

CONVENT OF THE HOLY INFANT JESUS SECONDARY
Preliminary Examination in preparation for
the General Certificate of Education Ordinary Level 2025

CANDIDATE
NAME

CLASS

REGISTER
NUMBER

--	--

PHYSICS

6091/01

Paper 1 Multiple Choice

03 September 2025

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 average width of a human hair as 0.0001 m and the distance between the Earth and the Sun as 1.5×10^{11} m.

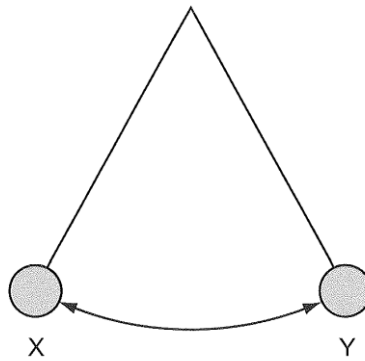
How are these values expressed with prefixes?

	average width of a human hair	distance between the Earth and the Sun
A	1.0×10^{-1} mm	1.5×10^{-1} Tm
B	1.0×10^{-1} mm	1.5×10^{-1} Gm
C	1.0×10^{-1} μ m	1.5×10^{-1} Gm
D	1.0×10^{-1} μ m	1.5×10^{-1} Tm

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

A kg / ms² **B** kg / ms **C** kg² / ms² **D** kg / m²s²

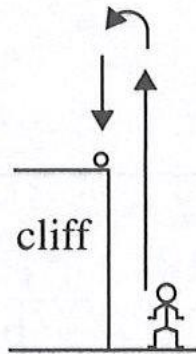
- 3 A pendulum is set in motion and 20 complete swings are timed. The time measured is 30 s.



What is the period and the shortest time t for the pendulum to swing from X to Y?

	period / s	time t / s
A	0.75	0.75
B	0.75	1.5
C	1.5	1.5
D	1.5	0.75

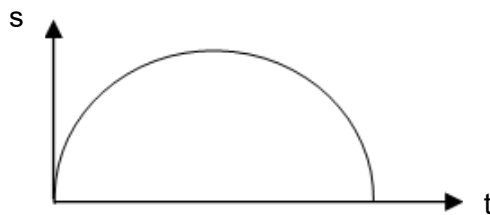
- 4 A robot standing at the bottom of a cliff shoots a ball upwards. The ball drops on top of the cliff after reaching a maximum height of 125 m in 5 s.



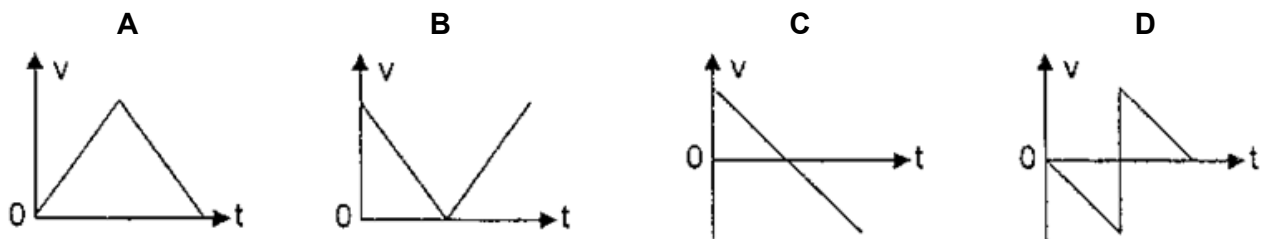
What is the height of the cliff given that the ball reaches the top of the cliff 7 s after the shoot? (Take $g = 10 \text{ m/s}^2$ and the height of the robot to be negligible)

- A** 125 m **B** 115 m **C** 110 m **D** 105 m

- 5 The diagram shows the graph of displacement s against time t for a body moving in a straight line.



Which is the graph of speed v against time t for this body?



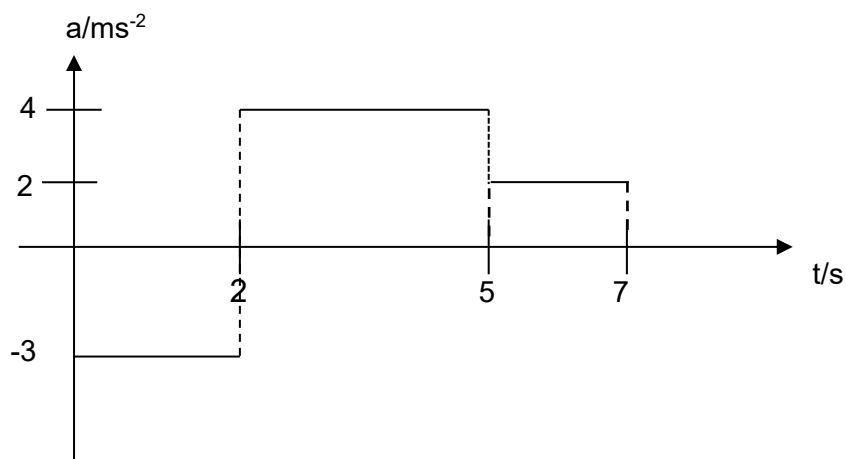
- 6 A bus has a total mass of 12 000 kg. It moves along a horizontal stretch of road at a speed of 10 m/s. It then accelerates, reaching a final speed of 30 m/s after 16 s.

What is the size of the average resultant force acting on the bus when it is accelerating?

- A** 7500 N **B** 9600 N **C** 15 000 N **D** 22 500 N

[Turn over

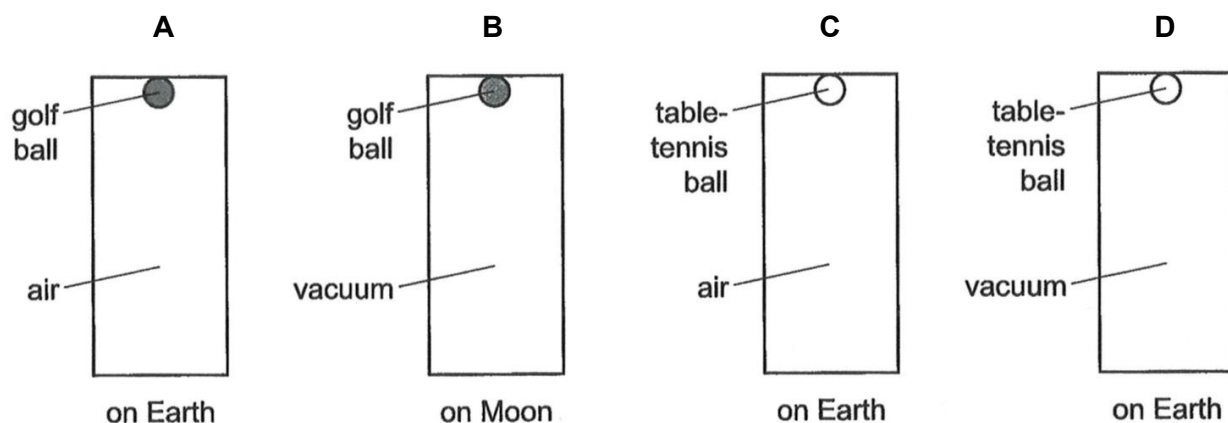
- 7 The graph shows the acceleration-time graph of a toy car.



If the toy car starts off with an initial velocity of 10 ms^{-1} , what is its velocity at the 7th second?

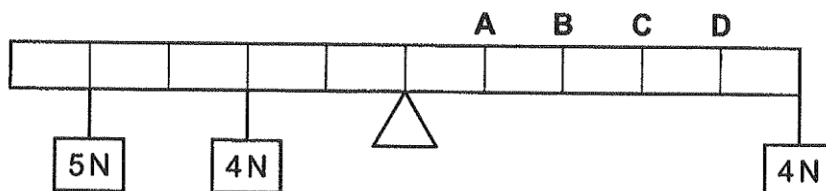
- A** -10 ms^{-1} **B** 10 ms^{-1} **C** 20 ms^{-1} **D** 30 ms^{-1}
- 8 The diagrams show four experiments in which a ball falls from the top to the bottom of identical sealed glass tubes.

In which experiment does the ball take the shortest time to reach the bottom of the tube?



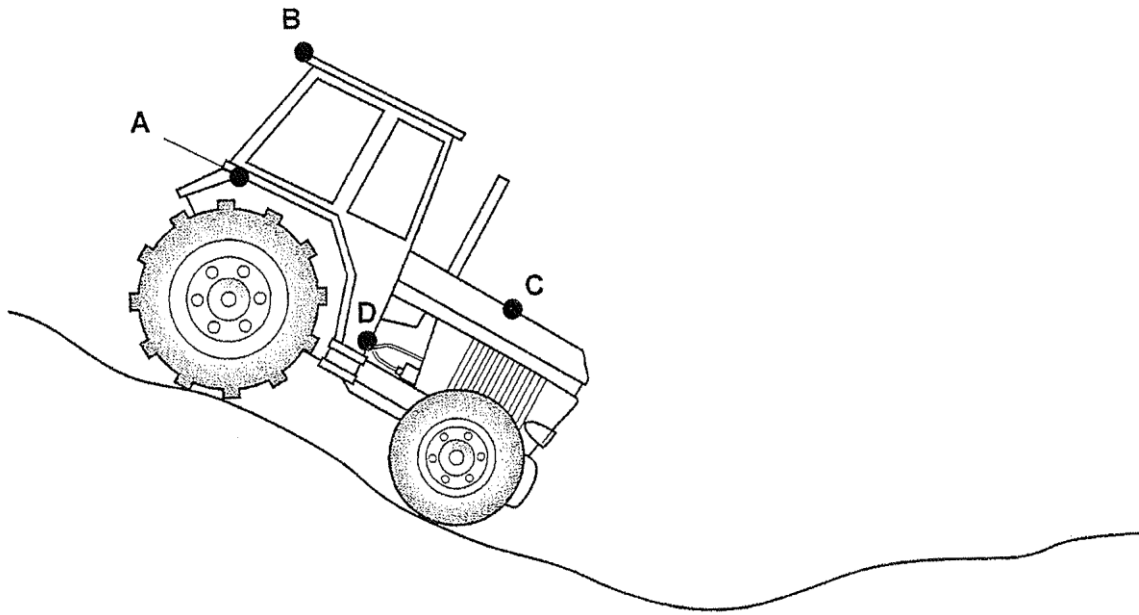
- 9 The diagram shows a uniform beam with three weights hung on it.

At which point does a load of 2 N balance the beam?

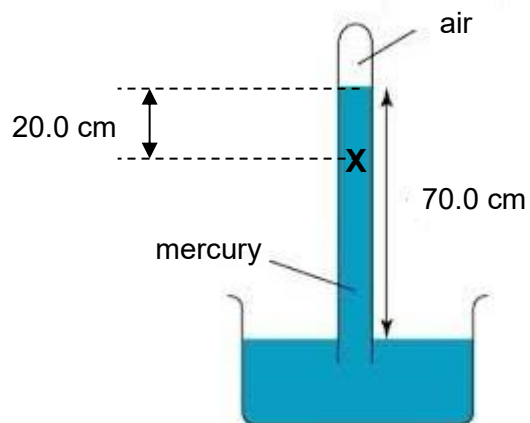


- 10 A tractor is being used on rough ground.

Where should the position of its centre of gravity be for the tractor to topple?



- 11 The diagram shows a barometer containing some air in the space above the mercury column. The height of mercury column is 70.0 cm. X is a point 20.0 cm below the surface of the mercury in the tube. The atmospheric pressure is 76.0 cmHg.

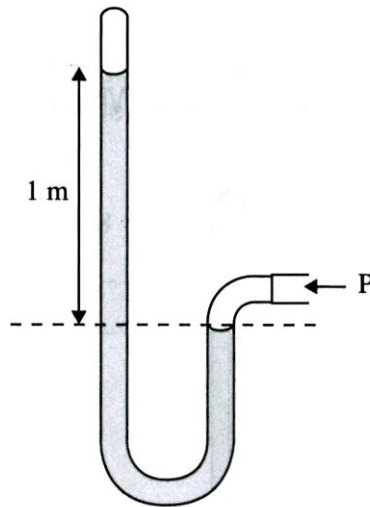


What is the pressure at point X in the mercury?

- A** 56.0 cmHg **B** 50.0 cmHg **C** 26.0 cmHg **D** 20.0 cmHg

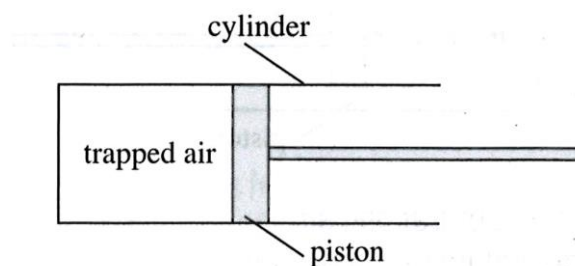
[Turn over

- 12** A closed tube manometer is connected to an air pump as shown. The manometer is filled with water of density 1000 kg/m^3 and the pressure exerted by the trapped air is 190 kPa .



What is the air pressure caused by the air pump?

- A** 10 kPa **B** 190 kPa **C** 200 kPa **D** 210 kPa
- 13** An electric motor took 20 s to lift a 500 N load through a vertical height of 8.0 m.
If the efficiency of the motor is 40 %, how much is the electric input power to the motor?
- A** 80 W **B** 120 W **C** 333 W **D** 500 W
- 14** A gas is trapped in a cylinder with a movable piston as shown. The temperature of the gas is kept constant as the piston is pulled out of the cylinder.



What happens to the gas particles?

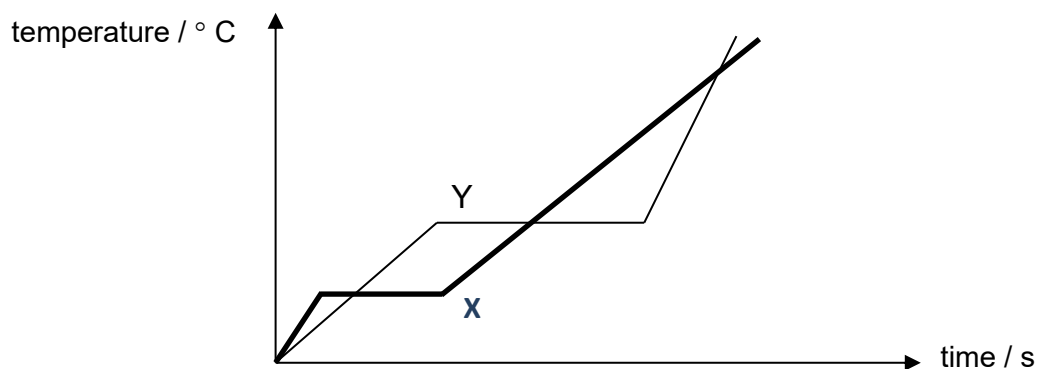
- A** They collide with the cylinder walls more frequently.
B They expand.
C They get further apart.
D They move slower.

- 15 Heat capacity is the energy required to raise the temperature of the object by 1°C .

What does this energy do?

- A It increases the internal potential energy of the solid molecules.
- B It increases the vibration among the solid molecules.
- C It increases the average size of the solid molecules.
- D It increases the forces of attraction between the solid molecules.

- 16 Equal masses of two solids X and Y are heated successively in a well-lagged calorimeter. Thermal energy is supplied to both at the same rate. The temperature-time graph for the process is shown.



Which statement below is correct?

- A Solid X has a larger specific heat capacity than solid Y.
- B Liquid X has a smaller specific heat capacity than liquid Y.
- C Solid X has a smaller specific latent heat of fusion than solid Y.
- D Solid X has a smaller specific latent heat of vaporization than solid Y.

[Turn over

- 17** Four bars, all exactly the same size, are each placed with one end in boiling water.

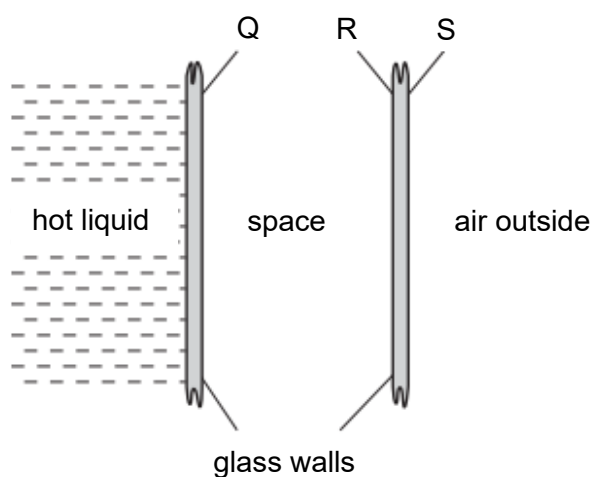
The times taken for the temperature of the other end to increase by 2 °C are measured.

material of bar	time for 2 °C rise / s
copper	5
aluminium	10
cork	800
styrofoam	1200

To make a large metal tank with the least heat loss, which materials should be used for the tank and its insulation?

	tank	Insulation
A	aluminium	cork
B	aluminium	styrofoam
C	copper	cork
D	copper	styrofoam

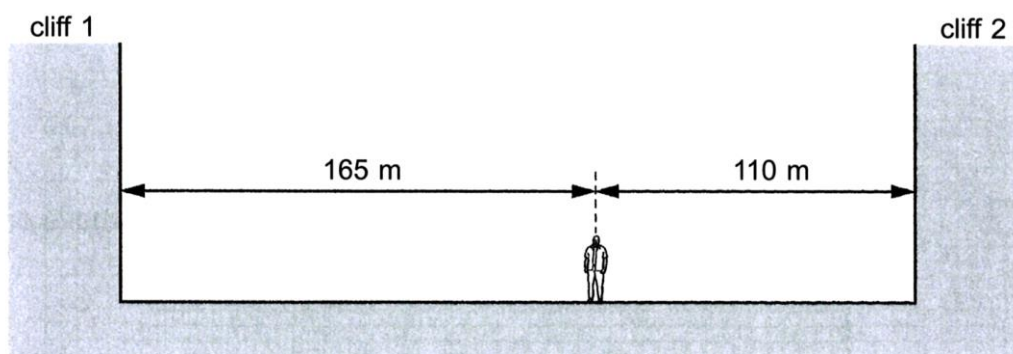
- 18** A student uses a double-walled glass vessel to contain a hot liquid.



Which method reduces the heat loss by radiation?

- A** creating a vacuum in the space between the glass walls
- B** painting surface Q black
- C** painting surface R black
- D** painting surface S white

- 19 A man stands between two cliffs and claps his hands once.

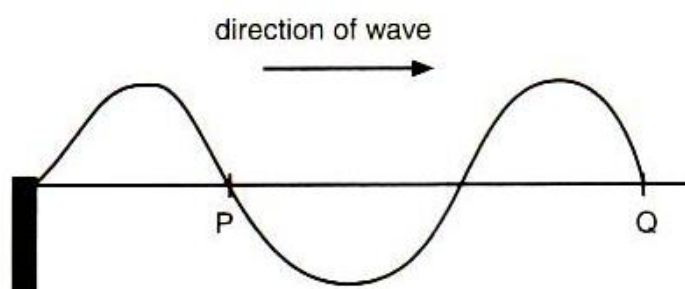


An echo is heard which is closely followed by another.
The speed of sound is 330 m/s.

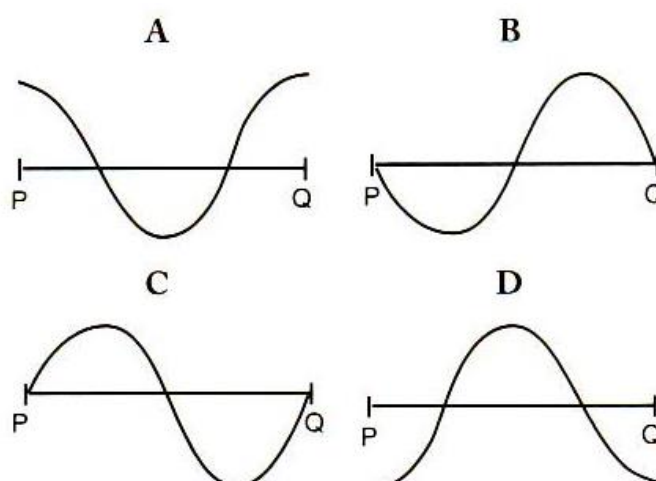
What is the time interval between the two echoes?

- A** 0.17 s **B** 0.33 s **C** 0.67 s **D** 0.83 s

- 20 A vibrator generates a travelling wave on a string. The diagram shows the shape of the string at a certain instant.



Which is the correct shape of the string between P and Q after half a period?



[Turn over

- 21 When ultrasound travels from air into water, what happens to its frequency, wavelength and speed?

	frequency	wavelength	speed
A	remains the same	reduced	reduced
B	remains the same	increased	increased
C	remains the same	increased	reduced
D	increased	increased	increased

- 22 The frequency of a note with high pitch is greater than the frequency of a note with low pitch.

Which statement about the note with high pitch is correct?

- A** It has a longer wavelength.
- B** It has a shorter wavelength.
- C** It has a greater speed in air.
- D** It has a slower speed in air.

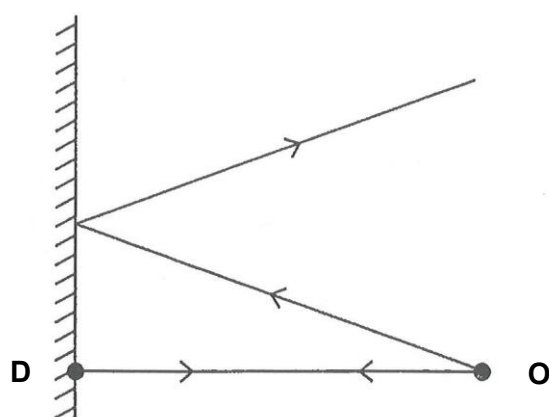
- 23 The diagram shows two divergent rays of light from an object O being reflected from a plane mirror.

At which position will the image be formed?

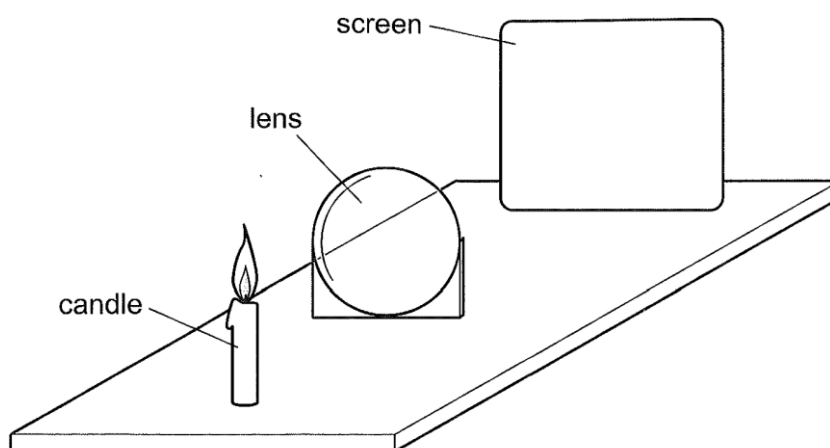
A ●

B ●

C ●



- 24 A thin converging lens is used to produce, on a screen, a focused image of a candle.



Various focused images are produced on the screen by moving the lens and the screen backwards and forwards.

Which statement is **always** correct?

- A The image is at the principal focus (focal point) of the lens.
- B The image is bigger than the object.
- C The image is closer to the lens than the object is.
- D The image is inverted.

- 25 Statements 1 and 2 refer to signals passing through an optical fibre of refractive index 1.5.

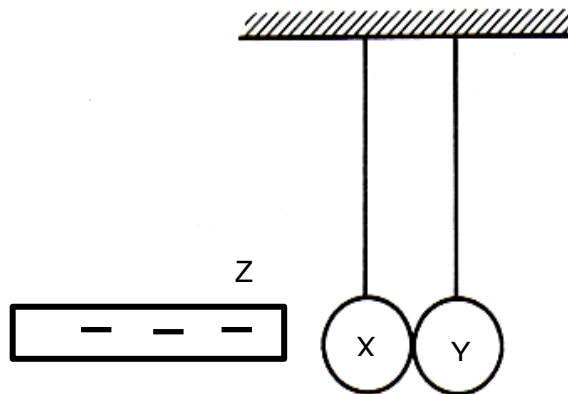
- 1 The speed of the signal in the optical fibre is less than 3.0×10^8 m/s.
- 2 The angle of incidence of the signals in the optical fibre must be greater than 41.8° .

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

[Turn over

- 26** A negatively charged rod is brought near two neutral spheres X and Y, which are in contact. Y is momentarily earthed and Z is then removed.



What happens to the charge distribution on X and Y?

	X	Y
A	negative	negative
B	negative	positive
C	positive	positive
D	positive	negative

- 27** A battery supplies a current of 0.5 A to a circuit consisting of two identical resistors in series.

If the work required to move the electrical charges through each resistor is 300 J per minute, what is the e.m.f. of the battery?

- A** 10 V **B** 20 V **C** 75 V **D** 150 V

- 28** A cell is connected to a resistor.

What is the electromotive force of the cell equal to?

- A** the potential difference across the resistor for each unit of current
B the power produced in the circuit for each unit of charge that passes the resistor
C the work done in the circuit for each unit of charge that passes the resistor
D the work done in the circuit for each unit of current

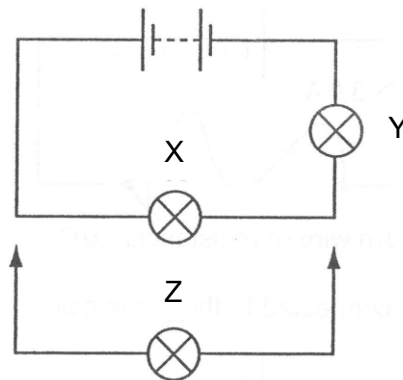
- 29** A resistor with resistance R is made from a length L of resistance wire with a cross-sectional area A .

A second resistor with twice the resistance of the first resistor is made from wire of the same material with a cross-sectional area $2A$.

What is the length of the second resistor?

- A** $L / 2$ **B** L **C** $2L$ **D** $4L$

- 30** The diagram shows identical lamps X and Y connected in series with a battery. The lamps light with normal brightness.

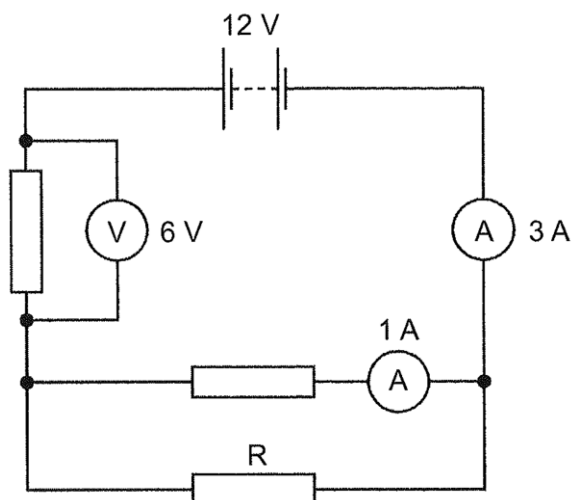


A third identical lamp Z is connected in parallel with lamp X .

What happens to the brightness of lamp Y ?

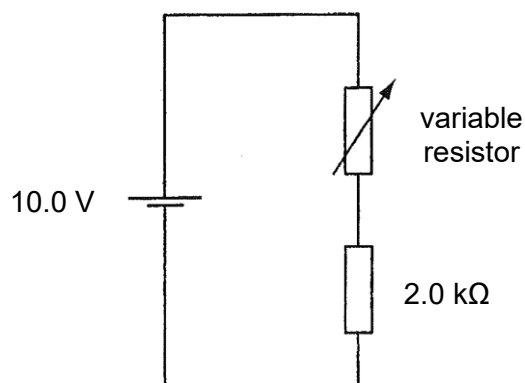
- A** brighter than normal
B normal
C dimmer than normal
D very dim (cannot be seen)

- 31 The circuit diagram shows three different resistors and three meters with their readings.



What is the value of resistor R?

- A** $2\ \Omega$ **B** $3\ \Omega$ **C** $4\ \Omega$ **D** $6\ \Omega$
- 32 A variable resistor is connected in series with a fixed resistor of resistance $2.0\ \text{k}\Omega$ and a $10.0\ \text{V}$ supply.



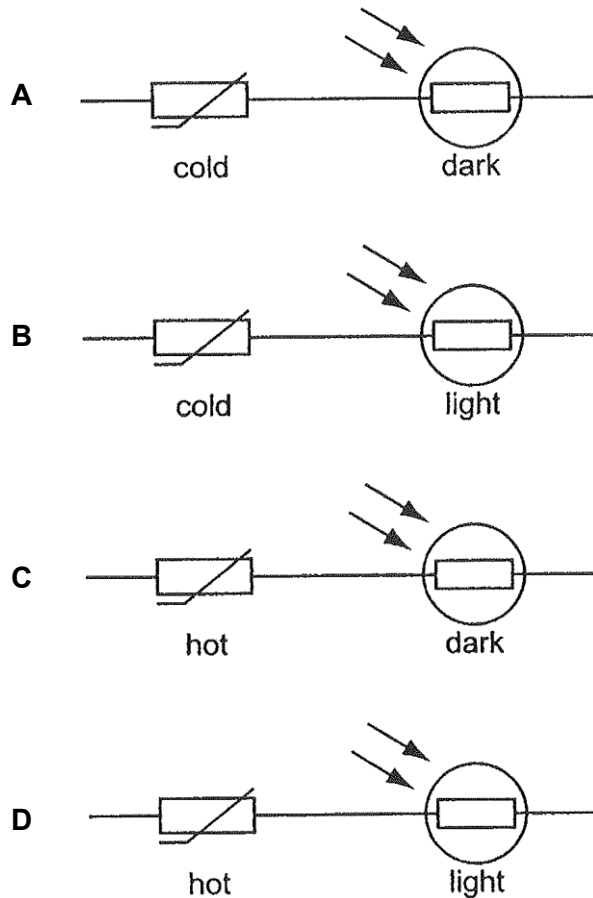
The resistance of the variable resistor can vary from $2.0\ \text{k}\Omega$ to $8.0\ \text{k}\Omega$

What is the range of possible values for the potential difference across the variable resistor?

- A** $2.0 - 8.0\ \text{V}$
B $2.0 - 10.0\ \text{V}$
C $5.0 - 8.0\ \text{V}$
D $5.0 - 10.0\ \text{V}$

- 33** A thermistor and a light-dependent resistor are connected in series to a power supply.

Which conditions will result in smallest current flowing through them?



- 34** An electric cooker has a hotplate rated at 1500 W and an oven rated at 2000 W.

During one day, the hotplate is switched on for a total of 1.0 hour and the oven is switched on for 3.0 hours.

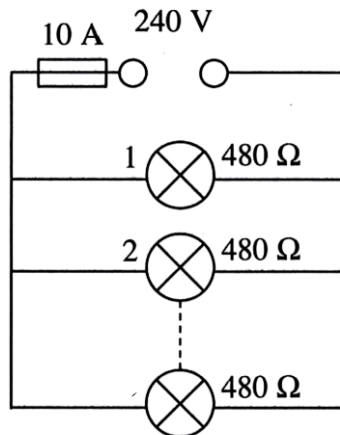
The cost of electricity is 30 cents per kWh.

What is the cost of using the electric cooker for one day?

- A** 225 cents **B** 420 cents **C** 2250 cents **D** 225 000 cents

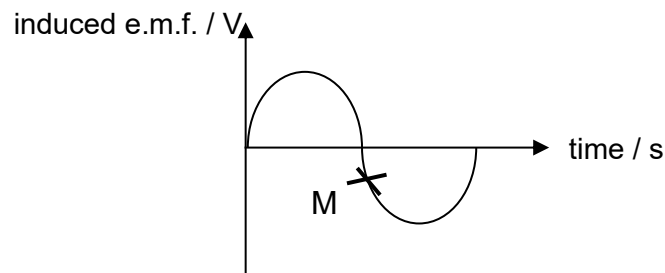
[Turn over

- 35** Lamps are connected in parallel in the circuit as shown. The fuse rating is 10 A and the resistance of each lamp is $480\ \Omega$.



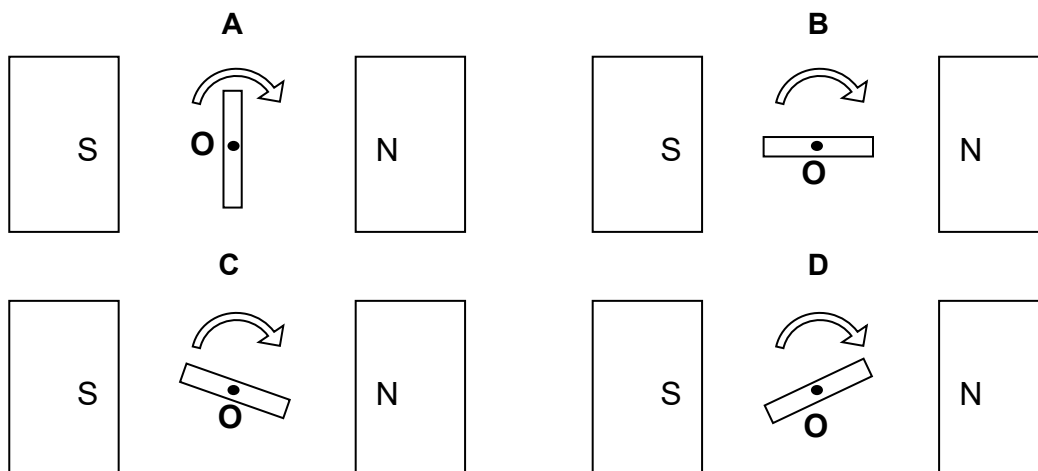
What is the maximum number of lamps that can be connected without blowing the fuse?

- A** 2 **B** 10 **C** 19 **D** 20
- 36** The graph shows how the induced e.m.f. of a simple a.c. generator varies with time.

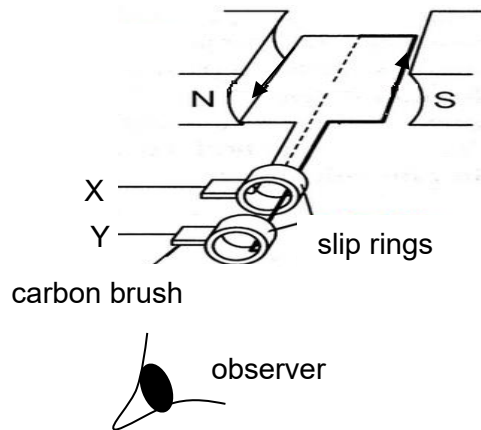


The diagrams below show the front view of the coil of an a.c. generator. The coil is being rotated about an axis through O in a uniform magnetic field.

Which of them shows the position of the coil when the value of the induced emf is at M?



- 37 The diagram shows an a.c. generator connected to leads X and Y. The current direction in the coil is as shown.

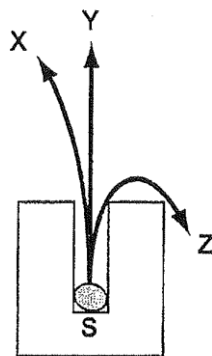


Which row shows the direction of rotation of the coil as seen by an observer and the rule used to obtain the direction of current as shown?

	direction of rotation	rule used
A	clockwise	Fleming's left hand rule
B	clockwise	Flemin's right hand rule
C	anti-clockwise	Fleming's left hand rule
D	anti-clockwise	Flemin's right hand rule

- 38 The diagram shows the emission of alpha, beta and gamma radiations from a source S within a lead block.

There is a strong magnetic field present.

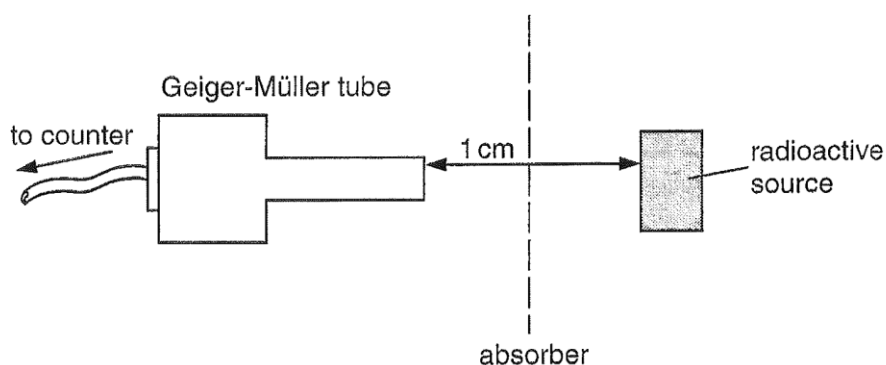


What are the names of the radiation X, Y and Z?

	X	Y	Z
A	alpha	beta	gamma
B	alpha	gamma	beta
C	beta	alpha	gamma
D	beta	gamma	alpha

[Turn over

- 39** A student investigates the penetrating power of radiation from a radioactive source.



The table shows her results.

background count	25 counts per minute
count with source only	630 counts per minute
count with source and paper absorber	630 counts per minute
count with source and aluminium absorber 3mm thick	180 counts per minute

The source emits

- A** alpha and beta particles.
- B** beta particles and gamma rays.
- C** beta particles only.
- D** gamma rays only.

- 40** Atoms P and Q are isotopes.

How does the composition of neutral atoms of P compare with neutral atoms of Q?

	number of protons	number of neutrons	number of electrons
A	different	different	different
B	different	same	same
C	same	different	same
D	same	same	different

BLANK PAGE

BLANK PAGE