Name: _____ ( ) Class: _____

PRELIMINARY EXAMINATION
GENERAL CERTIFICATE OF EDUCATION ORDINARY LEVEL

PHYSICS **6091/01**

Paper 1 Multiple Choice **27 August 2024**

1 hour

Additional Materials: Multiple Choice Answer Sheet

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.
Do not use staples, paper clips, highlighters, glue or correction fluid.
Write your name, index number and class on the Answer Sheet in the spaces provided.

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 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 on this booklet.
The use of an approved scientific calculator is expected, where appropriate.

This document consists of **18** printed pages.



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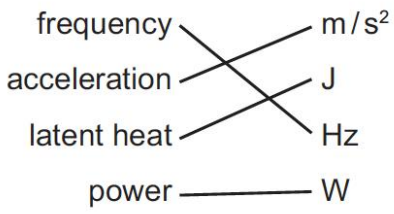
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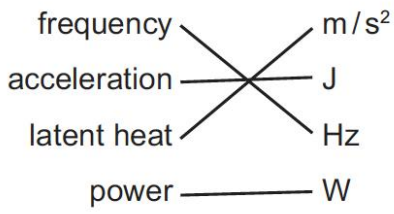
1 In a test, four students linked the quantities on the left with their units on the right.

Which student matched them all correctly?

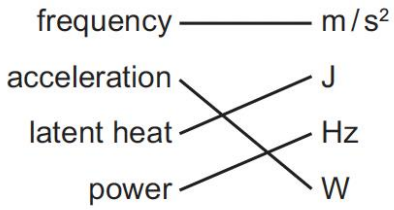
A



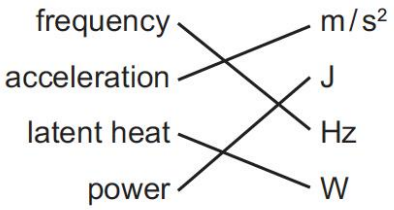
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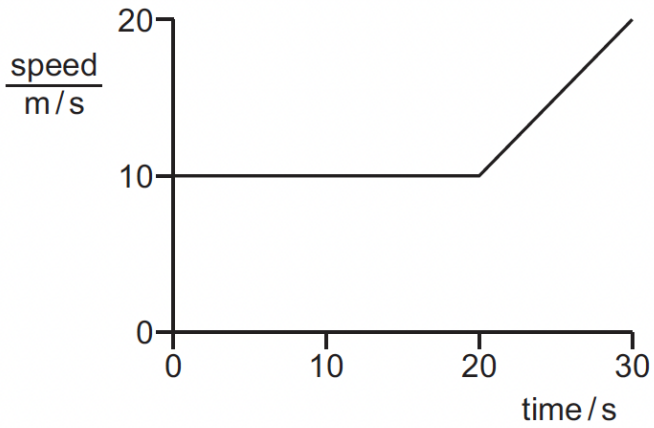
C



D



2 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 average speed of the object during the last 15 s of its motion?

A 11.7 m/s
B 12.5 m/s
C 13.3 m/s
D 15.0 m/s

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3 What happens to an object if it is moved from a location above sea level to the top of a very tall mountain?

A Its density increases.
B Its mass increases.
C Its weight decreases.
D Its volume decreases.

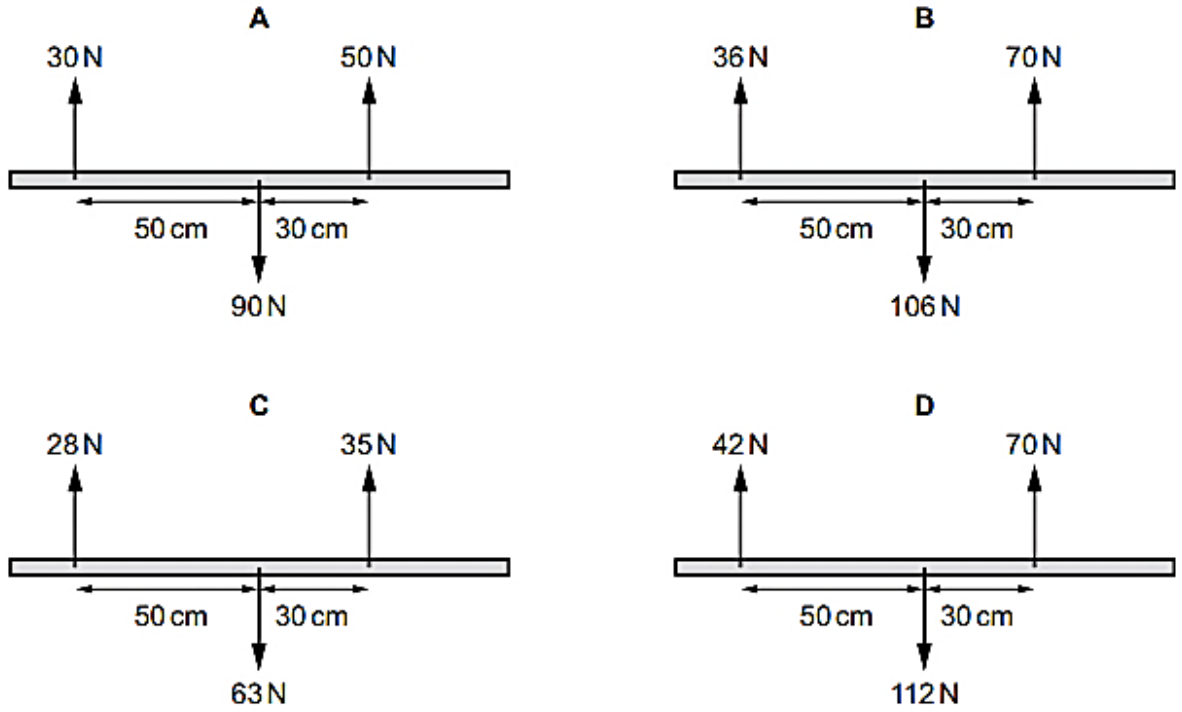
4 An electric car of mass 1500 kg has a forward acceleration of 4.5 m/s^2. A resistive force of 2000 N opposes the motion of the car.

What is the driving force due to the engine of the car?

A 1500 N
B 2000 N
C 6800 N
D 8800 N

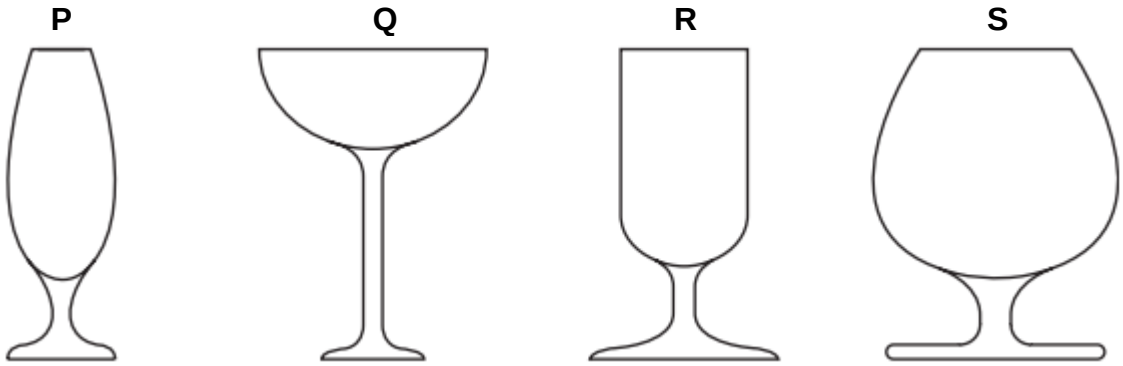
5 Four beams of the same length each have three forces acting on them.

Which beam has both zero resultant force and zero resultant moment?



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6 The diagrams show the cross-sections of different glasses. All the glasses are filled to the top with a liquid of similar density to glass.



Which row shows the glasses in order of decreasing stability?

A **Q → P → R → S**
B **Q → R → P → S**
C **S → P → R → Q**
D **S → R → P → Q**

7 The tyres of a racing car each have an area of 350 cm^2 in contact with the ground.

The car has a mass of 840 kg and its weight is assumed to be equally distributed amongst the four tyres.

The gravitational field strength is 10 N/kg.

What is the pressure exerted on the ground?

A 6.0 N / cm^2
B 24 N / cm^2
C 60 N / cm^2
D 240 N / cm^2

8 A metal cube has a mass of 1200 g and sides 4.00 cm each. There is a hole measuring 2.00 cm × 2.00 cm × 1.00 cm at the top.

What is the density of the metal used to make the block?

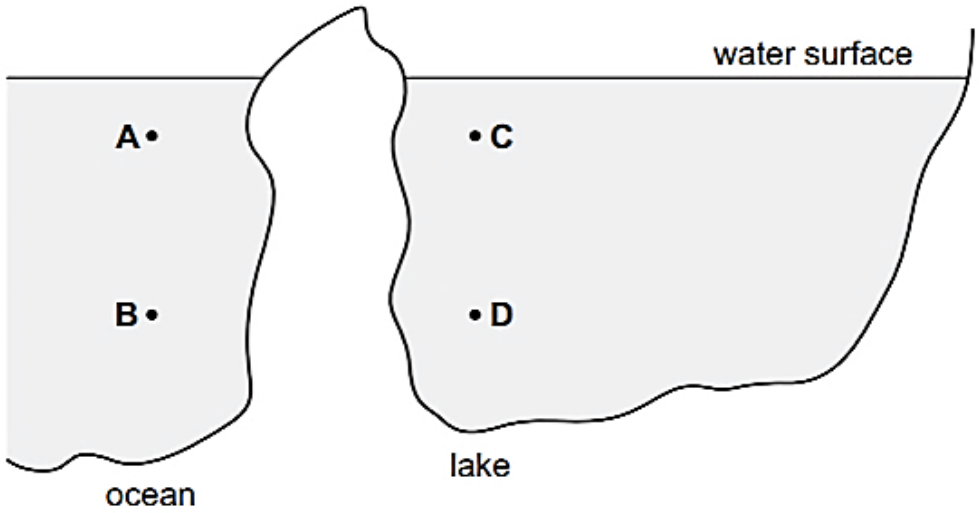
A 17.6 g/cm^3
B 18.8 g/cm^3
C 20.0 g/cm^3
D 21.4 g/cm^3

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9 An underwater diver moves from the ocean to a fresh water lake.

The density of water in the lake is less than in the ocean.

In which position does the diver experience the smallest pressure due to the water?



10 The table shows some data from a high-jump competition.

Which athlete jumps the highest?

	weight / N	increase in energy of gravitational potential store / J
A	650	1410
B	760	1730
C	870	1860
D	980	1900

11 A small ball bearing is released from the top of a tall cylinder filled with water. After some time, it is observed to fall with constant speed until it reaches the bottom of the cylinder.

What is the main energy transfer taking place as it falls with constant speed?

A kinetic store of ball to internal store of water molecules
B kinetic store of ball to gravitational potential store of ball
C gravitational potential store of ball to kinetic store of ball
D gravitational potential store of ball to internal store of water molecules

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12 Which row best describes the behaviour of molecules in a liquid?

	distance between the molecules	motion of the molecules	strength of forces between the molecules
A	close together	stationary	very strong
B	close together	random	fairly strong
C	far apart	stationary	fairly strong
D	far apart	random	weak

13 A gas is in a sealed container of constant volume. The gas is heated and the pressure of the gas on the walls of the container increases.

How do the particles of the gas cause this increase in pressure?

A They expand.
B They hit each other more frequently.
C They hit the container more frequently.
D They vibrate faster.

14 Which statement about the transfer of thermal energy is correct?

A Transfer by radiation does not require a medium.
B Transfer in solids is by means of density changes in the material.
C Transfer is from a region of lower temperature to one of higher temperature.
D Transfer upwards in fluids is mainly through the vibrations of neighbouring particles.

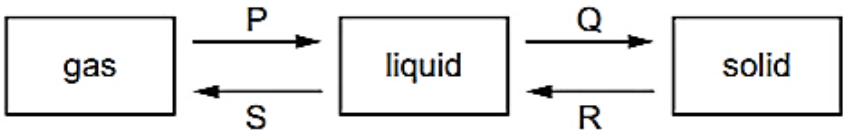
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15 Air in a closed container contains smoke illuminated by bright light. When viewed through a microscope, bright specks of light are seen moving at random.

Which statement is correct?

A The random motion of the specks is faster in a vacuum.
B The specks move faster when the air is at a higher temperature.
C The specks seen are molecules of air in rapid random motion.
D When light is turned off, the specks slow down and stop moving.

16 The diagram shows the changes of state of a substance.



What are the names of the changes of state P, Q, R and S?

	P	Q	R	S
A	condensation	melting	solidification	boiling
B	condensation	solidification	melting	boiling
C	boiling	melting	solidification	condensation
D	boiling	solidification	melting	condensation

17 When a liquid evaporates, molecules escape from its surface.

Which molecules escape, and what happens to the average kinetic energy of the molecules remaining in the liquid?

	molecules that escape	average kinetic energy of remaining molecules
A	less energetic	decrease
B	less energetic	increase
C	more energetic	decrease
D	more energetic	increase

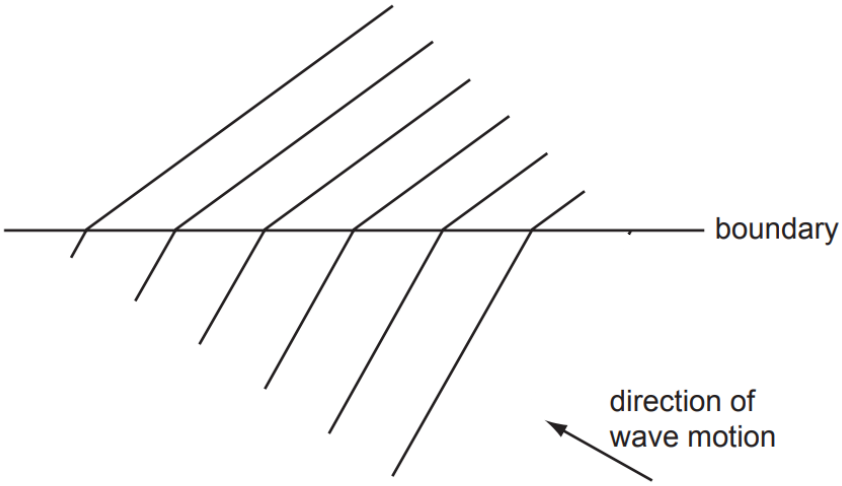
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18 A 0.30 kW heater is used to heat a well-insulated 3.0 kg mass of copper for 5 minutes. The temperature rises by 75 °C.

What is the specific heat capacity of copper?

A 0.0067 J/(kg °C)
B 0.40 J/(kg °C)
C 6.7 J/(kg °C)
D 400 J/(kg °C)

19 The diagram shows the change in direction of water waves as they cross a boundary in a ripple tank.

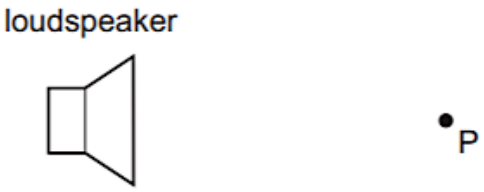


What causes this change in direction?

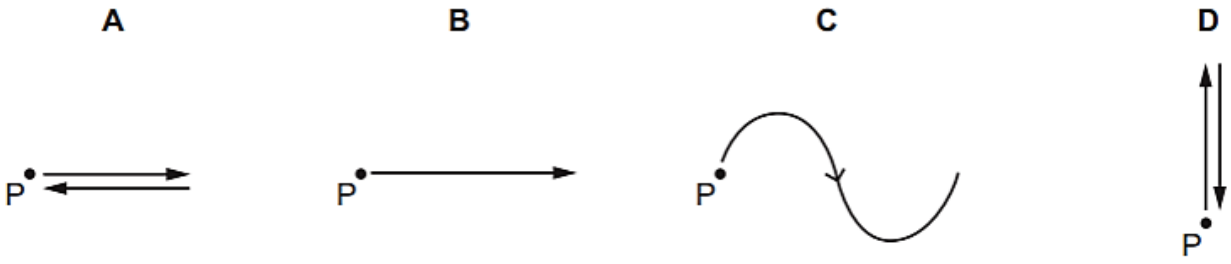
A a change in depth causing a change in frequency
B a change in depth causing a change in speed
C a change in frequency causing a change in speed
D a change in wavelength causing a change in frequency

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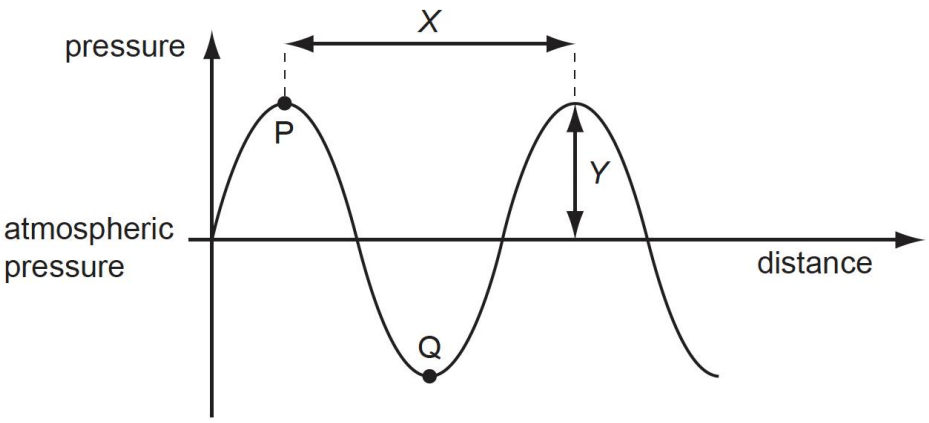
20 The diagram shows a loudspeaker that is producing a continuous sound wave of frequency 200 Hz in air.



Which diagram best shows how the sound wave causes a molecule at P to move in an interval of 5.0 ms?



21 The graph shows, at one instant, the pressure variation along a sound wave.



Which point on the diagram represents a rarefaction and what is the wavelength of the sound wave?

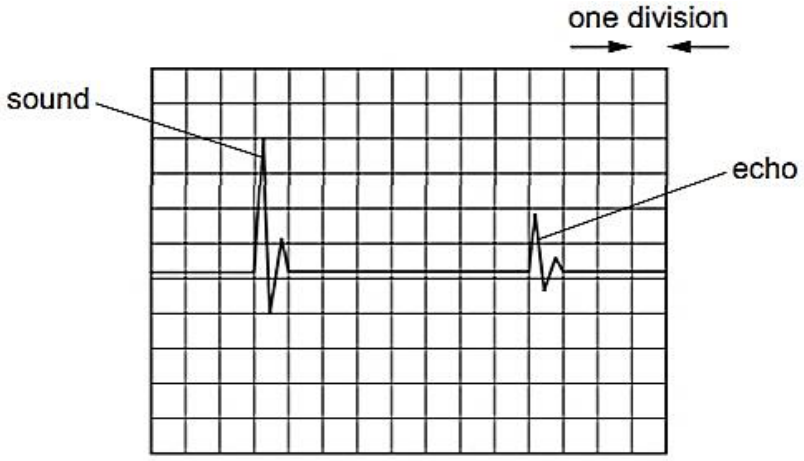
	rarefaction at	wavelength is
A	P	*X*
B	P	*Y*
C	Q	*X*
D	Q	*Y*

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22 A loudspeaker and a microphone are placed side by side in front of a wall.

The loudspeaker makes a sound which is detected by the microphone.

The microphone is connected to a device known as an oscilloscope which is set so that each horizontal division on its screen represents a duration of 0.01 s. The microphone detects the original sound and the echo.



display on oscilloscope

The speed of sound in air is 300 m/s.

What is the distance between the loudspeaker and the wall?

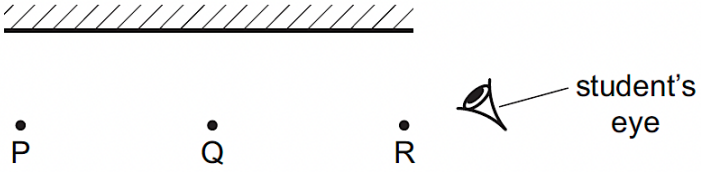
A 6.0 m
B 12 m
C 24 m
D 48 m

23 How do the frequencies and the wavelengths of infrared and ultraviolet radiation compare?

	higher frequency	longer wavelength
A	infrared	infrared
B	infrared	ultraviolet
C	ultraviolet	infrared
D	ultraviolet	ultraviolet

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24 Three objects P, Q and R are placed in front of a plane mirror.



The student's eye is positioned as shown.

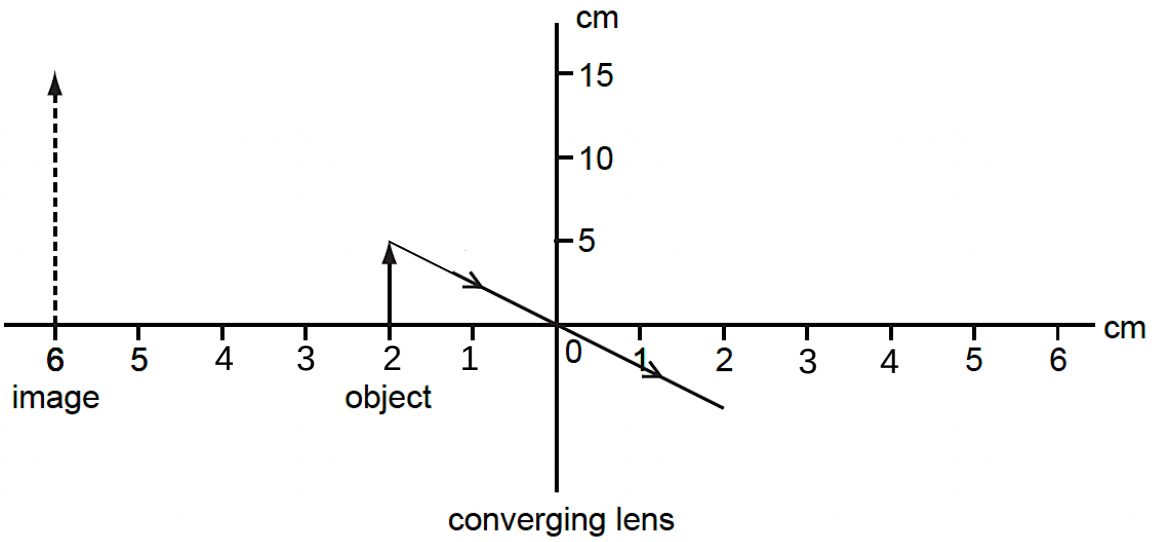
Which of the images of P, Q and R can the student see in the mirror?

	P	Q	R
A	✓	✓	✓
B	✓	✓	×
C	×	✓	×
D	×	×	×

key
✓ = can see
× = cannot see

25 An object 5.0 cm high is placed 2.0 cm from a converging (convex) lens which is being used as a magnifying glass.

The image produced is 6.0 cm from the lens and is 15 cm high.



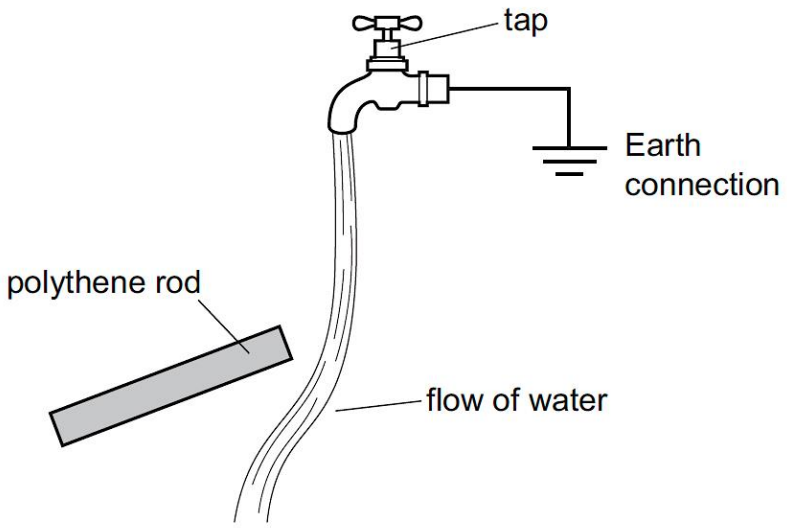
What is the focal length of the lens?

A 2.0 cm
B 3.0 cm
C 4.0 cm
D 6.0 cm

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26 A polythene rod is brought near to a stream of water from a metal tap which is earthed. Tap water is an electrical conductor.

The water moves towards the rod, as shown.

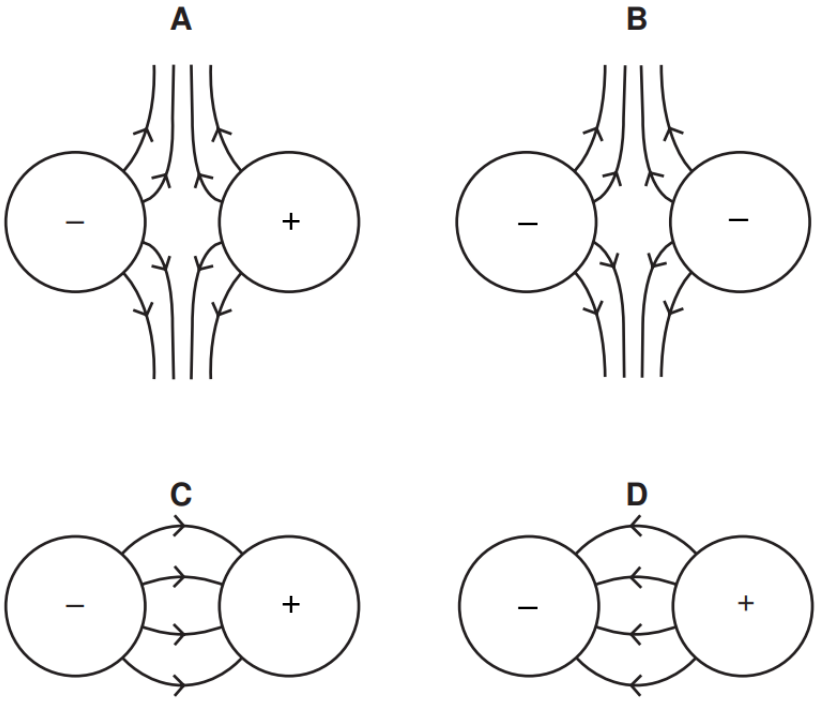


Which description of the rod and water is correct?

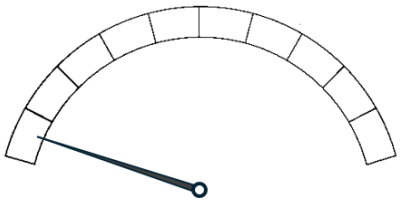
	rod	water
A	charged	charged
B	charged	uncharged
C	uncharged	charged
D	uncharged	uncharged

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27 Which diagram correctly shows the electric field between two charged spheres?



28 A charge of 9.5 C flows through a resistor in 5.0 s. A student has ammeters with different ranges.

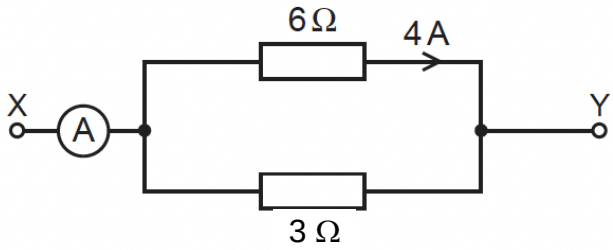


If each ammeter's range is divided into ten intervals as shown above, which ammeter range is the most appropriate to measure the current in the resistor?

A 0 – 1 A
B 0 – 2 A
C 0 – 5 A
D 0 – 10 A

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29 Two resistors of 3 Ω and 6 Ω are arranged in parallel. A p.d. is connected across the terminals X and Y. The current through the 6 Ω resistor is 4 A.



What is the current in the ammeter?

A 4 A
B 6 A
C 8 A
D 12 A

30 Three identical cells are connected in series to a resistor. A student makes the following claims:

(1) Connecting three cells in series allows a voltage higher than what a single cell can provide to the resistor.

(2) Connecting three cells in series enables the circuit to continue providing power to the resistor if any of the cells fail to operate.

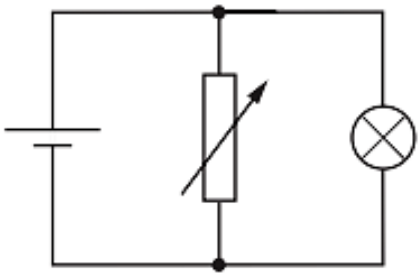
Which of the following rows is correct?

	Statement (1)	Statement (2)
A	True	True
B	True	False
C	False	True
D	False	False

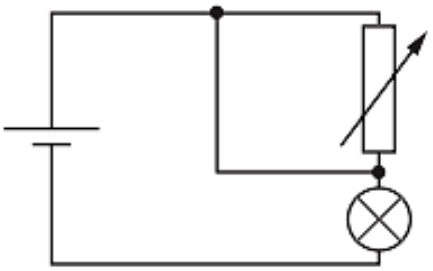
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31 Which diagram shows a circuit that can vary the potential difference across the lamp?

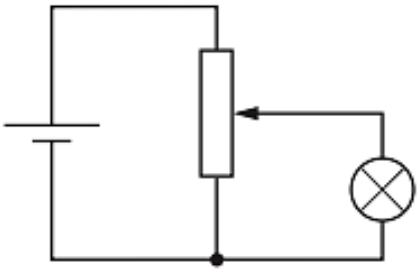
A



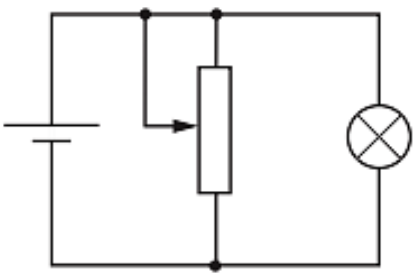
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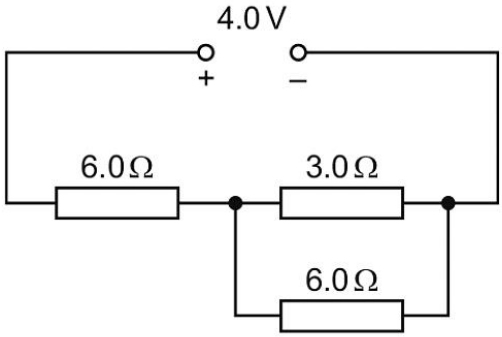
C



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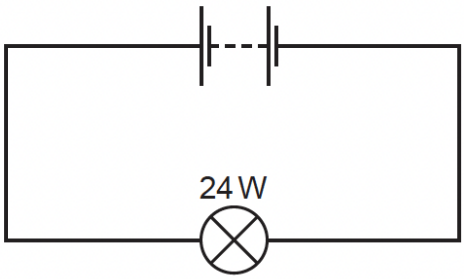
32 What is the current through the 3.0 Ω resistor in the circuit below?



A 0.17 A
B 0.25 A
C 0.33 A
D 1.3 A

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33 A student connected a 12 V, 24 W electric lamp directly to a 6 V power supply.



What is the annual cost of using this lamp if the power supply is turned on for 2 hours every day and the cost of electricity is 24 cents per kWh?

A 53 cents **B** 105 cents **C** 210 cents **D** 420 cents

34 A house-owner replaces a blown fuse for the lights of the house. When the lights are switched on, the second fuse also blows. The house-owner then uses a third fuse with a higher rating than the previous two.

Why is this **not** a sensible thing to do?

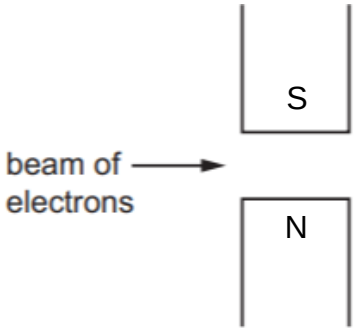
A Fuses only allow the circuit to work if the rating is exactly right.
B The circuit may work, but the fault is not corrected.
C The third fuse will melt because the rating is too high.
D Using a fuse with too high a rating causes electric shocks.

35 Which properties make materials suitable for use as a core in an electromagnet?

A difficult to magnetise and easy to demagnetise
B difficult to magnetise and retains magnetic strength
C easy to magnetise and easy to demagnetise
D easy to magnetise and retains magnetic strength

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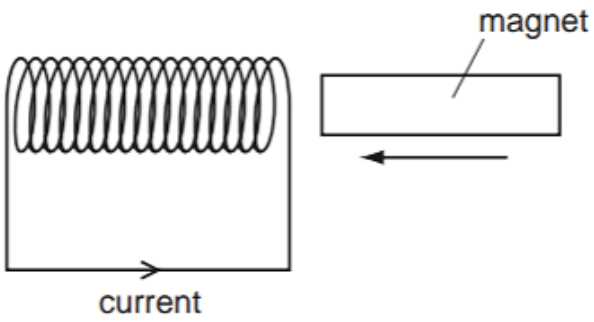
36 A horizontal beam of electrons passes between the two poles of a magnet.



In which direction is the beam deflected?

A into the page
B out of the page
C towards the north pole
D towards the south pole

37 A magnet is pushed slowly into a coil and there is a current in the coil in the direction shown.



The magnet is then pulled out quickly from the same end of the coil.

What happens to the direction and the size of the current?

	direction	size
A	reversed	decreased
B	reversed	increased
C	unchanged	decreased
D	unchanged	increased

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38 A transformer has 240 turns on its secondary coil and 2400 turns on its primary coil. The primary coil is connected to a 230 V, 50 Hz a.c. supply. The secondary coil is connected to an electric heater.

How does the current in the heater compare with the current in the supply?

A higher frequency a.c., larger current
B lower frequency a.c., smaller current
C same frequency a.c., larger current
D same frequency a.c., smaller current

39 Which row shows the atomic structure of a neutral atom with a nucleon number of 18?

	number of protons	number of neutrons	number of electrons
A	8	8	10
B	8	10	8
C	10	8	8
D	10	10	8

40 In nuclear ……1……, hydrogen nuclei ……2…… to form helium nuclei, releasing energy.

Which words correctly complete blanks 1 and 2?

	1	2
A	fission	join together
B	fission	split apart
C	fusion	join together
D	fusion	split apart

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