

CONVENT OF THE HOLY INFANT JESUS SECONDARY
Preliminary Examination in preparation for
the General Certificate of Education Ordinary Level 2024

CANDIDATE
NAME

CLASS

REGISTER
NUMBER

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PHYSICS

6091/01

Paper 1 Multiple Choice

28 August 2024

1 hour

Additional Materials: Multiple Choice Answer Sheet (OMR)

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.

Do not use staples, paper clips, glue or correction fluid.

Write your name, class and register number on the Answer Sheet in the spaces provided unless this has been done for you.

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.

The use of an approved scientific calculator is expected, where appropriate

- 1 A textbook lists the radius of a deuterium atom as 1.1×10^{-10} m and the distance travelled by light in one year as 9.5×10^{15} m.

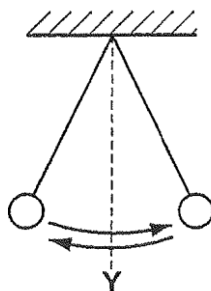
How are these values expressed with prefixes?

	radius of a deuterium atom	distance travelled by light in one year
A	1.1×10^{-1} nm	9.5×10^3 Tm
B	1.1×10^{-1} nm	9500 Gm
C	1.1×10^{-1} μ m	9500 Gm
D	1.1×10^{-1} μ m	9.5×10^3 Tm

- 2 What is the unit of power expressed in base units?

A $\text{kgm}^2 / \text{s}^2$ **B** kgm^2 / s **C** $\text{kg}^2\text{m}^2 / \text{s}^2$ **D** $\text{kgm}^2 / \text{s}^3$

- 3 A pendulum swings backwards and forwards passing through Y, the middle point of the oscillation.

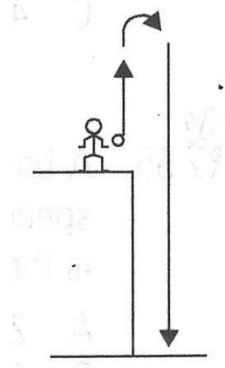


The first time the pendulum passes through Y, a stopwatch is started. The twenty-first time the pendulum passes through Y, the stopwatch is stopped. The reading is T.

What is the period of the pendulum?

A $T/40$ **B** $T/21$ **C** $T/20$ **D** $T/10$

- 4 A robot standing on a cliff shoots a ball upwards with an initial speed of 20 m/s.



What is the height of the cliff given that the ball reaches the bottom of the cliff 10 s after the shoot? (Take $g = 10 \text{ m/s}^2$ and the height of the robot to be negligible)

- A** 275 m **B** 300 m **C** 320 m **D** 375 m
- 5 A car driver takes a total of two hours to make a journey of 75 km. During the journey, the car was stationary as it was caught in a traffic jam for some time. She travels at an average speed of 60 km/h during the rest of the time.

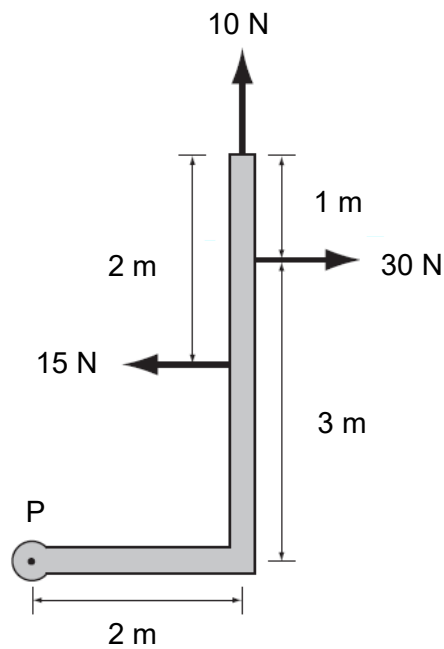
How long was the car caught in the traffic jam if she wants to complete the journey in two hours?

- A** 0.5 hour **B** 0.75 hour **C** 1 hour **D** 1.25 hours
- 6 An experiment is carried out by an astronaut on the surface of the Moon. A coin and a feather are dropped at the same instant from the same height.

Which statement is correct?

- A** The coin falls faster than the feather, but both take a longer time than if they were falling from the same height on Earth.
- B** The coin falls faster than the feather, but both take a shorter time than if they were falling from the same height on Earth.
- C** They fall together, taking a longer time than the coin would in falling from the same height on Earth.
- D** They fall together, taking a shorter time than the coin would in falling from the same height on Earth.

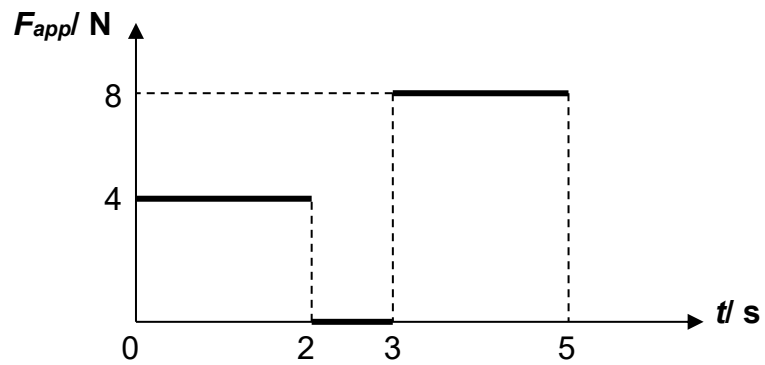
- 7 An L-shaped rigid lever arm is pivoted at point P. Three forces act on the lever arm, as shown in the diagram.



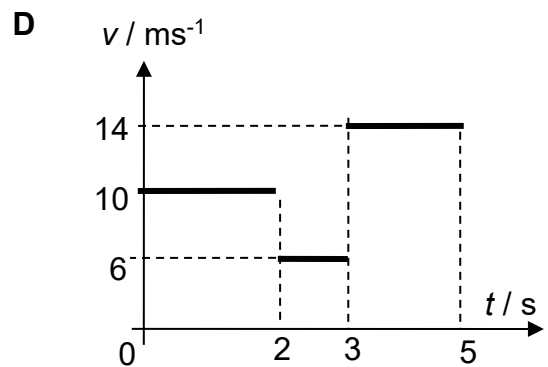
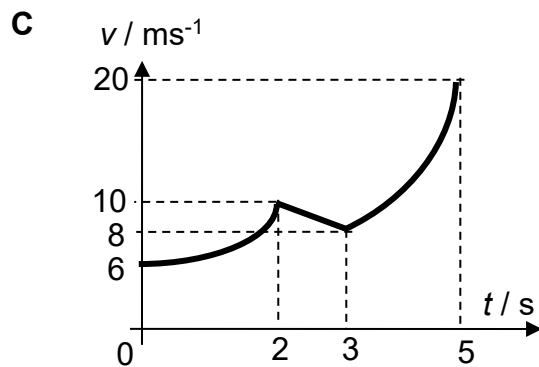
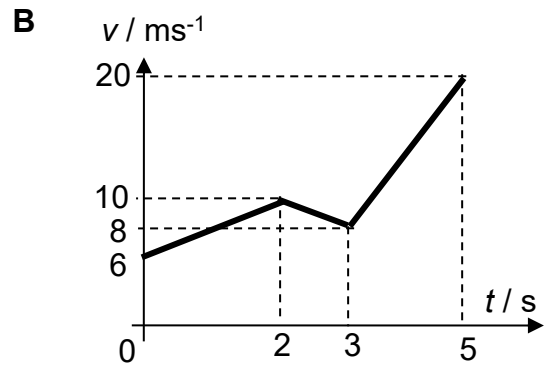
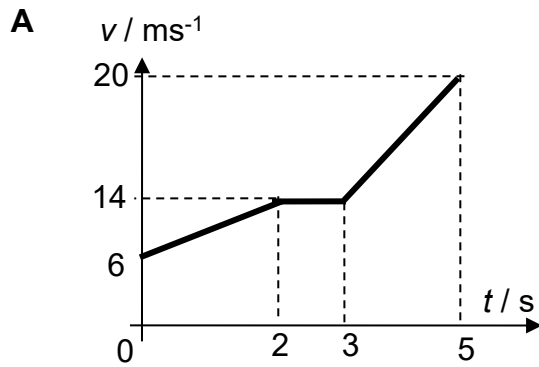
What is the magnitude of the resultant moment of these forces about point P?

- A** 40 Nm **B** 50 Nm **C** 60 Nm **D** 70 Nm

- 8 The graph below shows the applied force acting on a 1 kg block of wood which is initially moving at 6 ms^{-1} on a table.

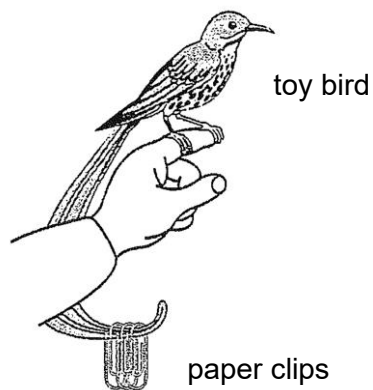


If the table has a friction of 2 N, what is the velocity-time graph of the wood?



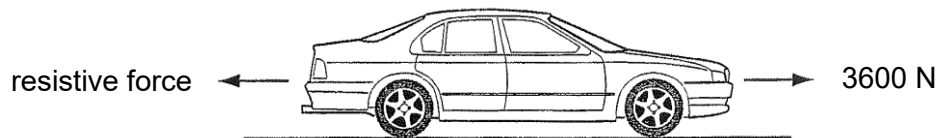
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- 9 A girl uses paper clips to balance a toy bird on her finger, as shown.



What is the effect of the paper clips?

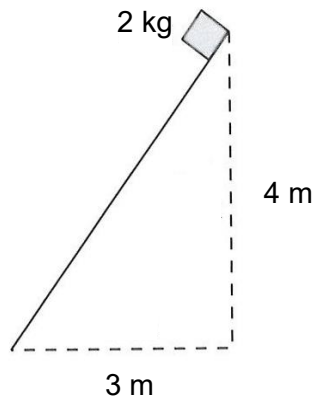
- A They help to raise the centre of gravity above her finger.
 - B They help to raise the centre of gravity to her finger.
 - C They help to lower the centre of gravity below her finger.
 - D They do not affect the centre of gravity but increase the weight.
- 10 A car of mass 800 kg is being driven along a level road.
- The engine supplies a forward force of 3600 N and there is a resistive force opposing motion.



If the car is accelerating at 2.5 m/s^2 , what is the resistive force?

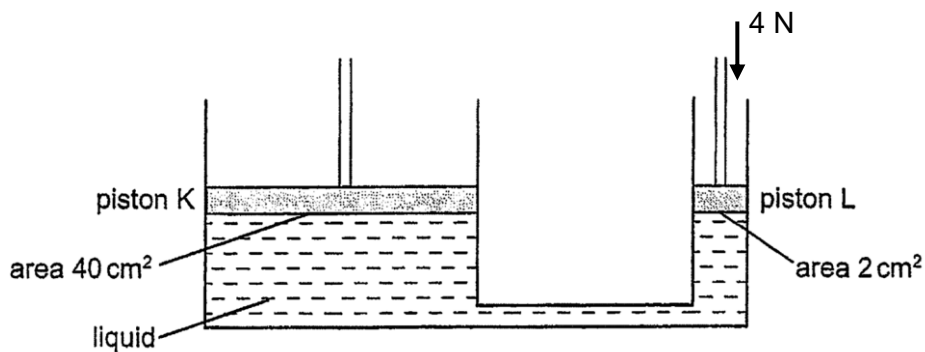
- A 1200 N
- B 1600 N
- C 2000 N
- D 2500 N

- 11 A box of mass 2 kg slides down from the top of the ramp from rest.



Given that the friction along the ramp is 3.2 N, what is the speed of the box when it reaches the foot of the ramp? Take g as 10 N/kg.

- A** 2.8 m/s **B** 4.5 m/s **C** 8.0 m/s **D** 8.9 m/s
- 12 The diagram shows a hydraulic press with two pistons.

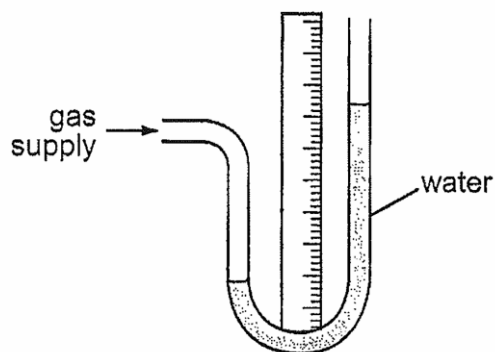


A downward force of 4 N is exerted on piston L.

What will be the upward force exerted by the liquid on piston K?

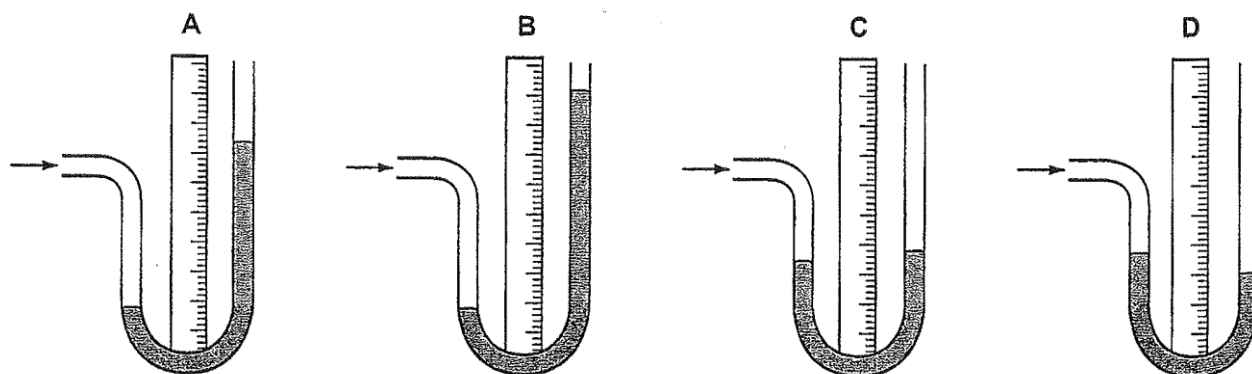
- A** 1 N **B** 4 N **C** 80 N **D** 1600 N

- 13 A water manometer is connected to a gas supply. The diagram shows the water levels.



The water is replaced by mercury, which is denser than water.

Which diagram shows the mercury levels when the manometer is connected to the same gas supply?

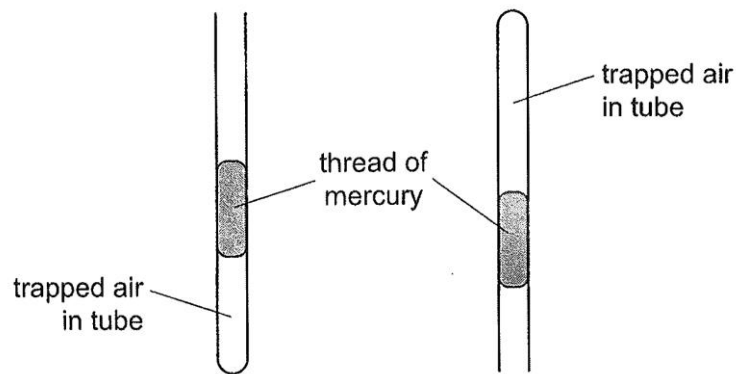


- 14 A fixed mass of gas is heated in a cylinder with a movable piston. The piston is pushed outward by the gas to maintain a constant pressure in the piston.

Which row about the gas particles is correct?

	frequency of collision with the inner wall of cylinder	average speed
A	decrease	no change
B	decrease	increase
C	increase	increase
D	increase	no change

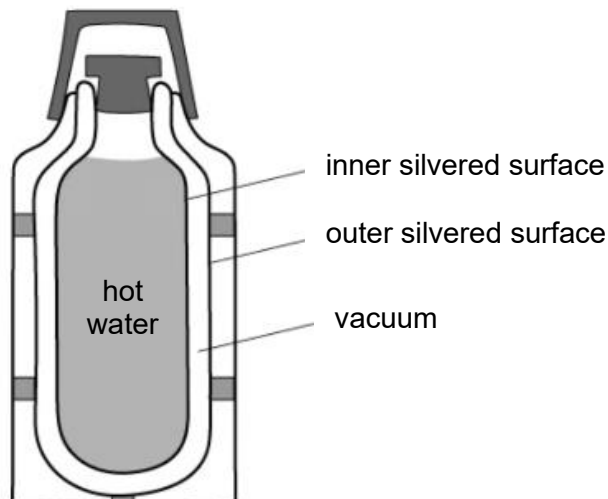
- 15 A thin tube contains a thread of mercury which traps air at the end of the tube. The other end of the tube is open to the atmosphere.



When the tube is turned upside down, the volume of the trapped air increases.

Which statement explains this?

- A The air gets hotter when the tube is turned upside down.
 - B The atmosphere pushes less when it acts upwards on the mercury.
 - C The pressure in the trapped air is reduced.
 - D The trapped air molecules hit the mercury harder when travelling downwards.
- 16 The diagram shows the cross-sectional view of a vacuum flask containing hot water.

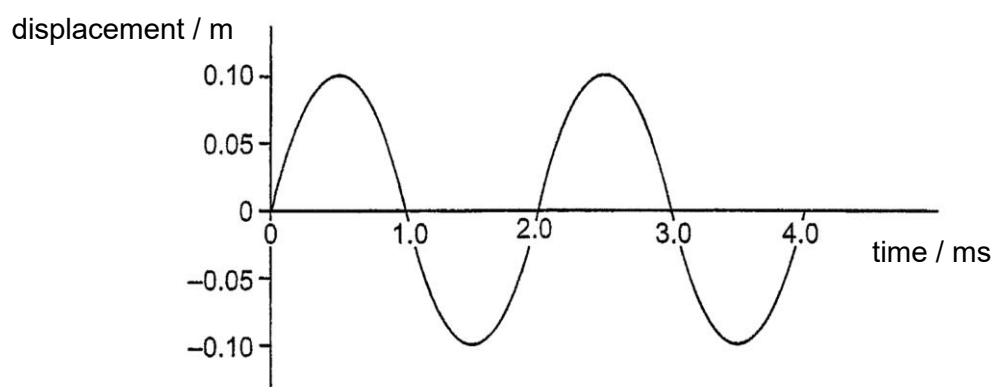
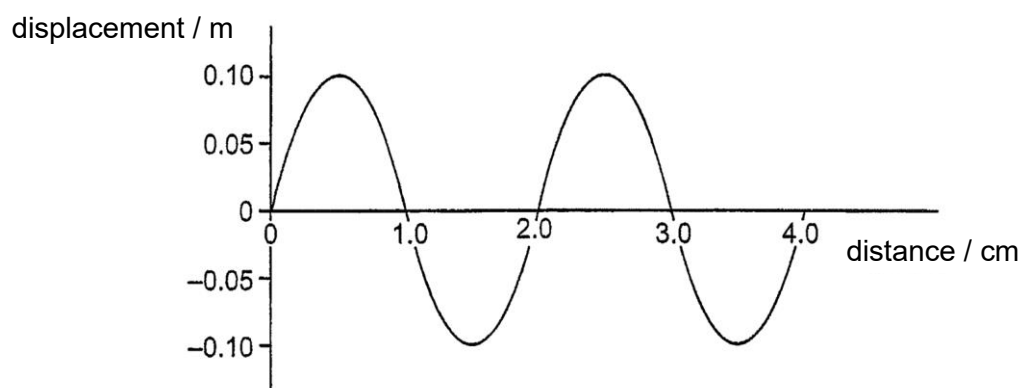


Which statement about the silvered surfaces is correct?

- A The inner silvered surface is a poor absorber of radiation.
- B The inner silvered surface is a poor emitter of radiation.
- C The outer silvered surface is a good absorber of radiation.
- D The outer silvered surface is a good emitter of radiation.

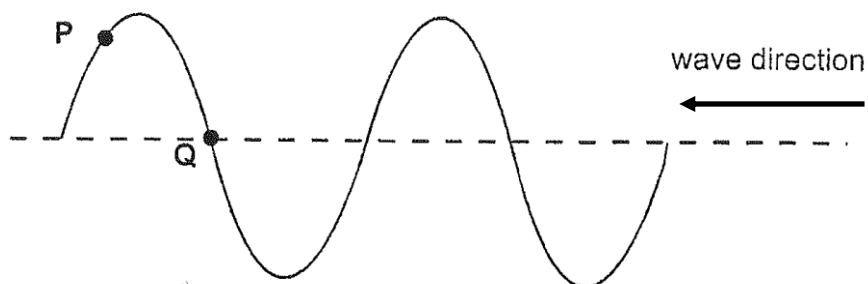
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- 17 The displacement-distance and displacement-time graphs for a wave are as shown.



What is the speed of the wave?

- A** 1 cm/s **B** 100 cm/s **C** 500 cm/s **D** 1000 cm/s
- 18 The diagram shows a wave on a string with two points P and Q marked. The wave is moving in the direction shown.



What will happen next?

- A** P will move to the right.
B P will move up.
C Q will not move.
D Q will move up.

- 19 What happen to the speed and frequency of visible light when it enters from plastic to air?

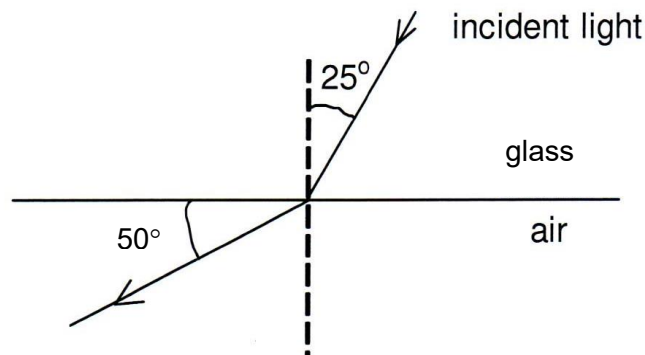
	speed	frequency
A	decreases	increases
B	decreases	unchanged
C	increases	unchanged
D	increases	increases

- 20 Radio waves, visible light and X-rays are all part of the electromagnetic spectrum.

What is the correct order of increasing wavelength?

	shortest	longest
A	X-rays	visible light
B	X-rays	radio waves
C	visible light	X-rays
D	visible light	radio waves

- 21 The figure below shows a ray of light moving from glass into air.



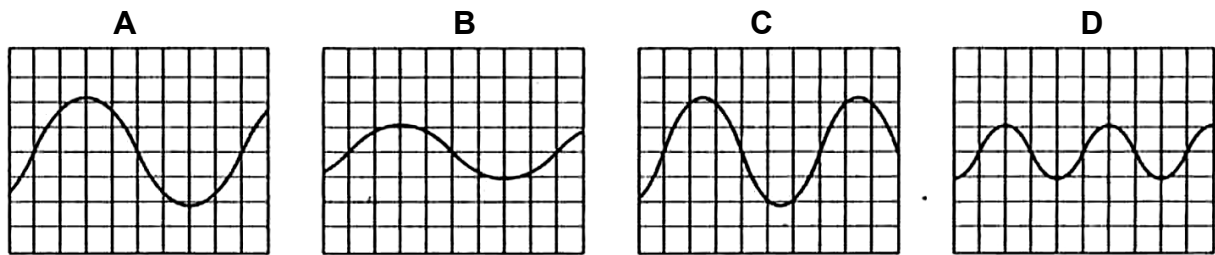
What is the critical angle of glass?

- A** 25° **B** 33° **C** 41° **D** 45°

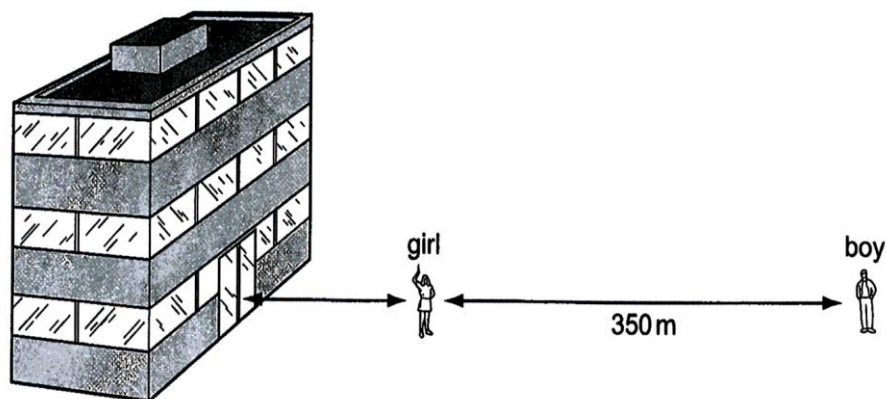
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- 22 The diagrams show traces of sound picked up by microphones. The scale on the grids is the same for all the traces.

Which trace shows the sound that is both soft and low-pitched?



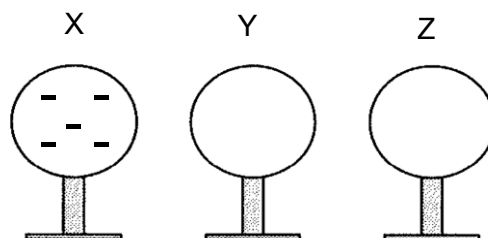
- 23 A girl, standing some distance in front of a tall building, fires a starting pistol.



A boy, standing 350 m from the girl, hears two bangs 1 s apart.
The speed of sound in air is 330 m/s.

Using this information, what is the distance of the girl in front of the tall building?

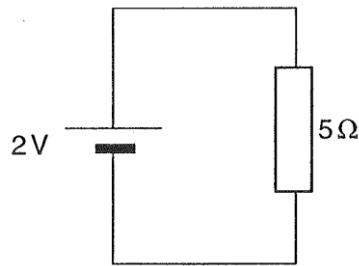
- A 165 m B 175 m C 300 m D 350 m
- 24 Three conductors are placed close to each other. Conductor X is negatively charged. Both conductor Y and Z are neutral.



What will be the charge in conductor Z after it is being earthed momentarily?

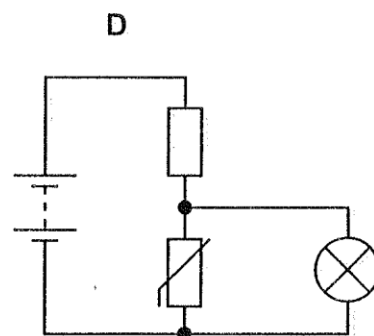
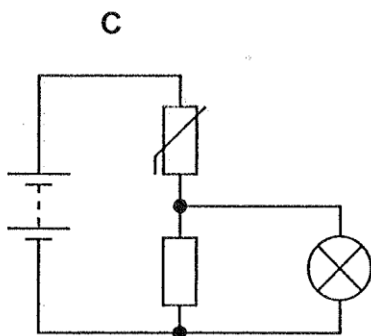
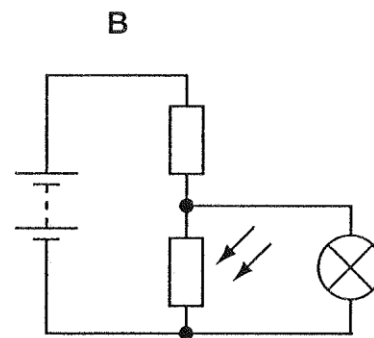
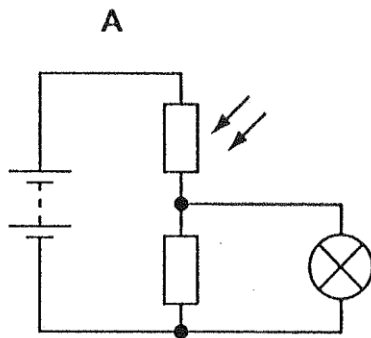
- A neutral B negative C no charge D positive

- 25 The diagram shows a resistor connected to a cell of e.m.f. 2 V.



How much thermal energy is produced in the resistor in ten seconds?

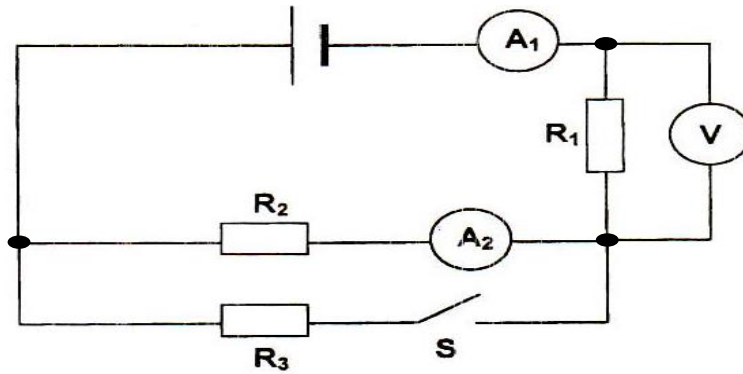
- A 2.5 J B 8 J C 10 J D 60 J
- 26 In which circuit will a lamp glow more brightly when the temperature around a thermistor decreases?



- 27 The terminals of a battery are joined by a length of resistance wire.
- Which change, on its own, will decrease the current through the battery?
- A connecting an identical wire in parallel with the first one
- B covering the wire with a thicker rubber insulation
- C using a thinner wire of the same material and the same length
- D using a shorter wire of the same material and the same thickness

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- 28 In the circuit below, R_1 , R_2 and R_3 are three identical resistors.



If the switch S is closed, what will be the changes to the ammeters and voltmeter readings?

	A_1	A_2	V
A	increases	decreases	increases
B	increases	increases	decreases
C	decreases	decreases	increases
D	increases	decreases	decreases

- 29 The average working time per wash of a 600 W washing machine is 104 minutes.

If Singapore Power charges 28 cents per kWh for electricity consumption, how much would it cost for the machine to perform 100 washes?

- A** \$9.69 **B** \$29.12 **C** \$63.00 **D** \$174.72

- 30 Electrical energy is transmitted at high alternating voltage.

Which is **not** a valid reason for doing this?

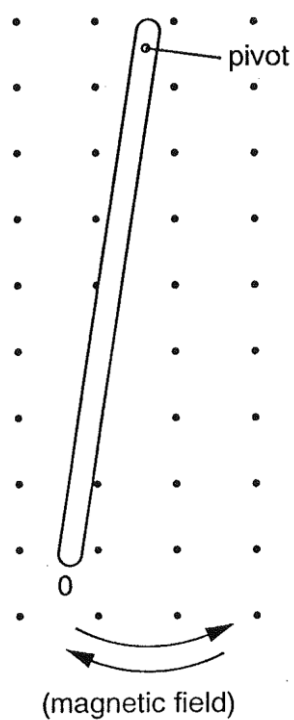
- A** At high voltage, a.c. is safer than d.c..
B For a given power, there is a lower current with a higher voltage.
C There is a smaller energy loss at higher voltage and lower current.
D The transmission lines used can be thinner.

- 31 One end X of a metal rod attracts the N-pole of a compass needle.

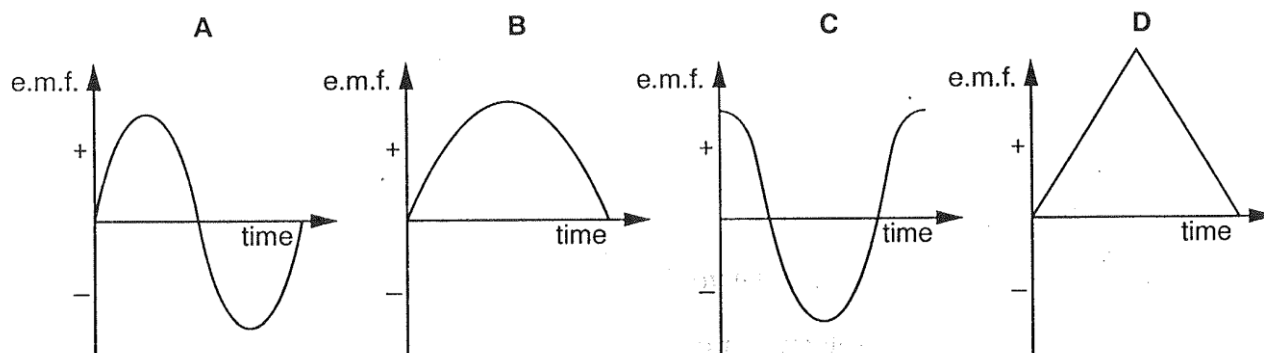
What does this show about the rod?

- A** It could be made of copper but is unmagnetised.
B It could be made of copper with a S-pole at X.
C It could be made of steel but is unmagnetised.
D It could be made of steel with a N-pole at X.

- 32 The diagram shows a metal bar swinging like a pendulum to and fro across a uniform magnetic field. The motion produces an induced e.m.f. in the bar.

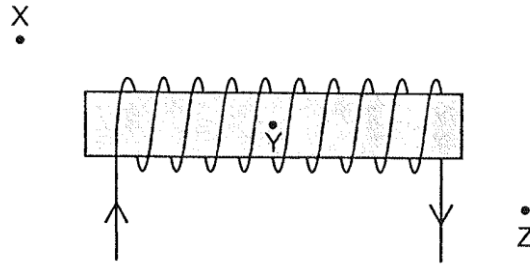


Which graph represents this e.m.f. during one complete oscillation of the bar starting at 0?



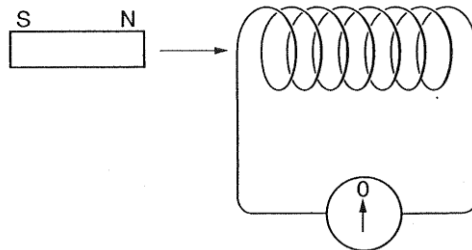
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- 33 The diagram shows a solenoid with current flowing in it.



How does the strength of the magnetic field at points X, Y and Z compare?

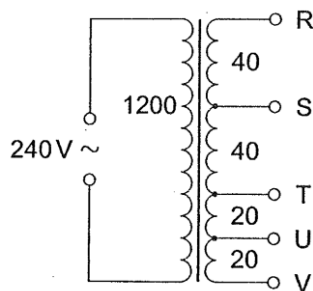
- A equal at X and Z but weaker at Y
 - B equal at X and Z but stronger at Y
 - C stronger at X than Y, and stronger at Y than Z
 - D the same at X, Y and Z
- 34 A small coil is connected to a meter as shown.



When a magnet is pushed into the coil, the pointer of the meter deflects to the right of zero.

What happens to the pointer of the meter when the poles of the magnet are reversed and pulled back more quickly from the coil?

- A The pointer gives a continuous reading to the left.
 - B The pointer gives a continuous reading to the right.
 - C The pointer gives a greater deflection to the left.
 - D The pointer gives a greater deflection to the right.
- 35 A transformer consists of one coil with 1200 turns and a second coil, with a total of 120 turns, which can be tapped at various places.

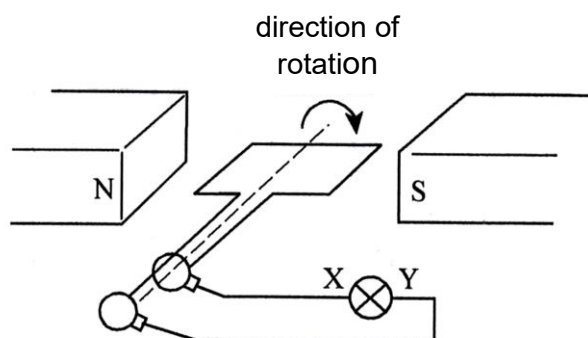


Which pairs of terminals should be connected to a 16 V, 32 W lamp for it to be lit normally?

- A TV
- B RV
- C SU
- D RT

36 Statements 1 and 2 refer to the simple generator, as shown.

- 1 The induced current is maximum when the coil is horizontal.
- 2 The current is flowing from X to Y in the instant shown.



Which statement(s) is/are correct?

- A neither of the statements
- B both statements 1 and 2
- C statement 1 only
- D statement 2 only

37 The table shows the compositions of the nuclei of three nuclides, X, Y and Z.

nuclide	number of protons	number of neutrons
X	12	12
Y	13	12
Z	13	13

Which nuclides are isotopes of the same element?

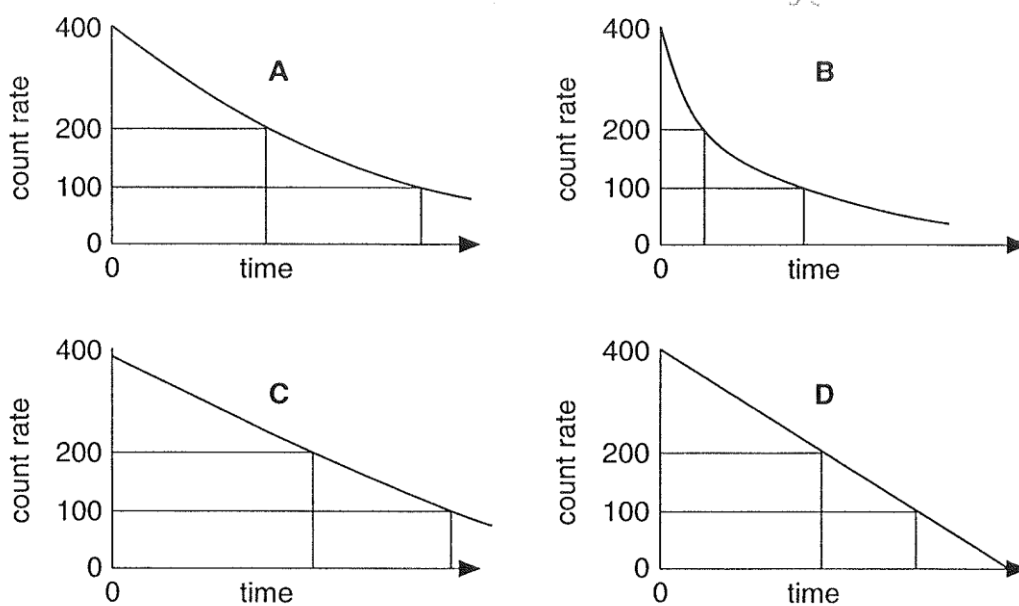
- A X and Y only
- B X and Z only
- C Y and Z only
- D X, Y and Z

38 Why are γ -rays **not** deflected by a magnetic field?

- A They are strongly penetrating.
- B They are weak ionising.
- C They have no charge.
- D They have no mass.

[Turn over

39 Which graph shows how the count rate for a radioactive substance varies with time?



40 Radioactive nuclides can be added to paint to determine how well a paint pigment is mixed. Litre samples, in thick steel cans, are taken from different parts of the mixing tank and the level of radiation measured 30 cm from the can.

Which nuclide properties would be the most suitable for this purpose?

	radiation emitted by nuclide	half-life of nuclide
A	beta	days
B	beta	years
C	gamma	days
D	gamma	years

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