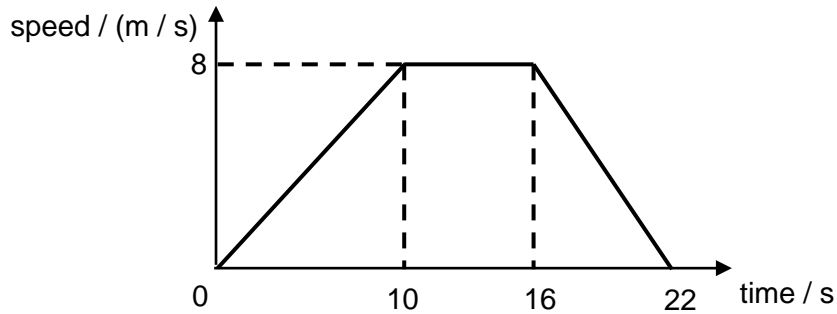


- 1 Which row correctly shows a scalar and a vector quantity?

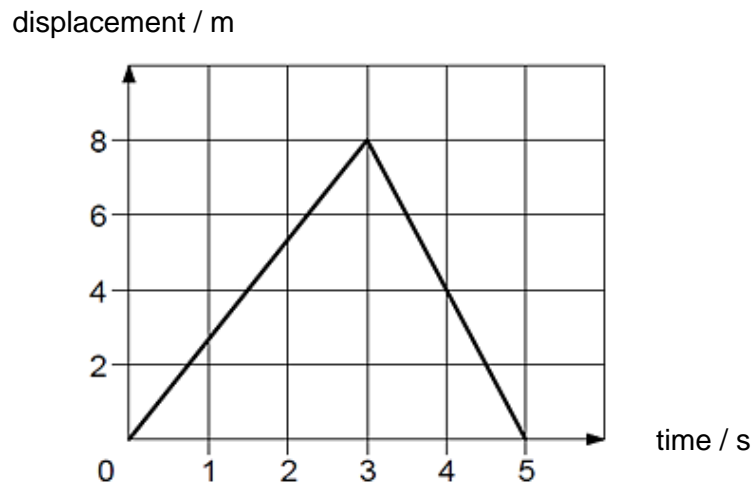
	scalar	vector
A	displacement	distance
B	mass	weight
C	temperature	pressure
D	velocity	acceleration

- 2 The speed-time graph below describes the motion of a toy car.



What is the average speed of the toy car while moving at constant deceleration?

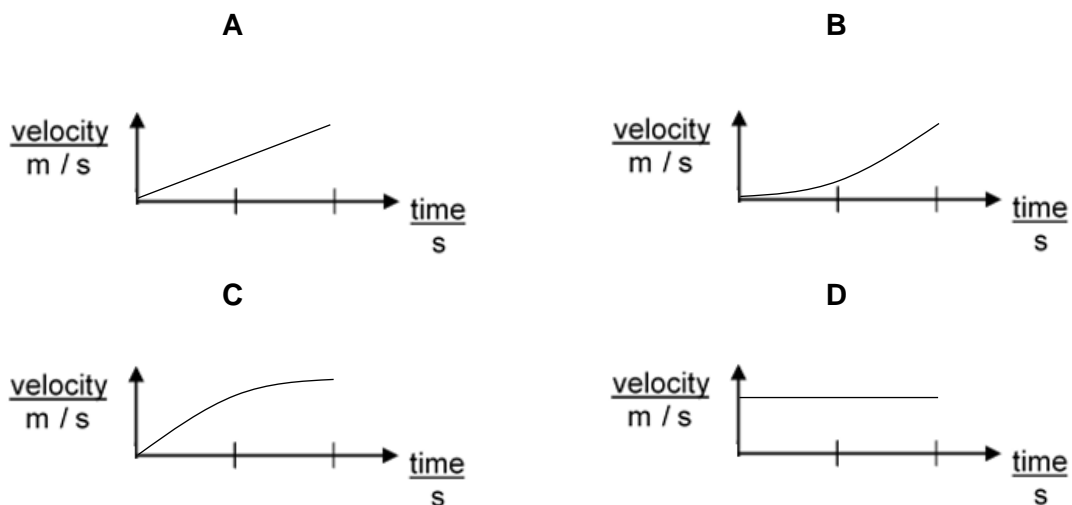
- A** 2.8 m / s **B** 4.0 m / s **C** 5.1 m / s **D** 8.0 m / s
- 3 The graph shows the displacement-time graph of a car moving along a straight line.



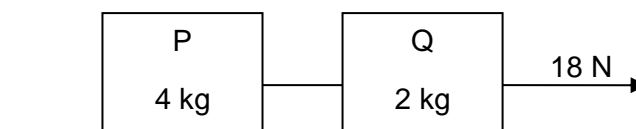
Which statement best describes the motion of the car?

- A** It moves a greater distance in the initial 3 seconds than in the final 2 seconds.
B It moves at a higher speed in the first 3 seconds than in the last 2 seconds.
C It moves uphill in the first 3 seconds and then downhill in the last 2 seconds.
D It returns to its starting point after 5 seconds.

- 4 A body is acted upon by a constant resultant force. Which graph shows how the velocity of the body varies with time?

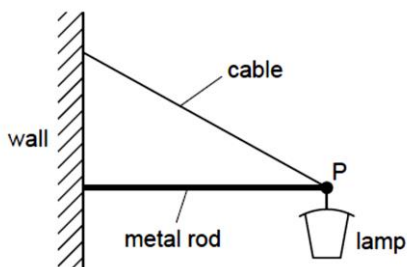


- 5 A force of 18 N acts on a block P and block Q of mass 4 kg and 2 kg respectively as shown.

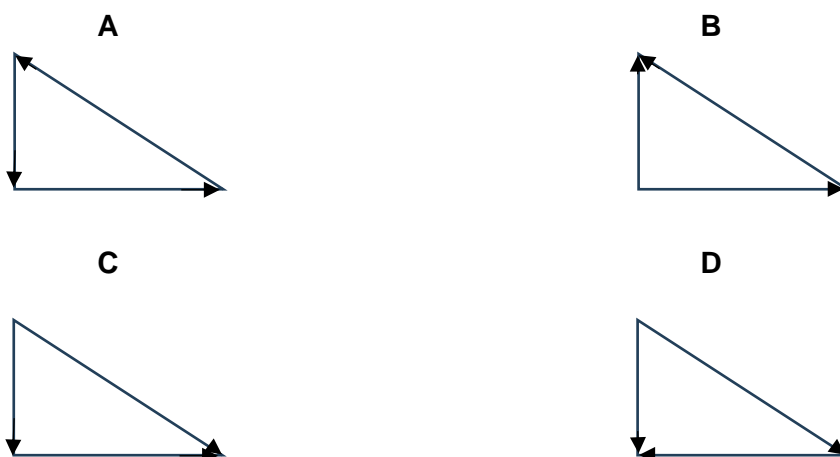


Given that the floor is smooth, what is the tension of the string between P and Q?

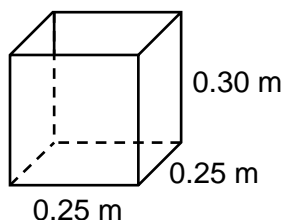
- A** 3 N **B** 6 N **C** 9 N **D** 12 N
- 6 A lamp is fixed to the wall by a metal rod and cable. The lamp does not move.



Which vector diagram represents the forces acting at point P?

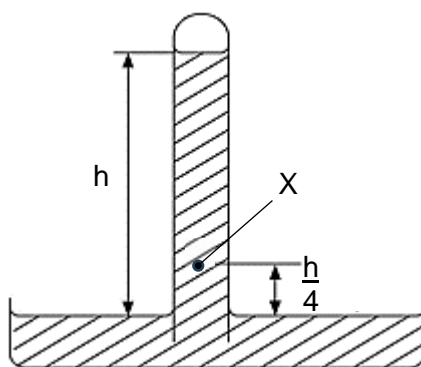


- 7 Four bags of flour, each of mass 2.0 kg, were used to fill up a box shown below. The box, with dimensions 0.30 m \times 0.25 m \times 0.25 m, has a mass of 1.0 kg.



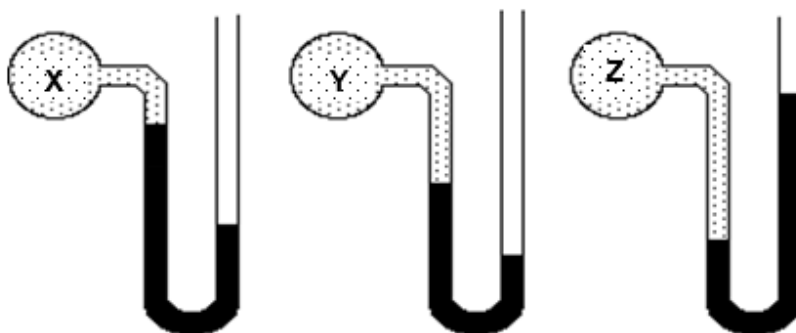
What is the average density of the box after it is filled up?

- A 160 kg / m³ B 250 kg / m³ C 430 kg / m³ D 480 kg / m³
- 8 When the atmospheric pressure is 100 000 Pa, the height of a mercury barometer is h .



What is the pressure at X?

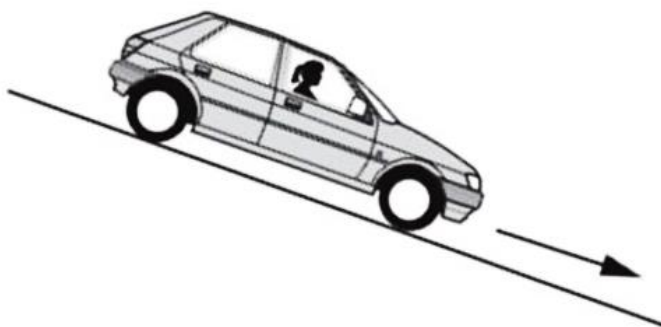
- A 25 000 Pa B 75 000 Pa C 125 000 Pa D 175 000 Pa
- 9 Three manometers are filled with mercury and connected to three different gas supplies, X, Y and Z, as shown in the figure below.



What are the gas pressures in ascending order?

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

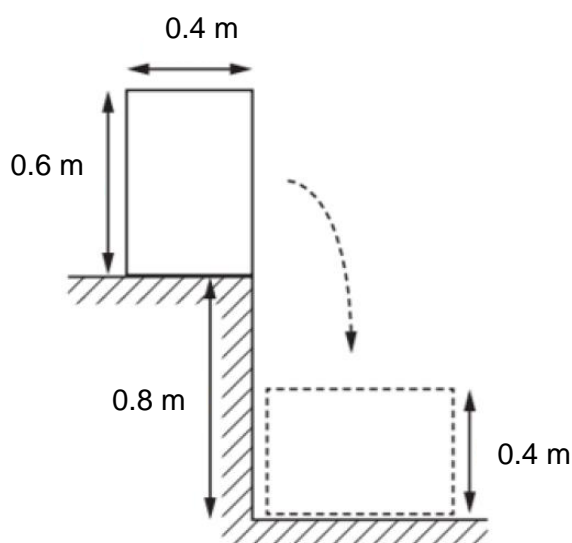
- 10 A car decelerates down a road as it goes downhill.



Which energy changes are taking place?

	energy in the gravitational store	energy in the kinetic store
A	decreasing	decreasing
B	decreasing	increasing
C	decreasing	remains the same
D	increasing	increasing

- 11 A uniform solid block has weight 200 N, width 0.4 m and height 0.6 m. The block rests on a step of depth 0.8 m, as shown in the diagram.

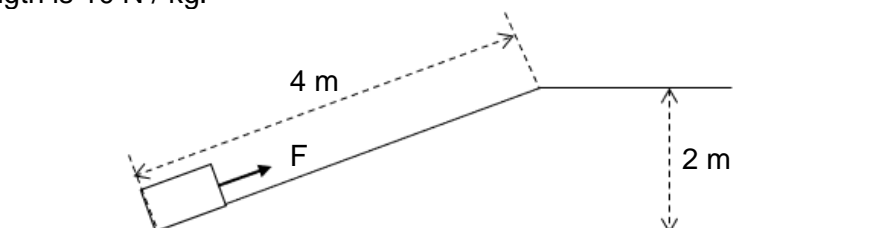


The block is knocked over the edge of the step and rotates through 90° before coming to rest with the 0.6 m side horizontal on the ground. The gravitational field strength g is 10 N/kg .

What is the change in gravitational potential energy of the block?

- A 100 J B 140 J C 180 J D 220 J

- 12 A man used a force F to pull a 2 kg box up a smooth inclined plane for a distance of 4 m, as illustrated in the figure below. The box was lifted to a vertical height of 2 m. The gravitational field strength is 10 N / kg.



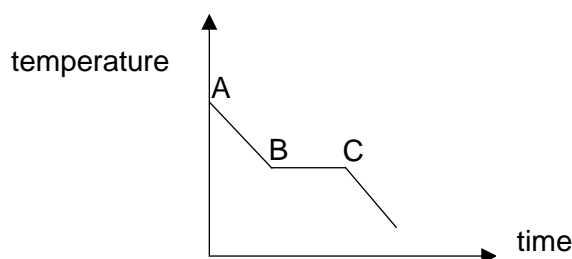
What is the force F exerted by the man on the box?

- A** 5 N **B** 10 N **C** 25 N **D** 40 N
- 13 In a Brownian motion experiment, illuminated smoke particles are seen to move randomly.
- Which statement correctly explains the motion of the smoke particles?
- A** They are continuously bombarded by the air molecules.
B They are moved by the convection currents in the air.
C They are shaken by the vibration of the air molecules.
D They are supplied with energy by the light illuminating them.
- 14 Air is pumped slowly into a car tyre to increase the pressure. The temperature of the air does not change.

Which row is correct?

	number of molecules hitting 1 cm ² of the tyre each second	average speed at which molecules hit inner walls of the tyre
A	increases	increases
B	increases	unchanged
C	unchanged	increases
D	unchanged	unchanged

- 15 The graph shows the cooling curve of an unknown liquid.



What happens to the potential energy (PE) and the kinetic energy (KE) of molecules between AB and BC?

	between A and B	between B and C
A	KE constant, PE decreases	KE constant, PE decreases
B	KE decreases, PE constant	KE constant, PE decreases
C	KE decreases, PE constant	KE decreases, PE constant
D	KE constant, PE decreases	KE decreases, PE constant

- 16** Cooling fins are used in refrigerators, car radiators and many other cooling devices to dissipate thermal energy from the system to the environment.

- i** The cooling fins are made of a good conductor to ensure that thermal energy is being conducted quickly out to the environment.
- ii** Cooling fins are typically black to enhance the rate of thermal energy conduction.
- iii** The cooling fins have a large surface area to quickly dissipate heat to the environment through radiation and conduction.

Which statements about cooling fins are correct?

- A** i and ii only
- B** ii and iii only
- C** i and iii only
- D** i, ii and iii

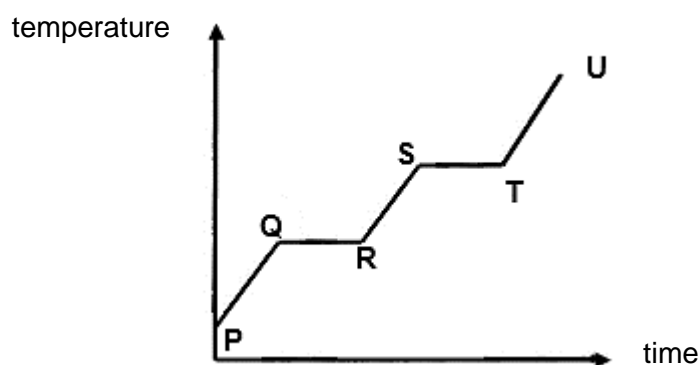
- 17** Three statements about boiling and evaporation of a liquid are stated below.

- i** Intermolecular attractive forces are overcome during boiling but not during evaporation.
- ii** Boiling does not change the average kinetic energy of molecules of the liquid but evaporation does.
- iii** Boiling involves all the molecules in the liquid but evaporation does not.

Which of the above statements are correct?

- A** i and ii only
- B** ii and iii only
- C** i and iii only
- D** i, ii and iii

- 18** The diagram below shows the graph of temperature against time where a solid is heated.



Between which two points on the graph does the beaker contain a mixture of liquid and solid?

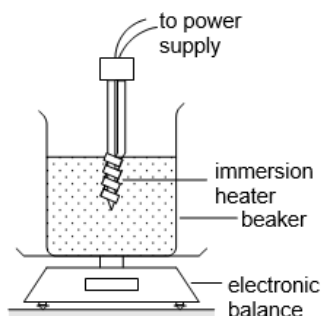
- A** P and Q
- B** Q and R
- C** R and S
- D** S and T

- 19 Metal X and metal Y, having identical dimensions but different densities, are heated with an equal amount of thermal energy. Metal X's temperature increases twice as much as metal Y's.

Why is this so?

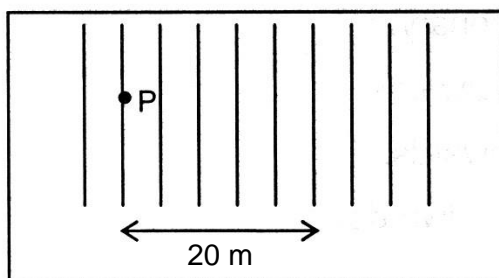
- A The heat capacity of X is half that of Y.
- B The heat capacity of X is twice that of Y.
- C The specific heat capacity of X is half that of Y.
- D The specific heat capacity of X is twice that of Y.

- 20 The diagram below shows an experimental arrangement for determining the specific latent heat of vaporisation of a liquid. The reading of the balance is noted when boiling begins. After 3.0 min, the balance reading decreases by 20 g. The heater operates at a power output of 100 W.



If 10% of the energy supplied is lost to the surroundings, what is the specific latent heat of vaporization of the liquid?

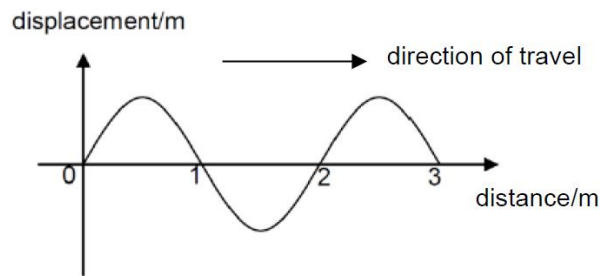
- A 13.5 kJ / kg
 - B 15 kJ / kg
 - C 0.81 MJ / kg
 - D 0.90 MJ / kg
- 21 The diagram of a water wave in a ripple tank is shown below. The period of vibration of P is 0.10 s.



What is the frequency, wavelength and velocity of the water wave?

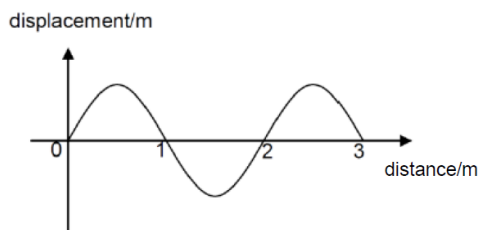
	frequency / Hz	wavelength / m	velocity / (m / s)
A	10	4.0	40
B	10	8.0	80
C	20	4.0	5.0
D	20	8.0	2.5

- 22** The diagram shows the displacement-distance graph of a transverse wave at a certain instant as it travels from left to right. The period of this wave is 2.0 s.

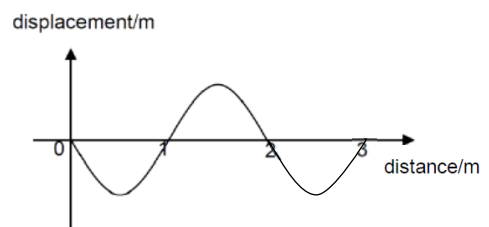


Which diagram shows the displacement-distance graph of the wave 3.0 s later?

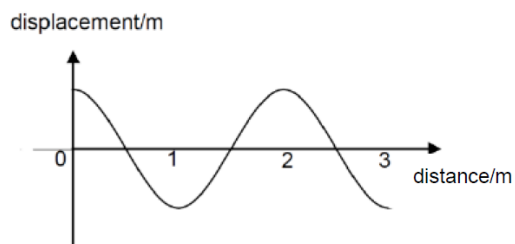
A



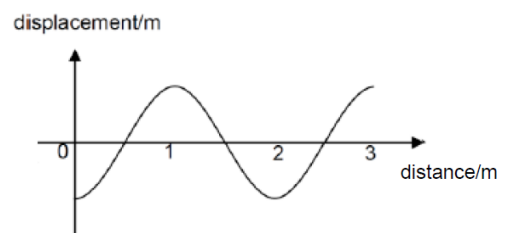
B



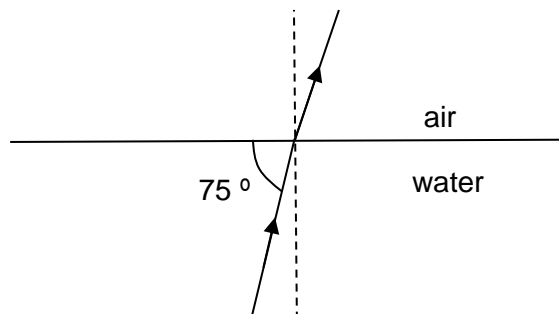
C



D



- 23** A ray of light is incident from below the surface of water as shown in the diagram. The refractive index of water is 1.3.



What is the angle of refraction in air?

A

11 °

B

15 °

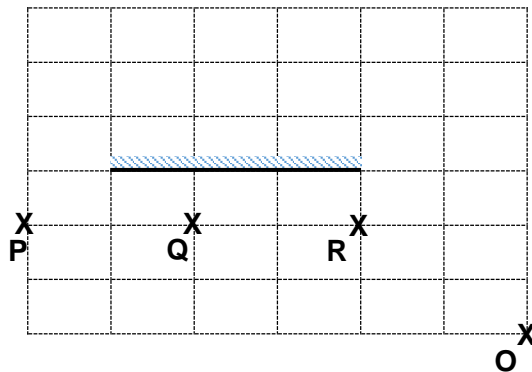
C

20 °

D

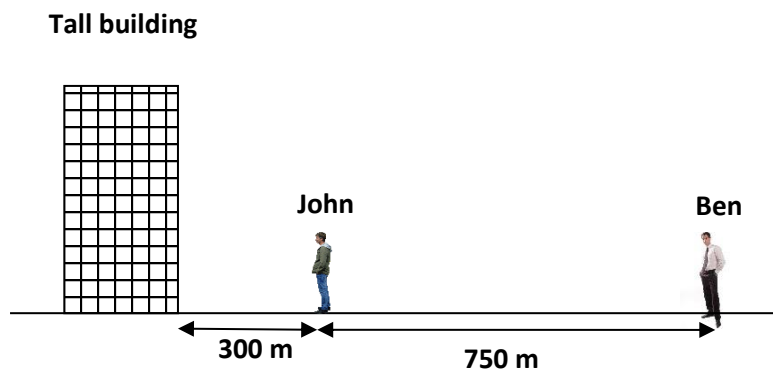
48 °

- 24 **P**, **Q** and **R** are objects placed in front of a plane mirror. An observer at **O** looks into the plane mirror.



Which image(s) can the observer see in the plane mirror?

- A** **P** and **Q** only
B **Q** and **R** only
C **P** and **R** only
D **P**, **Q** and **R**
- 25 John, positioned 300 m in front of a tall building, shouts loudly. Ben, who is 750 m behind John, hears two shouts with a 2 s interval between them.



What is the speed of sound in air?

- A** 300 m / s **B** 320 m / s **C** 340 m / s **D** 375 m / s
- 26 A wave of frequency 500 Hz has a wavelength of 0.660 m.
- How long does it take for the waves to travel 1.0 km?

- A** 1.3 s **B** 2.0 s **C** 3.0 s **D** 5.6 s

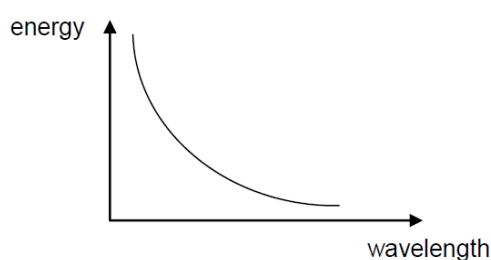
27 Below are four statements about the uses of electromagnetic radiation.

1. Infra-red waves are used in intruder alarms and thermal imaging.
2. Gamma rays are used in detection of cancer and its treatment.
3. Ultra-violet waves are used in bank note authentication and disinfecting water.
4. X-rays are used in medical radiology and industrial defect detection.

How many of these statements is/are correct?

- A** 1 **B** 2 **C** 3 **D** 4

28 The diagram shows the relationship between the energy and the wavelength of electromagnetic radiation waves.



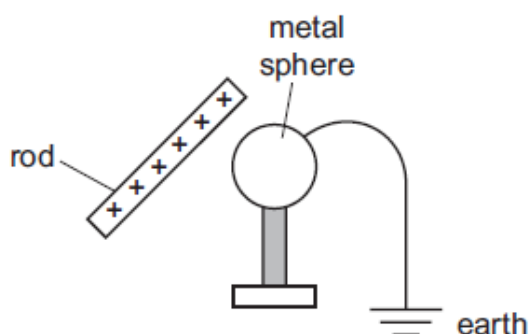
Which has the lowest energy?

- A** gamma rays
B microwaves
C ultra-violet radiation
D X-rays

29 A band member plays a note on a trumpet. He then plays a softer note of higher pitch. How do the amplitude and frequency of the sound compare with the first?

	amplitude of second sound	frequency of second sound
A	smaller	higher
B	smaller	lower
C	larger	higher
D	larger	lower

- 30** A positively charged rod is held close to an insulated metal sphere. The sphere is earthed as shown.



The earth connection is removed and then the rod is removed.

Which diagram shows the charges on the sphere after the rod was removed?



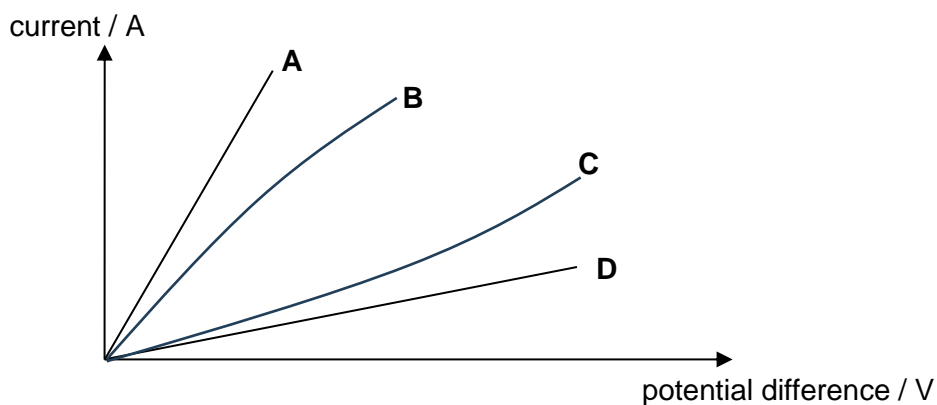
- 31** When a plastic rod is rubbed with wool, the wool acquires a positive charge.

Why is this so?

- A** Electrons are transferred from the rod to the wool.
- B** Electrons are transferred from the wool to the rod.
- C** Protons are transferred from the rod to the wool.
- D** Protons are transferred from the wool to the rod.

- 32** The diagram shows a graph of current against potential difference across four wires, **A**, **B**, **C** and **D**. The wires are of the same material and length.

Which wire is the thickest?



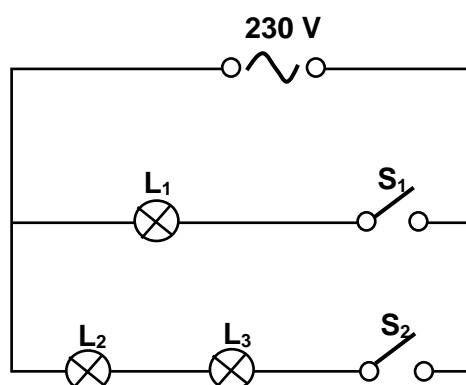
- 33** During a thunderstorm, a lightning strike transferred an electric charge of 150 C from a thundercloud to the earth. The potential difference between the thundercloud and the earth was 2.0×10^{10} V during the discharge.

How much energy was produced during the lightning strike?

- A** 1.3 kJ **B** 1.3 MJ **C** 3.0 GJ **D** 3.0 TJ

- 34** The diagram below shows part of the lighting circuit of a house.

All the bulbs are identical and are rated 100 W, 230 V.



What is the current flowing through L_3 when the switches S_1 and S_2 are closed?

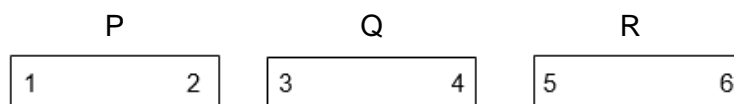
- A** 0.22 A **B** 0.29 A **C** 0.65 A **D** 2.3 A

- 35** In a water heating system, a 1 kW heater and a 50 W lamp are connected in parallel and controlled by the same switch. Over one month, the lamp alone consumes 1 kWh of electrical energy. The electricity costs \$0.20 per kWh.

How much does it cost to use the water heating system in that month?

- A** \$ 2.50 **B** \$ 4.00 **C** \$ 4.20 **D** \$ 6.80

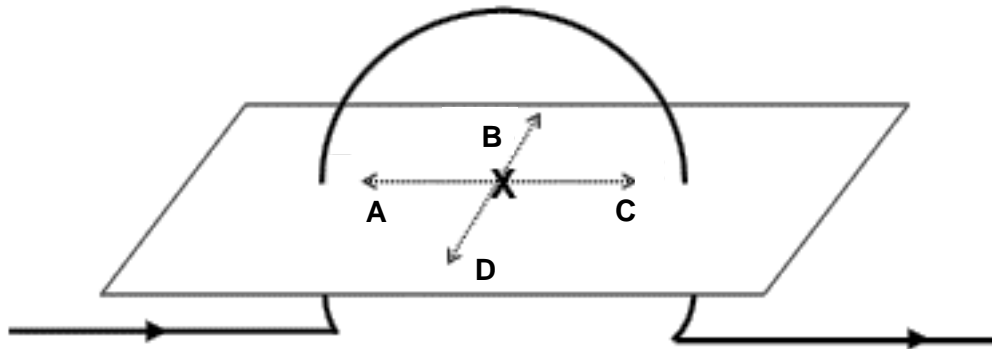
- 36** Three metal bars P, Q and R, which are identical in size and shape, are suspected of being magnets. Tests are carried out and it is found that there is attraction between poles 1 and 6, between poles 2 and 4, and between poles 2 and 6. However between poles 2 and 3, there is repulsion.



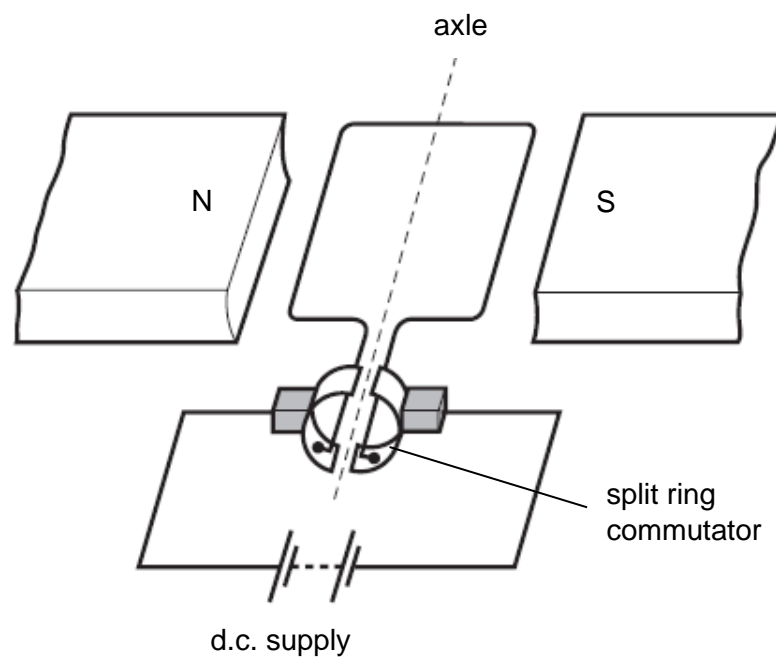
Without making any further tests, which statement is correct?

- A** P and Q are magnets only
B P and R are magnets only
C Poles 2 and 5 would repel one another.
D P, Q and R are magnets.

- 37** A current is passed through the coil while a compass is placed at point X on the cardboard as shown in the diagram below. Which direction will the north pole of the compass needle be pointing towards?



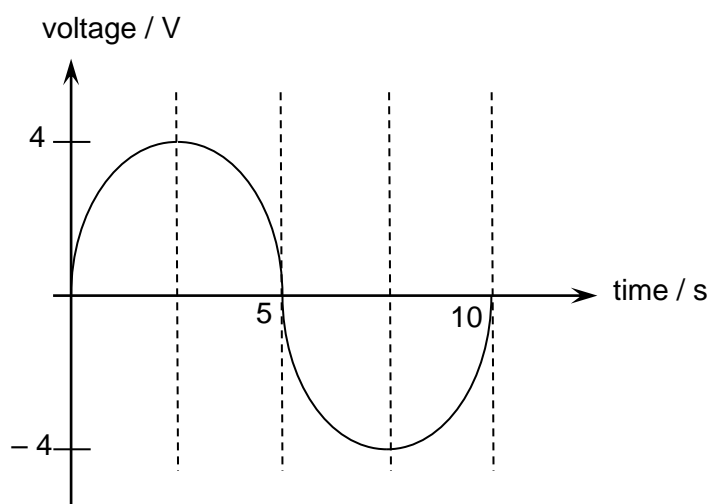
- 38** The diagram shows a simple d.c. motor with its coil horizontal.



What is the main function of the split ring commutator?

- A** To allow current to flow in the coil.
- B** To prevent the wires from twisting.
- C** To reverse the current direction in the coil as the coil passes the horizontal position.
- D** To reverse the current direction in the coil as the coil passes the vertical position.

- 39** A simple a.c. generator produces a voltage that varies with time as shown.



How will the period and the maximum voltage change if the speed of rotation of the coil in the generator is halved?

	period of wave / s	maximum voltage / V
A	5	2
B	5	8
C	20	2
D	20	8

- 40** The count rate from a radioactive source falls from 4000 counts per minute to 500 counts per minute in 1 hour.

What is the half-life of the source?

- A** 5 minutes
- B** 10 minutes
- C** 15 minutes
- D** 20 minutes

End of Paper

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