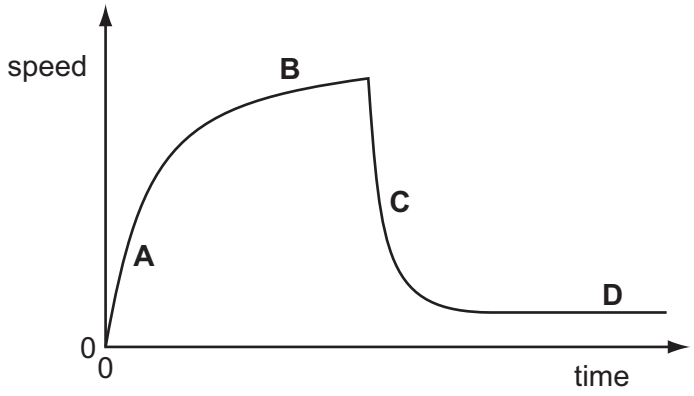
C 30 cm ruler

D micrometer

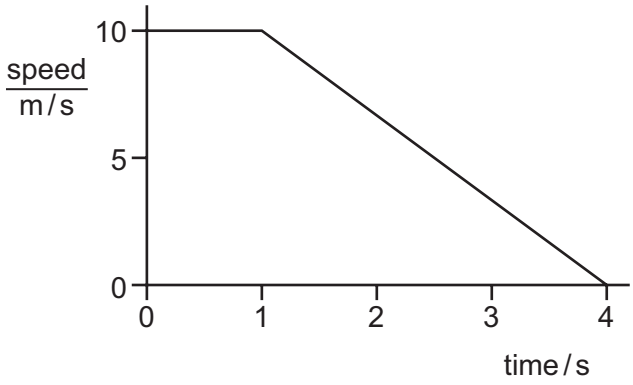
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3 The speed-time graph for a falling skydiver is shown below. As he falls, the skydiver spreads out his arms and legs and then opens his parachute.

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



4 The diagram shows the speed-time graph of the motion of a car for four seconds.



What is the distance travelled by the car in the four seconds?

A 15 m **B** 25 m **C** 30 m **D** 40 m

5 A car of mass 1500 kg travels along a horizontal road.

It accelerates steadily from 10 m/s to 25 m/s in 5.0 s.

What is the force needed to produce this acceleration?

A 300 N **B** 500 N **C** 4500 N **D** 7500 N

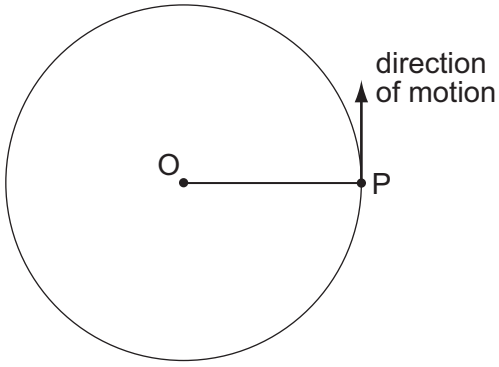
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6 Balanced forces are acting on a moving body.

What happens to the direction of movement and to the speed of the body?

	direction of movement	speed
A	changes	changes
B	changes	does not change
C	does not change	changes
D	does not change	does not change

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



Which statement is true?

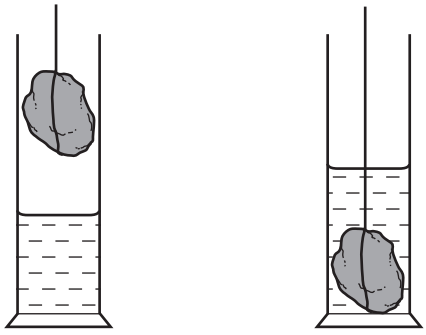
A A force of constant size acts on P in the direction of motion.

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.

8 A measuring cylinder contains 20 cm^3 of water. A stone is placed in the water and the water level rises to 38 cm^3.

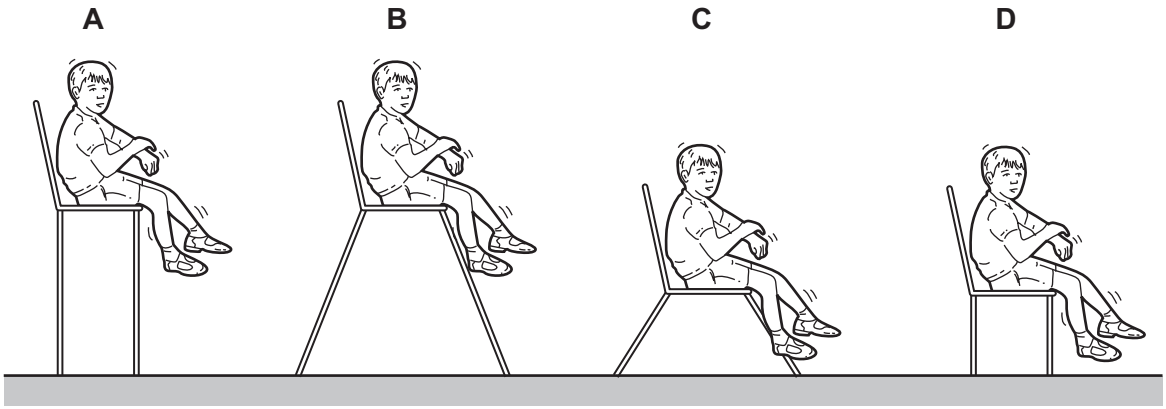


What is the volume of the stone?

A 18 cm^3 **B** 29 cm^3 **C** 38 cm^3 **D** 58 cm^3

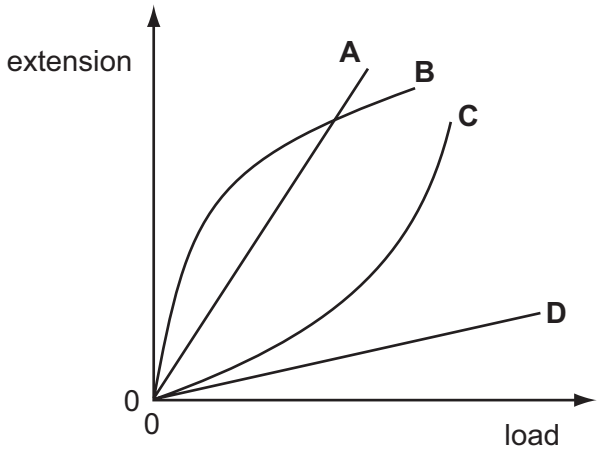
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9 Which chair is the **least** stable if the child moves?



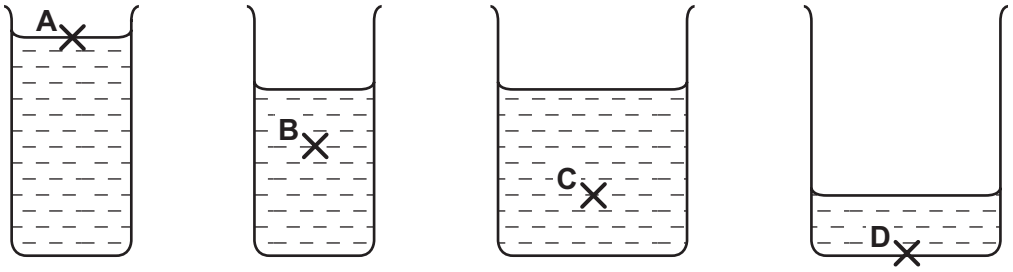
10 The graph shows extension-load curves for four fibres.

Which fibre is the hardest to stretch over the range of loads shown?



11 Four beakers contain the same liquid.

At which point is the pressure greatest?



12 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

13 A swimmer dives into a very deep pool at high speed. He slows down as he moves towards the bottom of the pool.

What is the overall energy transformation as the diver moves downwards through the water?

A gravitational potential energy → kinetic energy + thermal energy (heat)

B gravitational potential energy → kinetic energy → thermal energy (heat)

C kinetic energy + gravitational potential energy → thermal energy (heat)

D kinetic energy → gravitational potential energy + thermal energy (heat)

14 A lorry of mass 10 000 kg takes 5000 kg of sand to the top of a hill 50 m high, unloads the sand and then returns to the bottom of the hill.

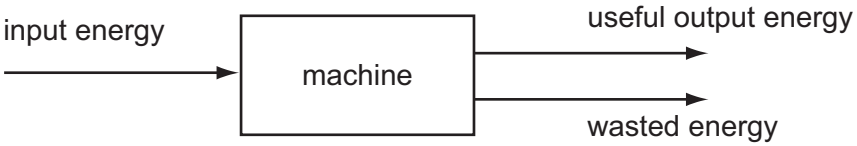
The gravitational field strength is 10 N / kg.

What is the overall gain in potential energy?

A 250 000 J **B** 750 000 J **C** 2 500 000 J **D** 7 500 000 J

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15 The diagram shows the energy transfer through a machine.



The machine is 50% efficient.

Which equation is correct?

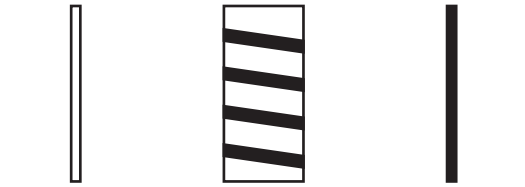
A input energy = useful output energy

B useful output energy = input energy + wasted energy

C wasted energy = input energy + useful output energy

D wasted energy = useful output energy

16 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

17 A liquid-in-glass thermometer contains mercury.

Which physical property of the mercury varies with temperature, enabling the thermometer to operate?

A mass

B melting point

C resistance

D volume

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18 Thermal energy of 12 000 J is supplied to a 2.0 kg mass of copper.

The specific heat capacity of copper is 400 J / (kg °C).

What is the rise in temperature?

A 15 °C **B** 30 °C **C** 60 °C **D** 100 °C

19 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?

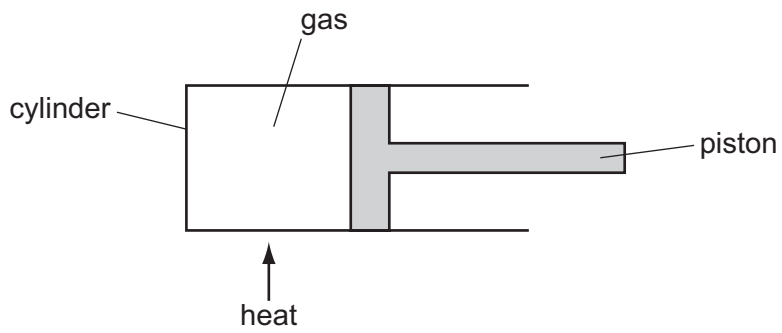
A $\frac{2250}{300 \times 200}$ W

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

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

D 200 × 300 × 2250 W

20 The diagram shows a fixed mass of gas in a cylinder fitted with a piston that can move easily.



What is the change, if any, in the pressure and volume of the gas after it is heated?

	pressure	volume
A	no change	increases
B	decreases	no change
C	decreases	increases
D	increases	decreases

21 What happens to the molecules of a gas when the gas changes into a liquid?

A They move closer and lose energy.

B They move closer and gain energy.

C They move apart and lose energy.

D They move apart and gain energy.

22 Energy can be transferred in many different ways.

In which situation is energy transferred by wave motion?

A colliding atoms in a heated copper rod

B fast-moving electrons in a cathode-ray oscilloscope

C hot water rising in a heated saucepan

D ripples passing across water in a ripple tank

23 A wave has a frequency of 10 kHz.

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

	$\frac{\text{speed}}{\text{m/s}}$	$\frac{\text{wavelength}}{\text{m}}$
A	330	0.33
B	330	33
C	3.0×10^8	30
D	3.0×10^8	3.0×10^4

24 Which of the following travels as a longitudinal wave?

A a radio wave in air

B a sound wave in a solid

C a wave on a rope shaken from side to side

D an infra-red wave in space

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

A real and inverted

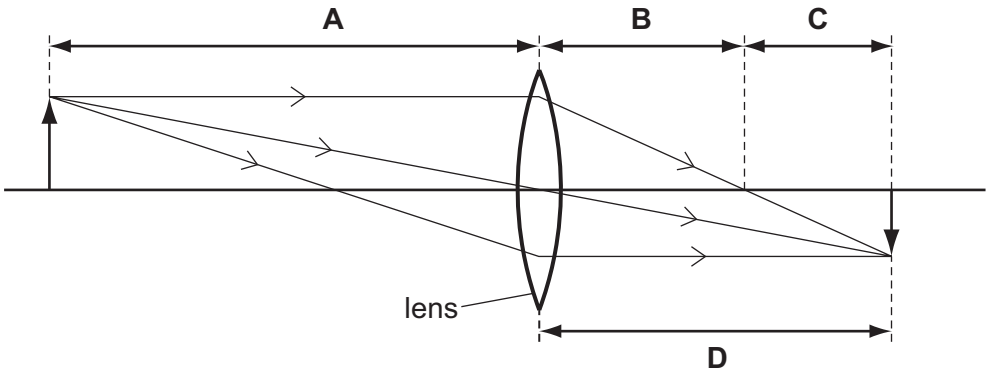
B virtual and not inverted

C real and larger than the object

D virtual and smaller than the object

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26 Which length is the focal length of the lens?



27 What is a possible frequency of an ultrasound wave?

A 0.1 kHz **B** 3 kHz **C** 10 kHz **D** 30 kHz

28 A guitar string is made to vibrate.

What makes the pitch of the note rise?

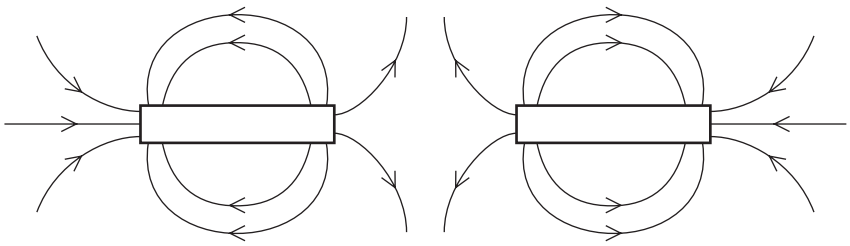
A a decrease in the amplitude of vibration

B a decrease in the frequency of vibration

C an increase in the amplitude of vibration

D an increase in the frequency of vibration

29 The magnetic field around two bar magnets is shown.



Which diagram represents the correct arrangement of magnetic poles?

A N S N S

B N S S N

C S N N S

D S N S N

30 Which material is used to magnetically screen electrical equipment from unwanted magnetic fields?

A aluminium

B copper

C iron

D steel

31 A student rubs a rod held in his hand.

Which action causes the rod to gain a large electrostatic charge?

A rubbing an iron rod with a steel magnet

B rubbing an iron rod with a woollen duster

C rubbing a polythene rod with a steel magnet

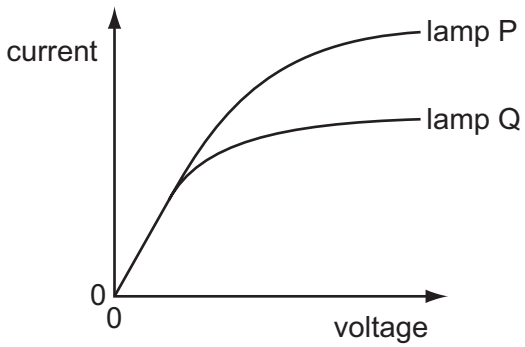
D rubbing a polythene rod with a woollen duster

32 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

33 The diagram shows the current-voltage graph of two filament lamps.



Which statement is correct?

A Lamp P has a lower resistance than lamp Q at all currents.

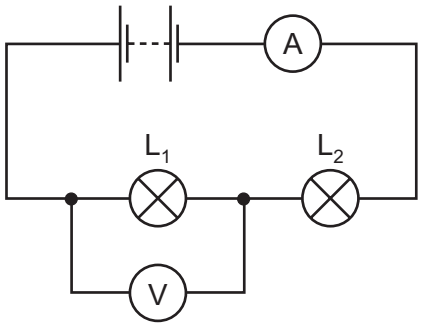
B Lamp P has the same resistance as lamp Q at low currents.

C Lamp P has the same resistance as lamp Q at high currents.

D Lamp P has a higher resistance than lamp Q at all currents.

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34 A circuit containing two lamps L_1 and L_2 is connected as shown.

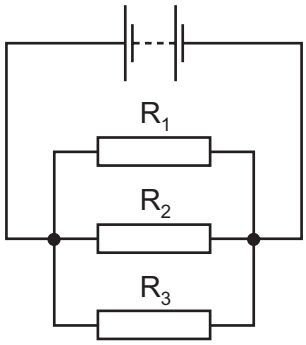


A voltmeter measures the potential difference across the lamp L_1.

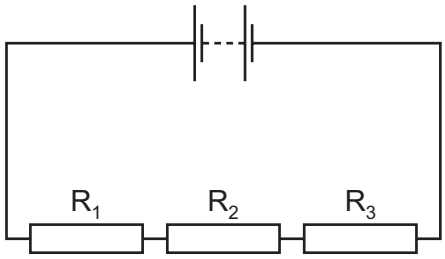
The filament of lamp L_1 breaks. What happens to the readings of the ammeter and of the voltmeter?

	reading on the ammeter	reading on the voltmeter
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

35 In the circuits P and Q below, resistors R_1, R_2 and R_3 have different resistances.



circuit P



circuit Q

In which circuit are the currents in the resistors equal and in which circuit are the potential differences across the resistors equal?

	currents equal	potential differences equal
A	P	P
B	P	Q
C	Q	P
D	Q	Q

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36 Five electrical appliances are connected to the same socket and there is a very large current.

Why is this dangerous?

A The fuses blow in the appliances.

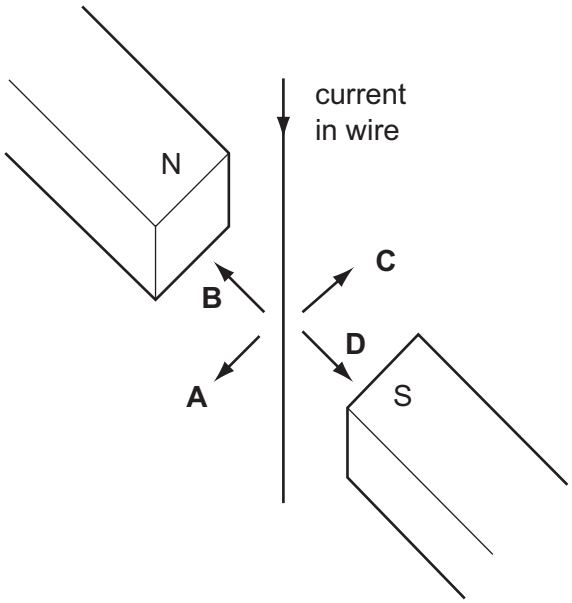
B There is a greater risk of an electrical shock.

C There is overheating in each appliance.

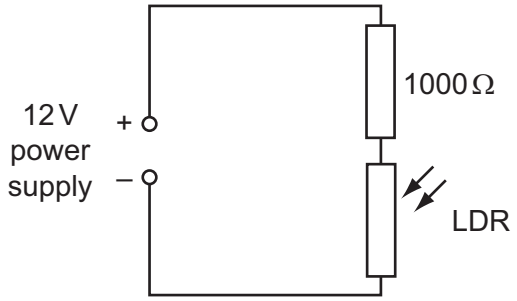
D There is overheating in the socket.

37 A wire hangs between the poles of a magnet.

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



38 In a darkened room, a 1000 Ω resistor and a light-dependent resistor (LDR) are connected in series with a 12 V power supply.



The curtains are opened and light falls on the LDR.

What happens to the voltage across the LDR?

A It decreases.

B It increases.

C It remains at 0 V.

D It remains at 12 V.

39 The count rate from a radioactive source falls from 4000 counts per minute to 500 counts per minute in 72 minutes.

What is the half-life of the source?

A 8 minutes

B 9 minutes

C 18 minutes

D 24 minutes

40 In the Geiger-Marsden experiment, a beam of alpha-particles is fired at a thin sheet of gold in a vacuum. The majority of the alpha-particles pass straight through the sheet without being deflected.

What does this show?

A The alpha-particle is uncharged.

B The alpha-particle is very large.

C The nucleus is positively charged.

D The nucleus is very small.

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