BOTSWANA EXAMINATIONS COUNCIL
Botswana General Certificate of Secondary Education

PHYSICS **0571/01**

Paper 1 Multiple Choice **October/November 2016**

1 hour

Additional Materials: Electronic calculator and/or Mathematical tables
Soft clean eraser
Soft pencil (type B or HB)
Multiple Choice Answer Sheet

9514858424

READ THESE INSTRUCTIONS FIRST

Do not open this booklet until you are told to do so.
Read the instructions on the separate Answer Sheet very carefully.
Write your name, Centre number and candidate number in the spaces provided on the Answer Sheet unless this has already been done for you.
Sign your name in the space provided on the Answer Sheet.

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 using a **soft pencil** on the separate Answer Sheet.
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.
Do not use staples, paper clips, highlighters, glue or correction fluid.

This document consists of **14** printed pages and **2** blank pages.

[Turn over

1 A student has a small test-tube, approximately 5 cm deep.

Which instrument is the most appropriate to use when accurately measuring the depth of the test-tube?

A measuring tape

B micrometer screw-gauge

C ruler

D Vernier caliper

2 A solid object is taken from the Earth to the Moon. The gravitational field strength on the Moon is less than that of the Earth.

Which physical quantity of the object will change when it is on the Moon?

A density

B mass

C size

D weight

3 Which instrument can be used on its own to measure the density of a liquid?

A barometer

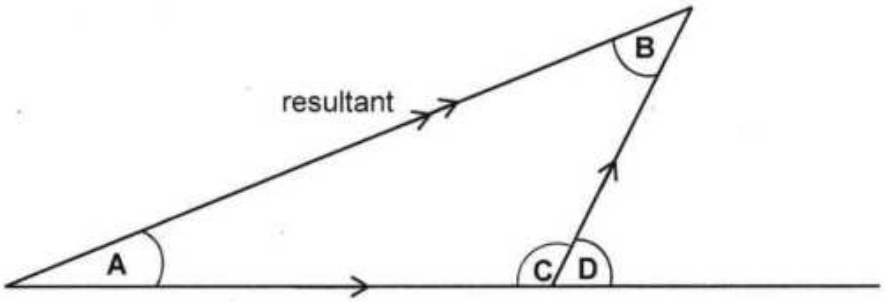
B force meter

C hydrometer

D manometer

4 The diagram shows a graphical method used to obtain the resultant of two forces acting on a body.

Which letter shows the angle between the two forces when they act on the body?



5 A trolley of mass 2.0 kg is initially at rest. A resultant force of 0.4 N acts on the trolley.

What is the distance covered by the trolley in the first 10 seconds?

A 2.0 m

B 8.0 m

C 10 m

D 15 m

6 Water of mass 200 kg is pumped into a tank that is 4.0 m above the ground. (g = 10 N/kg)

How much work is done on the water to raise it into the tank?

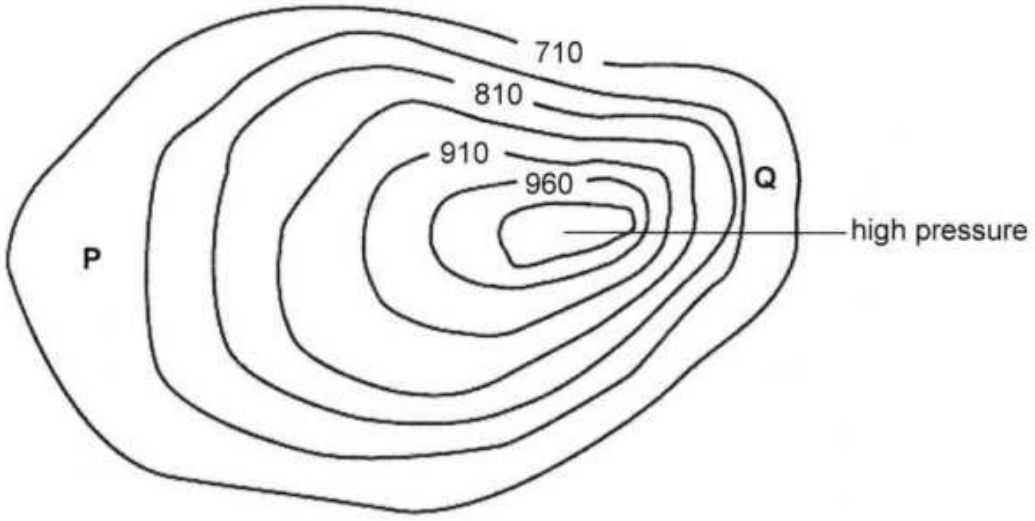
A 40 J

B 800 J

C 2000 J

D 8000 J

7 The diagram shows isobars on a weather map in the southern hemisphere.
The isobars show pressure in millibars.



In which direction will the wind blow in the area shown by the map?

A anticlockwise around the high pressure region

B clockwise around the high pressure region

C from the high pressure region towards **P** and **Q**

D from **Q** to the high pressure region to **P**

8 A gas is trapped in a cylinder that has a movable piston. The gas is heated.
The pressure exerted by the gas on the walls of the cylinder remains constant.

Which statement is correct?

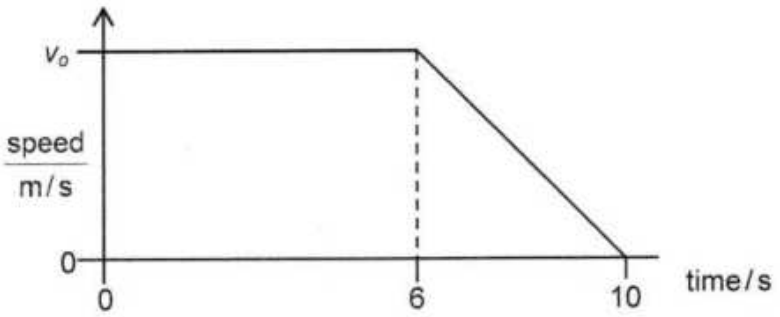
A The mass of the gas increases.

B The rate of collision of the gas particles reduces.

C The speed of the gas particles reduces.

D The volume of the gas increases.

9 The diagram shows the speed / time graph of an object.
The object travelled a total distance of 60 m in 10 s.



What was the initial speed v_o of the object?

A 5.5 m/s

B 6.0 m/s

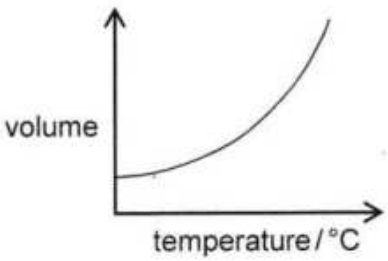
C 7.5 m/s

D 12.0 m/s

10 A liquid-in-glass thermometer contains mercury.

Which graph shows how the volume of mercury changes with temperature?

A



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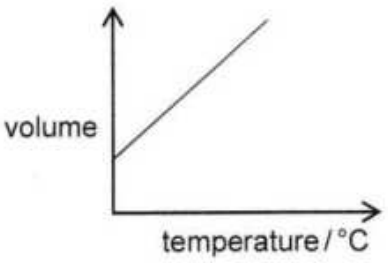

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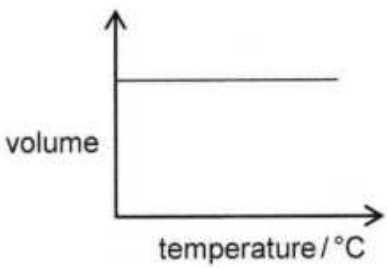

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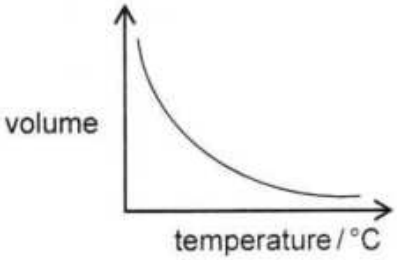
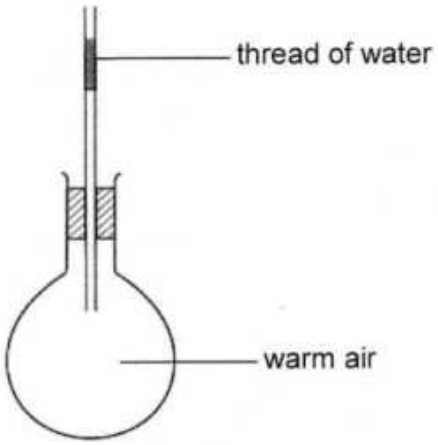


11 The diagram shows a flask containing warm air. The capillary tube contains a thread of water.



The flask is placed in cold water. The thread of water moves downwards.

Which statement explains why the thread of water moves downwards?

A the air particles are contracting

B the average space between the air particles is decreasing

C the volume of the flask is increasing

D the weight of the thread of water is increasing

12 Which factor does **not** affect the rate of evaporation of water in a pond?

A the depth of the water in the pond

B the movement of air over the water's surface

C the surface area of the water

D the temperature of the surroundings

13 A glass is filled with ice cubes and placed on top of a sensitive balance.
After a few minutes, the mass of the glass and contents increases slightly.

Which process has resulted in the increase of the mass of the glass and the contents?

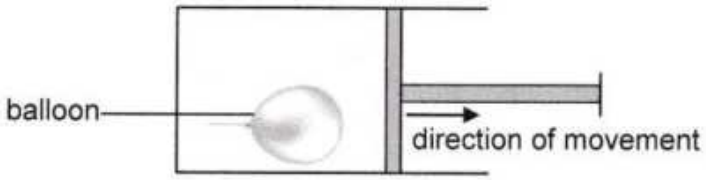
A expansion of glass

B expansion of water

C condensation of water vapour

D melting of ice cubes

14 The diagram shows a partially inflated balloon placed in a cylinder that has a movable piston.



The piston is pulled in the direction shown by the arrow.
The temperature of the air inside the balloon and the cylinder remains constant.

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

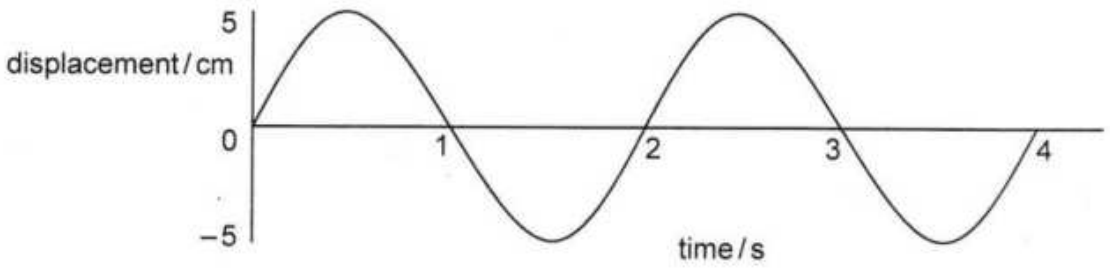
	pressure	volume of balloon
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

15 A solid requires 2000 J of thermal energy for its temperature to change from 20 °C to 25 °C.
The specific heat capacity of the solid is 200 J / kg °C.

What is the mass of the solid?

A 2 kg
B 10 kg
C 12.5 kg
D 50 kg

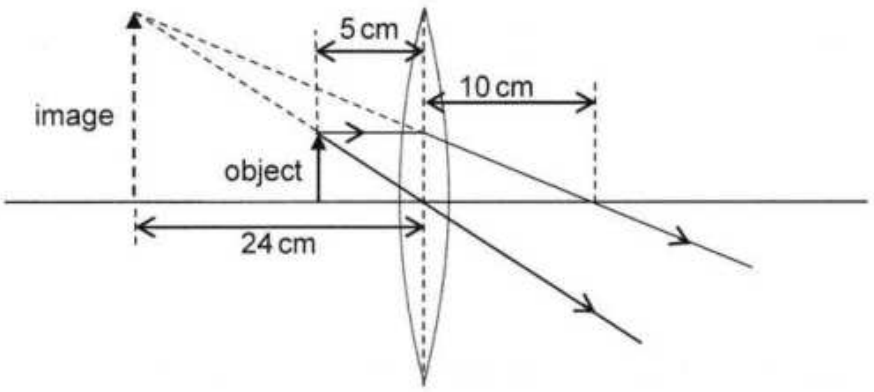
16 The diagram shows a displacement-time graph of a wave.



What is the frequency of the wave?

A 0.25 Hz
B 0.5 Hz
C 2.0 Hz
D 4.0 Hz

17 The diagram shows an image formed by a converging lens.



What is the focal length of the lens?

A 5 cm

B 10 cm

C 19 cm

D 24 cm

18 A siren is used to produce a loud sound.
The siren is adjusted to reduce the loudness of the sound but its pitch remains the same.

What effect does this have on the amplitude and the frequency of the new sound wave formed?

	amplitude	frequency
A	same	same
B	same	reduced
C	reduced	same
D	reduced	reduced

19 A water wave is moving from a shallow area and is incident on a deep area at an angle of 30°.

Which property of the wave will **not** change when it reaches the deep area?

A direction

B frequency

C speed

D wavelength

20 An object is placed 4.0 cm in front of a plane mirror.
The object is moved another 2.0 cm away from the mirror.

What is the distance between the object and the image after the object has been moved?

A 4.0 cm

B 6.0 cm

C 8.0 cm

D 12.0 cm

21 A mechanic wants to test for very thin cracks in some metal parts of an engine.

Which of the following can be used by the mechanic?

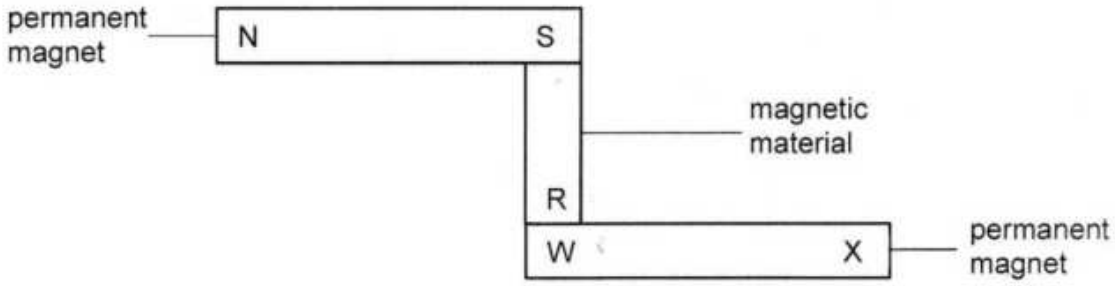
A alpha particles

B infrared radiation

C radio waves

D ultrasonic sound

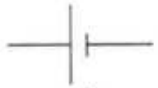
22 The diagram shows two permanent magnets attracted to a magnetic material.
The poles of one of the magnets are labelled W and X.
One of the induced poles of the magnetic material is labelled R.

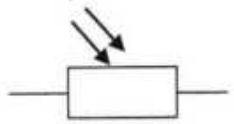


What is the pole W of the permanent magnet and the induced pole R?

	W	R
A	N	S
B	N	N
C	S	S
D	S	N

23 Which symbol represents an electrical component that is used to store charge?

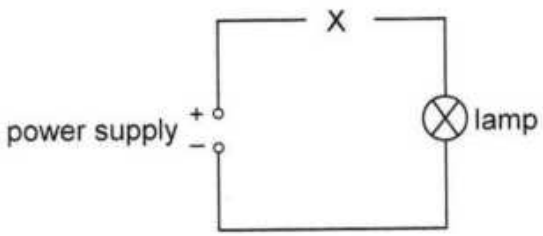
A 

B 

C 

D 

24 The diagram shows a simple circuit.



Which component should be connected into the circuit at X so that the lamp lights more brightly when the temperature rises?

A diode

B fuse

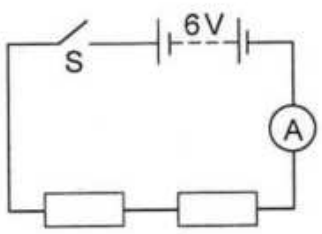
C resistor

D thermistor

25 The diagrams show identical resistors connected in different combinations.

In which diagram would the ammeter give the highest reading when switch S is closed?

A



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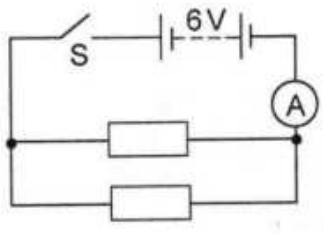

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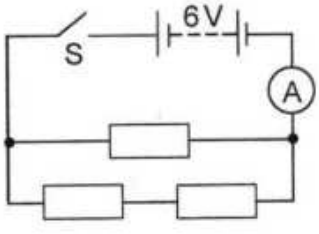

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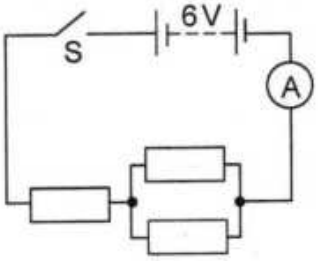


26 A 3.0 kW heater is used for 5 hours. Electrical energy is charged P0.60 per kWh.

What is the cost of using the heater?

A P1.80

B P3.00

C P9.00

D P15.00

27 A transformer is used to produce a current of 2.0 A. The input current of the transformer is 0.8 A. The primary coil of the transformer is connected to a 120 V alternating current mains.

What is the output voltage of the transformer?

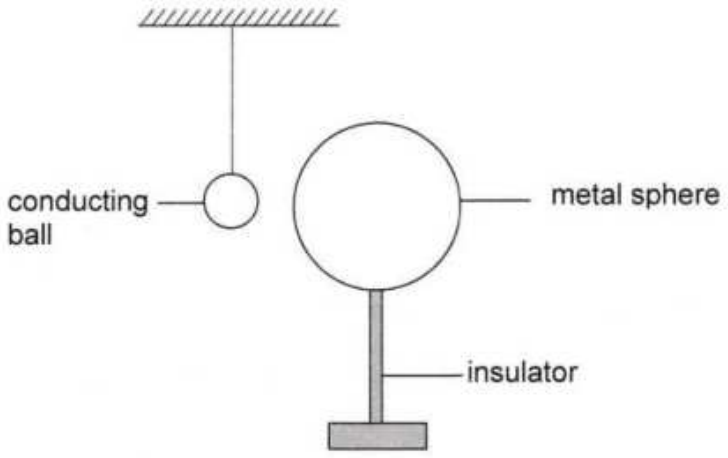
A 48 V

B 96 V

C 120 V

D 240 V

28 The diagram shows a small conducting ball hanging freely, very close to a large metal sphere. The ball and the metal sphere are not charged.



The metal sphere is then charged.

What effect will the charging have on the conducting ball?

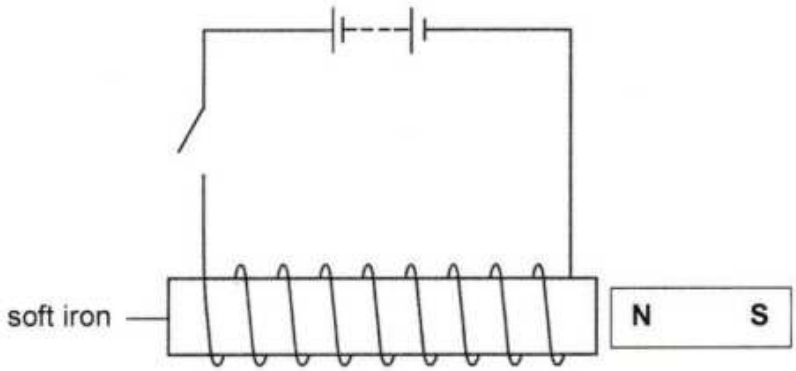
A It will move away from the sphere.

B It will move towards the sphere and remain attached.

C It will remain at its original position.

D It will touch the sphere and then move away from the sphere.

29 The diagram shows a bar magnet very close to a piece of soft iron placed inside a solenoid.



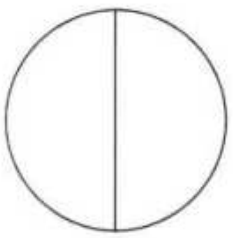
Which row shows what will be observed when the switch is closed and when it is opened?

	closed	opened
A	magnet attracts soft iron	magnet attracts soft iron
B	magnet attracts soft iron	magnet repels soft iron
C	magnet repels soft iron	magnet attracts soft iron
D	magnet repels soft iron	magnet repels soft iron

30 An alternating current is applied to the Y-plates of a cathode-ray oscilloscope (C.R.O.) with the time base off.

Which pattern would appear on the screen of the C.R.O?

A



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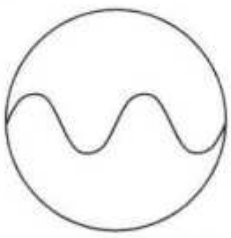
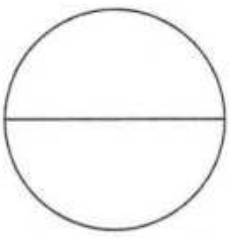


C



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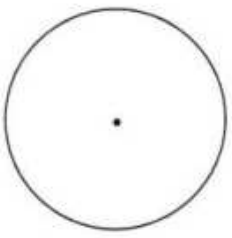


31 An electric kettle is marked at 3000 W, 240 V and 50 Hz on its cover.

What is the resistance of its heating element when it is operating at full power?

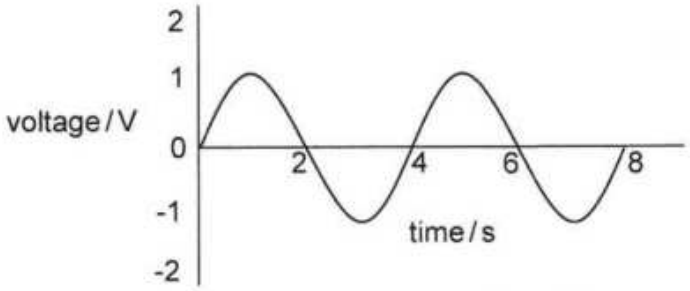
A 4.8 Ω

B 10.4 Ω

C 12.5 Ω

D 19.2 Ω

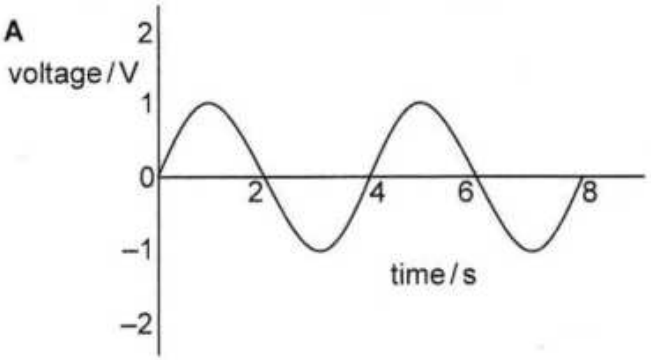
32 The diagram shows a voltage output of a simple alternating current generator.



The speed of rotation of the coil of the generator is doubled.

Which graph shows the new voltage output?

A



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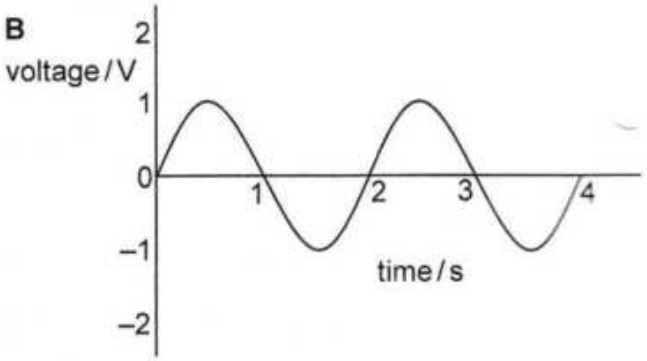

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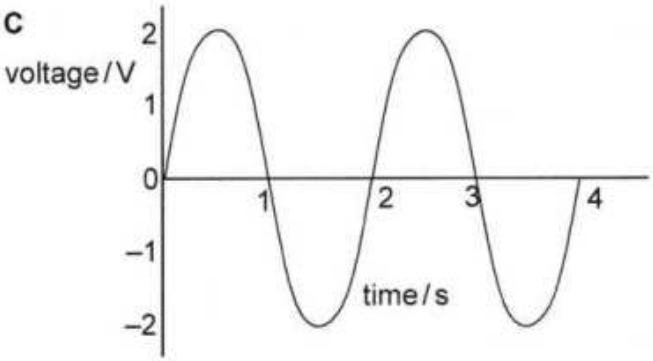

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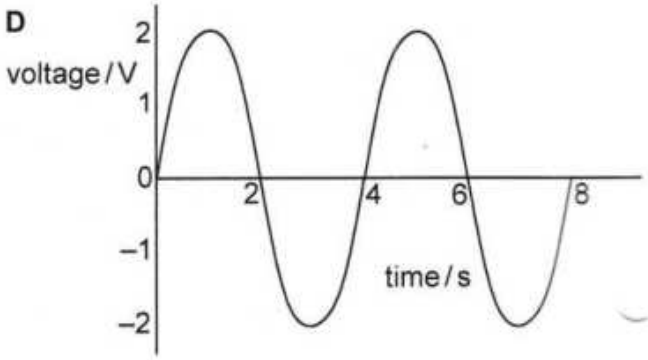


33 A launderette initially operates with four identical machines connected in parallel. Two similar machines are then connected in parallel to the four machines.

Which quantity will increase when all of the six machines are in operation?

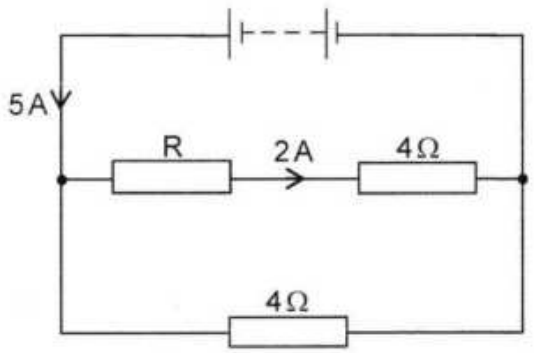
A the total effective resistance of the machines

B the potential difference across each machine

C the total current in the circuit

D the voltage needed to operate the machines

34 The diagram shows three resistors connected in a circuit.



What is the value of resistor R?

A 2Ω

B 4Ω

C 8Ω

D 12Ω

35 An electric motor is connected to a 240V power supply.
There is a current of 3.0A in the motor. The useful power output of the motor is 500W.

What is the efficiency of the motor?

A 0.48

B 0.69

C 1.44

D 2.08

36 Two electric fans are connected in series. The fans are switched on for 300 seconds.
There is a current of 5.0A in each fan.

How much charge will flow through each fan?

A 120C

B 750C

C 1500C

D 3000C

37 Two samples of the same radioactive source have different masses.

Which property is the same for the samples?

A amount of radiation emitted in each second

B half-life

C number of atoms

D volume

38 Which row shows the most ionising and the most penetrating types of radiation?

	most ionising	most penetrating
A	alpha particle	gamma rays
B	alpha particle	beta particle
C	beta particle	gamma rays
D	gamma rays	alpha particle

39 A radioactive nucleus X decays by emission of an alpha particle as shown by the equation.

$$^{p}_{q}X \longrightarrow {}^{r}_{s}Y + {}^{4}_{2}He$$

Which of the equations about the nuclides of X and Y is correct?

A $q = s + 2$

B $q = s - 2$

C $p = r - 4$

D $p = r + 2$

40 $^{14}_{6}C$ is the symbol of a nuclide of carbon.

How many nucleons does the nuclide contain?

A 6

B 8

C 14

D 20