BOTSWANA EXAMINATIONS COUNCIL
Botswana General Certificate of Secondary Education

PHYSICS **0571/01**

Paper 1 Multiple Choice **October/November 2023**

1 hour

Additional Materials: Multiple choice Answer Sheet

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 in 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 separate Answer Sheet very carefully.

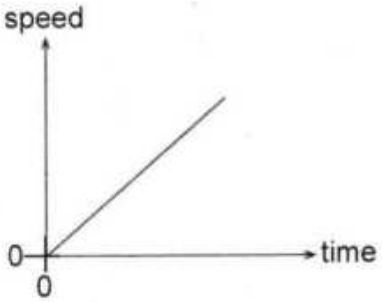
Each correct answer will score one mark. A mark will not be deducted for a wrong answer.
Any rough working should be done in this booklet.
Electronic calculators may be used.
Take the weight of 1.0 kg to be 10 N (acceleration of free fall = 10 m/s^2).

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

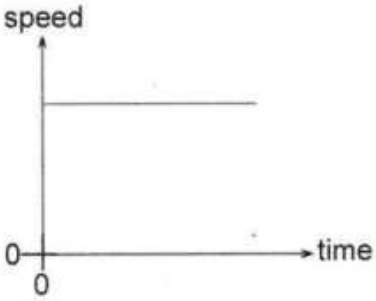
1 A small iron ball is released from the surface of oil in a long jar.

Which graph represents the motion of the ball as it falls through the oil from the time it is released?

A



B



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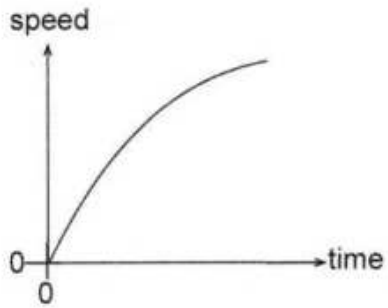
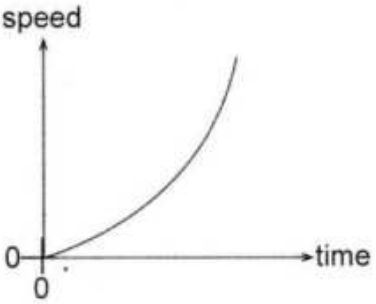
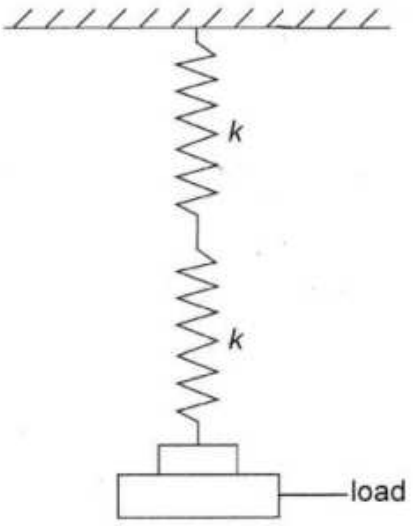


D



2 The diagram shows two identical springs of spring constant k connected in series.



Which expression represents the combined spring constant of the two springs?

A k

B $2k$

C $\frac{k}{2}$

D $\frac{2}{k}$

3 What is the SI unit of density?

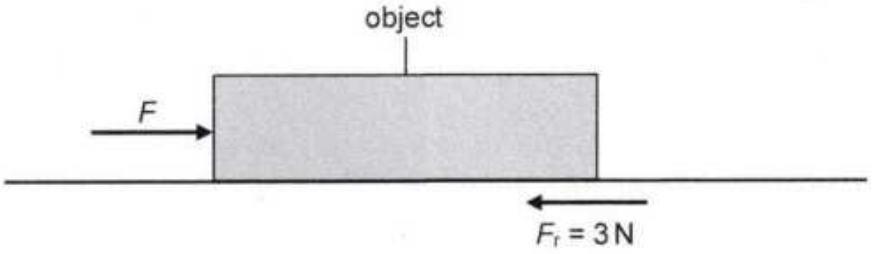
A g/cm^3

B g/m^3

C kg/cm^3

D kg/m^3

4 The diagram shows an object of mass 0.5 kg being pushed by a force F.



The acceleration of the object is $10\,m/s^2$.
The force of friction F_r opposing the motion is 3 N.

What is the force F applied on the object?

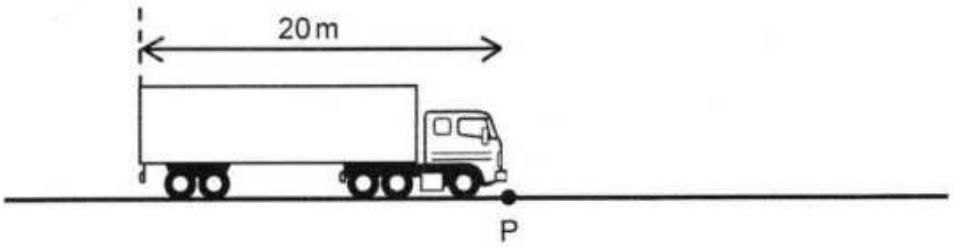
A 2 N

B 3 N

C 5 N

D 8 N

5 A truck of length 20 m accelerates uniformly from rest at $2.0\,m/s^2$ when its head is in line with point P.



What is the velocity of the truck when its tail end is 100 m away from point P?

A 10.0 m/s

B 10.95 m/s

C 20.0 m/s

D 21.91 m/s

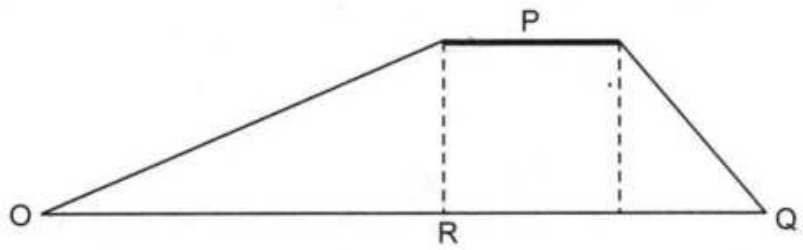
6 Which quantity is a vector?

A mass
B speed
C volume
D weight

7 Which is a major source of energy in Botswana?

A firewood
B hydro-electric
C nuclear
D wind

8 The diagram shows a platform P at the top of two ramps.
The diagram is not drawn to scale.



Which statement about the diagram is correct? Ignore the effect of friction.

A less vertical work is done to move to the platform through RP
B more vertical work is done to move to the platform through OP
C more vertical work is done to move to the platform through RP
D same amount of vertical work is done to move to the platform through OP, RP or QP

9 A cup contains water at 80 °C. The water is allowed to cool until it reaches room temperature.

Which quantity increases as the water cools?

A density
B mass
C volume
D weight

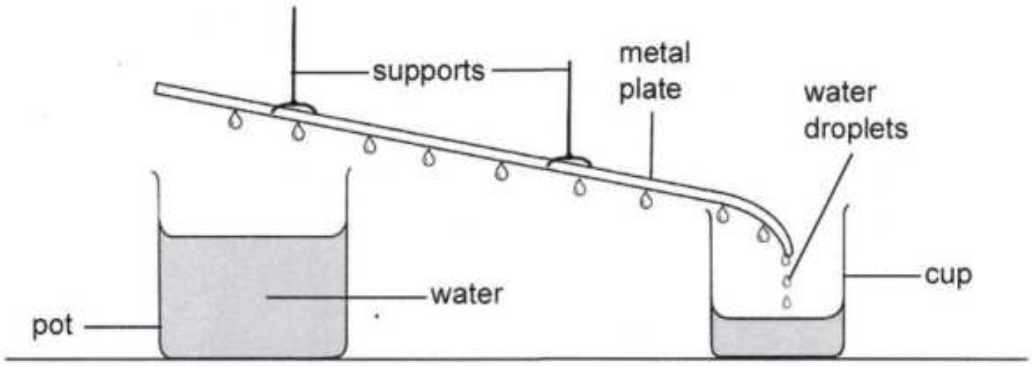
10 Which instrument uses thermal expansion to measure temperature?

A force meter
B hydrometer
C liquid-in-glass thermometer
D thermocouple thermometer

11 Which feature enables a mercury-in-glass thermometer to be more sensitive?

A large bulb
B long capillary tube
C small bulb
D wider capillary tube

12 The diagram shows a simple model used to collect clean water.
The model is left in an open space on a hot day.



Which change does **not** increase the rate at which water droplets are collected in the cup?

A heating the water in the pot
B increasing the amount of water in the pot
C placing ice above the metal plate
D using a wider pot

13 The table shows some information about water.

quantity	value
specific heat capacity	4.2 J/g °C
specific latent heat of fusion	334 J/g
specific latent heat of vaporization	2230 J/g

A block of ice is heated from 0 °C until all the water evaporates.

Which statement about the thermal energy used for heating is correct?

Thermal energy used to

A boil the water is more than the thermal energy used to melt the ice.

B melt the ice is equal to the thermal energy used to vaporise the water.

C melt the ice is more than the thermal energy used to boil the water.

D melt the ice is more than the thermal energy used to vaporise the water.

14 A fixed volume cylinder filled with a gas is left in an open space during a hot day.

Which quantity increases as the temperature increases?

A the mass of the gas particles

B the size of the gas particles

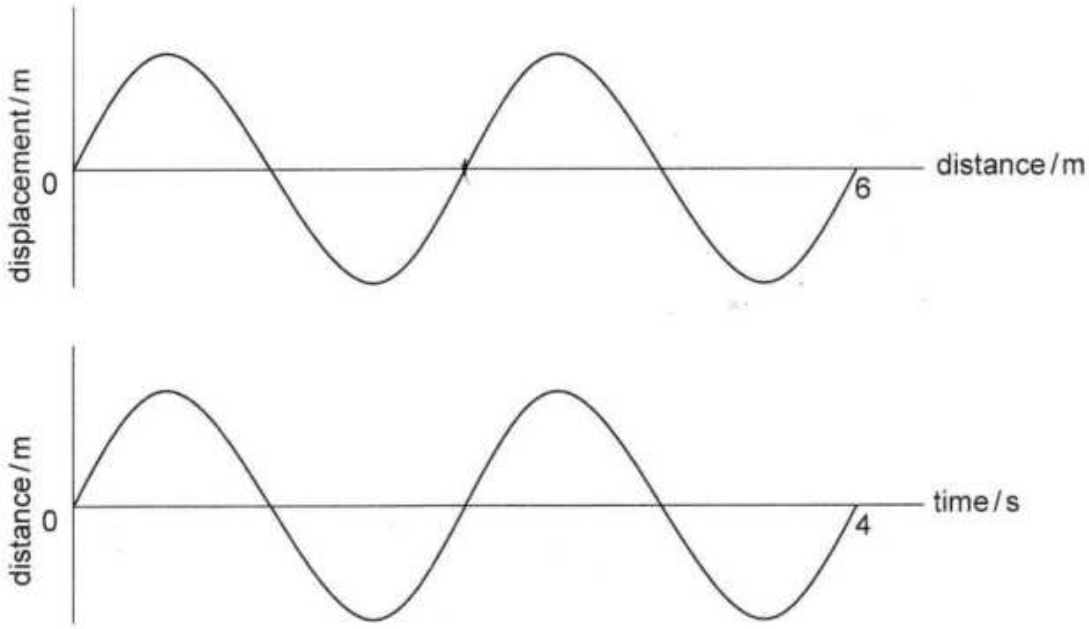
C the space between gas particles

D the speed of the gas particles

15 Which feature of a thermos flask is matched with its correct function?

	feature	function
A	glass walls	reduces heat gain by conduction
B	plastic stopper	reduces heat gain by radiation
C	silvered walls	reduces heat loss by conduction
D	vacuum space	reduces heat loss by radiation

16 The diagrams show the displacement – distance and displacement – time graphs of the same wave.



What is the speed of the wave?

A 0.75 m / s

B 1.5 m / s

C 6.0 m / s

D 24 m / s

17 A water wave moves from deep to shallow water.

What happens to the frequency and the period of the wave as it moves to shallow water?

	frequency	period
A	decreases	decreases
B	remains same	decreases
C	increases	increases
D	remains same	remains same

18 Which of the quantities increases for the loudness of a sound wave to increase?

A amplitude

B frequency

C speed

D wavelength

19 Which electromagnetic wave is detected by a photographic film?

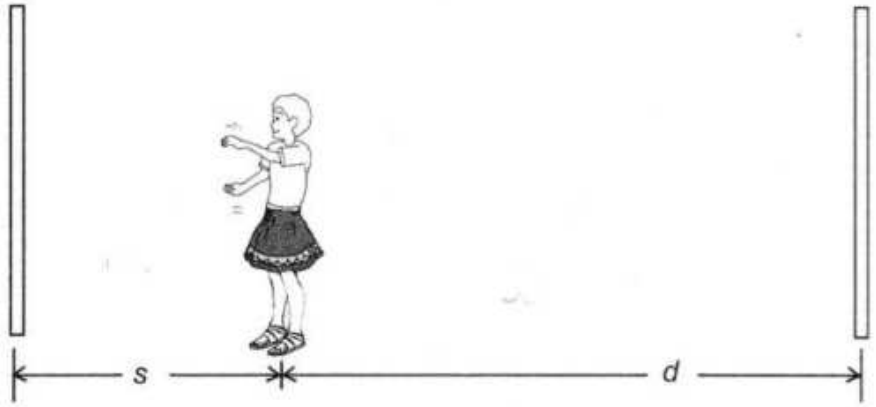
A gamma rays

B microwaves

C radio waves

D ultraviolet radiation

20 The diagram shows a girl standing between two walls.



The girl claps her hands and receives two echoes at a time interval t from the walls.
The distance s is 105 m and the distance d is 225 m. The speed of sound in air is 330 m / s.

What is the time interval t between the two echoes?

A 0.36 s

B 0.64 s

C 0.72 s

D 1.36 s

21 An object is placed 5 cm in front of a thin converging lens of focal length 10 cm.

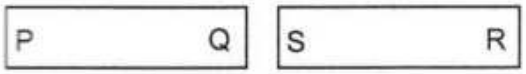
Which row is correct about the characteristics and the magnification of the image formed by the lens?

	characteristic	magnification
A	real	more than 1
B	real	less than 1
C	virtual	more than 1
D	virtual	less than 1

22 A bar magnet is cut into three equal magnets as shown in the diagram.

In which of the arrangements will attraction take place?

A



B

C

D

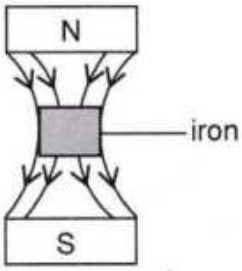
23 Which symbol is for electric charge?

A C
B E
C Q
D ρ

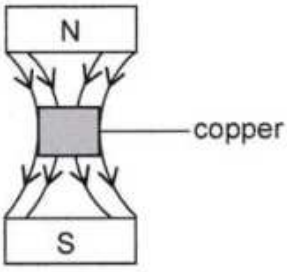
24 Different metal blocks are placed between two permanent magnets.

Which diagram shows the correct magnetic field pattern between the magnets?

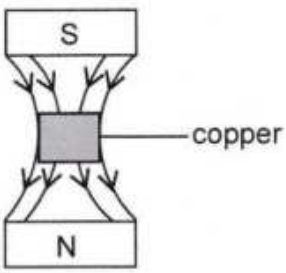
A



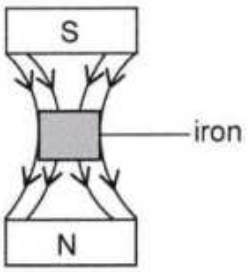
B



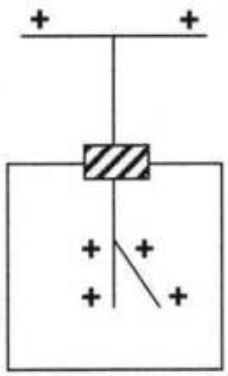
C



D



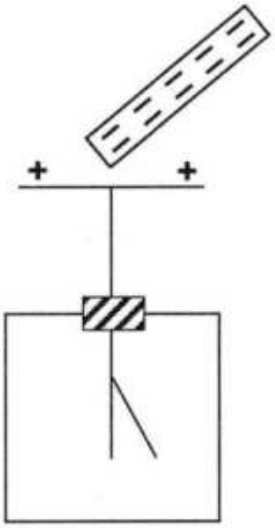
25 The diagram shows a positively charged electroscope.



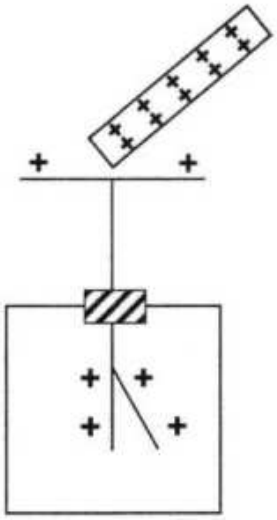
A charged rod is brought near the metal cap of the electroscope.

Which diagram shows the charge of the rod and the correct distribution of charges in the electroscope?

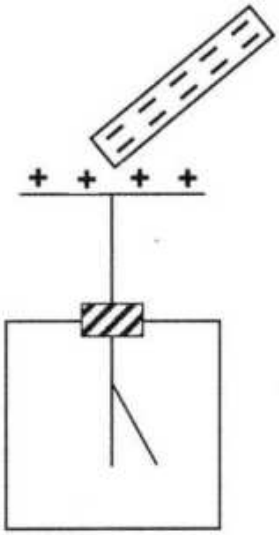
A



B



C



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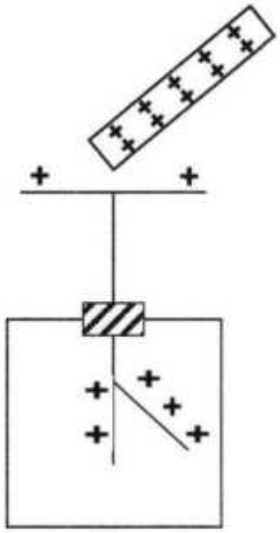
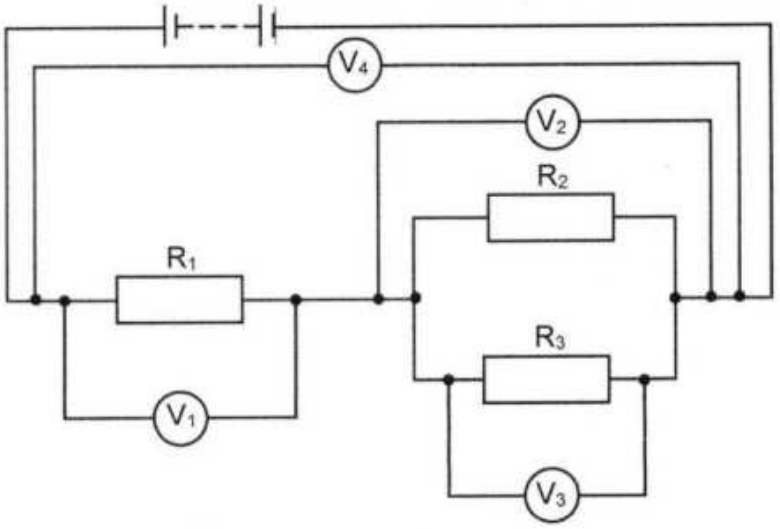


26 The diagram shows an electric circuit with identical resistors.



Which voltmeter will show the highest reading?

A V_1

B V_2

C V_3

D V_4

27 The ratio of the number of turns in the primary coil to the number of turns in the secondary coil of a step-up transformer is 1: 5. The transformer is used to operate a 45 V, 0.8 A appliance.

What is the current in the primary.coil?

A 1.25 A

B 4.0 A

C 6.25 A

D 9.0 A

28 An electric heater is switched on for 2 hours. Electricity is charged at P0.50 per unit. The cost of using the heater is P1.50.

What is the power of the heater?

A 0.7 kW

B 1.5 kW

C 2.7 kW

D 6.0 kW

29 Which action will ensure safety when using electricity?

A connecting an electric stove to a refrigerator socket

B connecting the earth wire to a metal pipe that is buried underground

C placing a fuse in the neutral wire

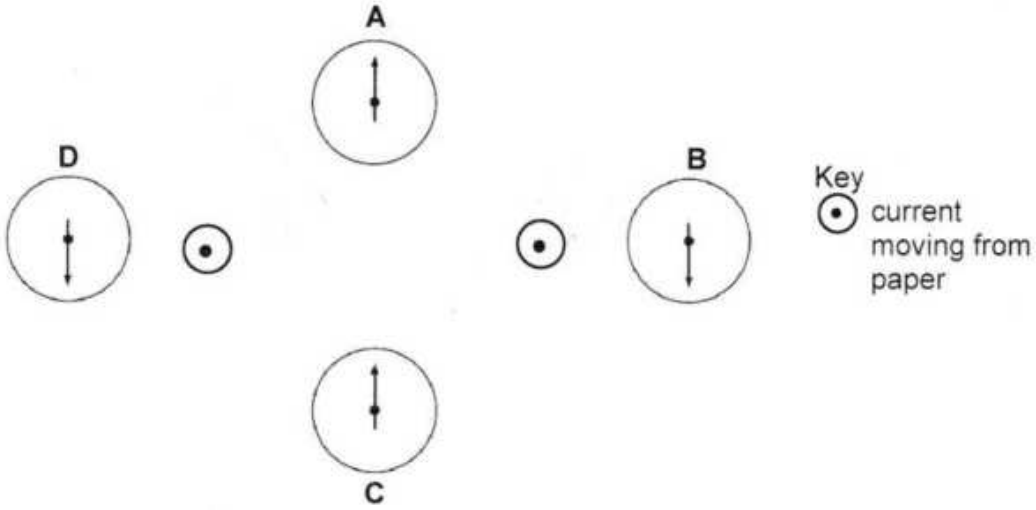
D using a two pin plug to connect a metal cased electrical appliance

30 Which characteristics are correct for power during transmission and at households?

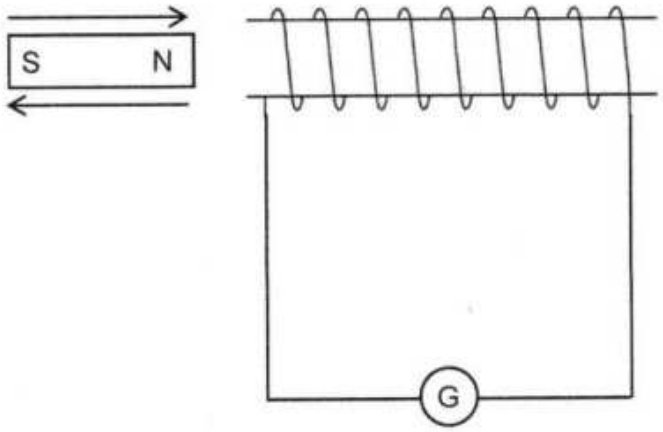
	during transmission	at households
A	high current and low voltage	high current and low voltage
B	low current and high voltage	high current and low voltage
C	high current and high voltage	low current and low voltage
D	low current and low voltage	low current and high voltage

31 The diagram shows four plotting compasses placed next to two current carrying conductors.

Which compass shows the correct direction of the magnetic field from the wires?

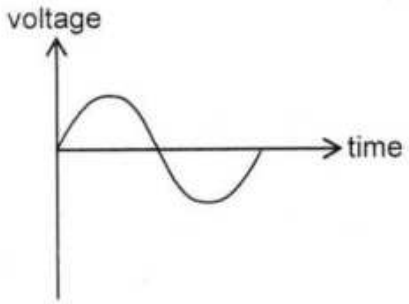


32 The diagram shows a magnet near a solenoid.
The magnet is moved into the solenoid and then moved back out to the original position.

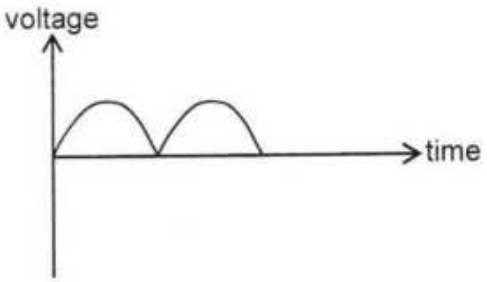


Which of the graphs shows the voltage output on the solenoid?

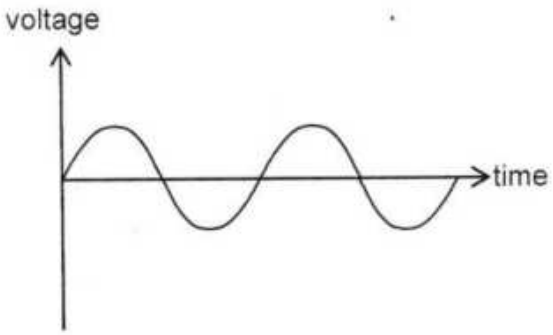
A



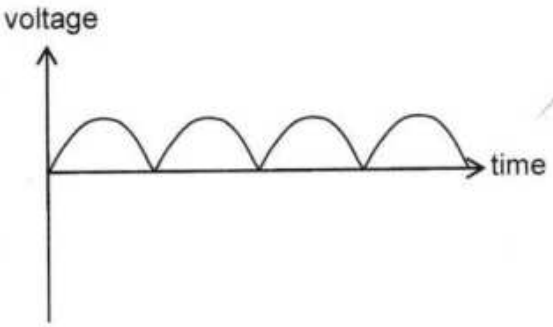
B



C

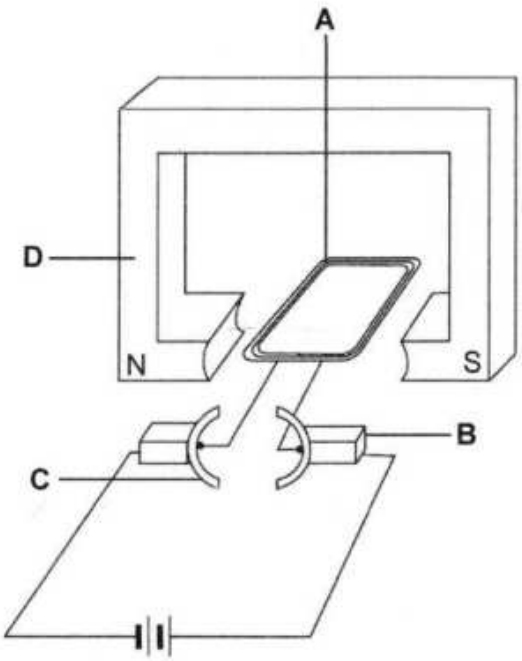


D

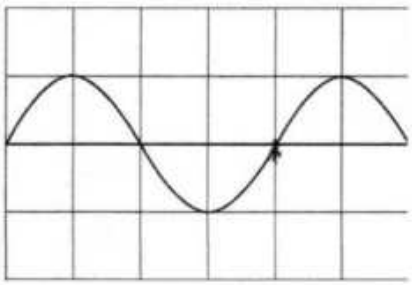


33 The diagram shows a simple direct current motor.

Which part of the motor helps to maintain continuous rotation of the coil?



34 The diagram shows a display of a waveform on the cathode ray oscilloscope.
The time base is set at 50 ms / div.



What is the frequency of the wave?

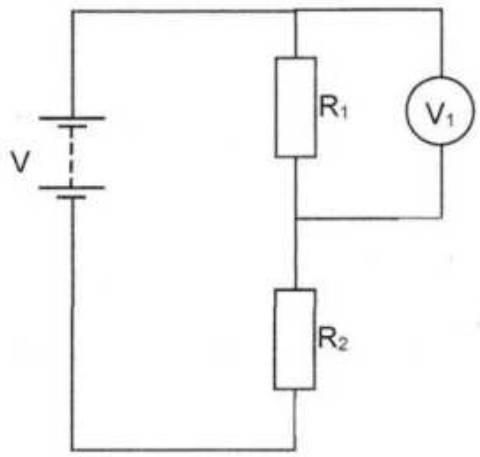
A 0.005 Hz

B 0.020 Hz

C 5.0 Hz

D 20 Hz

35 The diagram shows a potential divider.



The resistance of R_1 is twice the resistance of R_2.

Which statement is correct?

A The current in R_1 is half the current in R_2.

B The current in R_1 is twice the current in R_2.

C The voltage V_1 is half the voltage V.

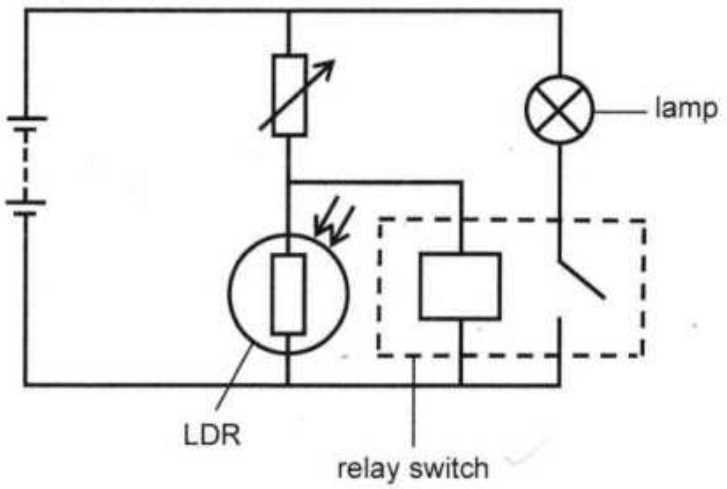
D The voltage V_1 is two thirds of the voltage V.

36 An atom of caesium is represented by the atomic notation, $^{133}_{55}Cs$.

How many electrons, neutrons and protons are in the atom?

	electrons	neutrons	protons
A	55	78	55
B	55	133	55
C	78	55	78
D	133	55	133

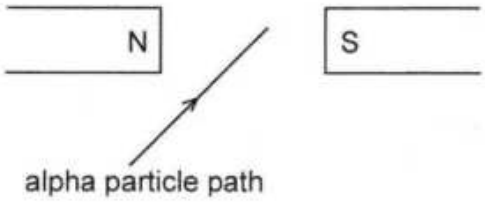
37 The diagram shows a circuit used to operate a lamp.



Which row is correct about the resistance of the LDR and current in the relay switch when it becomes dark?

	resistance of LDR	current in the relay switch
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

38 The diagram shows an alpha particle entering a magnetic field.



In which direction does the particle move when it is within the magnetic field?

A downwards

B towards the N pole

C towards the S pole

D upwards

39 A radioactive isotope has $\frac{1}{16}$ of the radioactive sample remaining after 32 days.

What is the half-life of the sample?

A 2 days

B 4 days

C 8 days

D 32 days

40 Which is an industrial use of radio isotopes?

A carbon dating

B radio therapy

C thickness gauging

D tracers