



**REGENT SECONDARY SCHOOL
PRELIMINARY EXAMINATION 2024
SECONDARY FOUR (EXPRESS)**

NAME: _____

INDEX NUMBER: _____

CLASS: _____

SETTER: MDM NOR RASIDAH

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, glue or correction fluid.

Write your name, class and index 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.

40	TARGET
PARENT'S SIGNATURE	

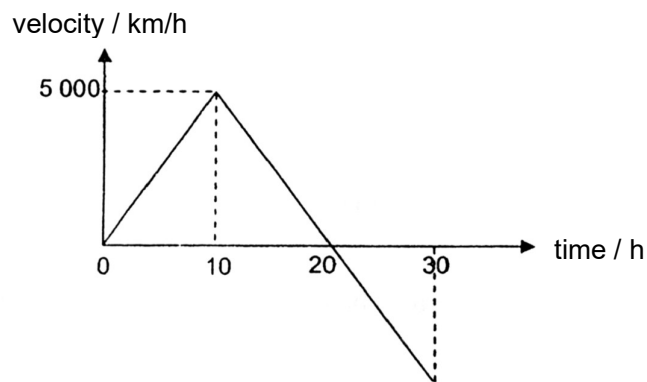
1 Which frequency is in the range heard by a healthy human ear?

- A 12 mHz
- B 12 Hz
- C 12 kHz
- D 12 MHz

2 Which list of SI units contains only base units?

- A ampere, metre, kelvin
- B ampere, joules, kilogram
- C kilogram, metre, ohm,
- D kilogram, newton, kelvin

3 A spacecraft is launched vertically. The velocity-time graph of the motion of the spacecraft is shown in the diagram.

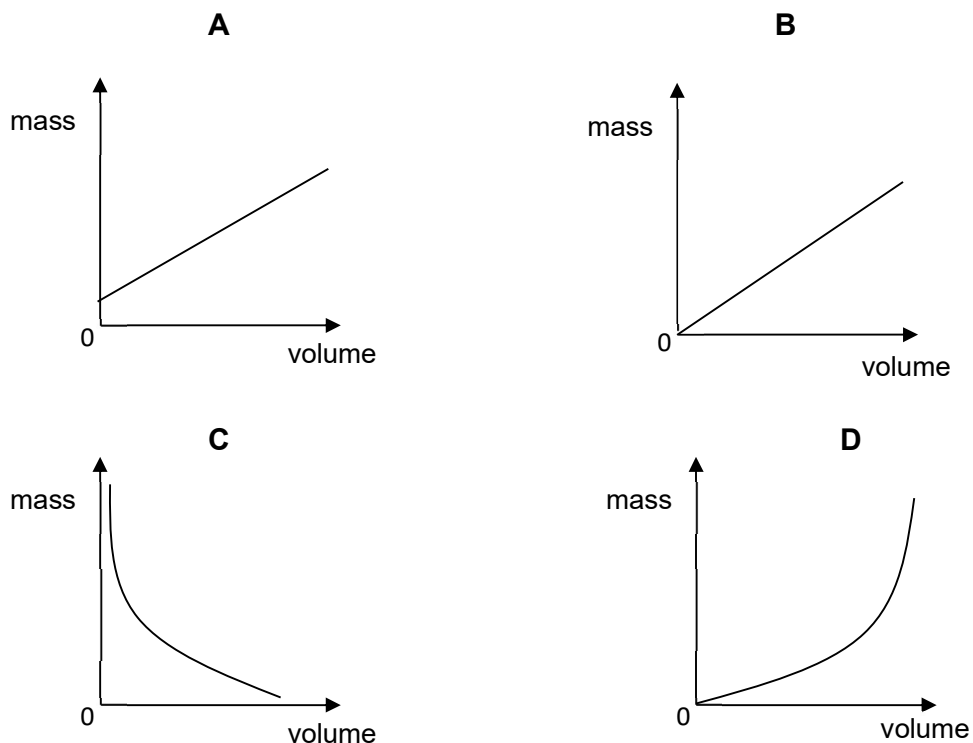


What is the maximum height reached by the spacecraft?

- A 25 000 km
- B 50 000 km
- C 75 000 km
- D 100 000 km

- 4 Iron blocks are made available in different sizes. Some of the blocks are randomly selected and their masses and volumes are measured.

Which graph shows the relationship between the two quantities?



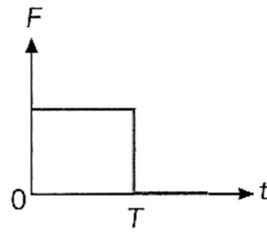
- 5 Two identical measuring cylinders containing different liquids are placed on a simple balance. They balance as shown.



How does the density of P compare with the density of Q?

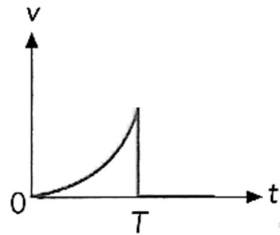
- A** Density of P is half the density of Q.
- B** Density of P is equal to the density of Q.
- C** Density of P is twice the density of Q.
- D** Density of P is four times the density of Q.

- 6 The diagram below shows how the net force acting on an object varies with time.

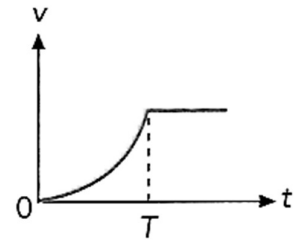


Which one of the following graphs correctly shows its velocity varies with time?

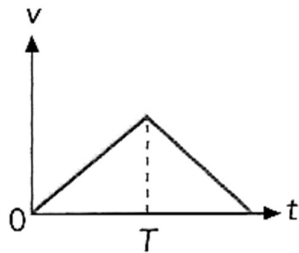
A



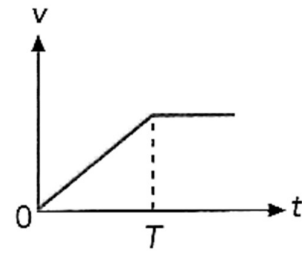
B



C



D



- 7 A man with an open parachute falls to Earth at constant speed.

Consider the following forces:

P the upward force of the parachute on the man

Q the upward force of the man on the Earth

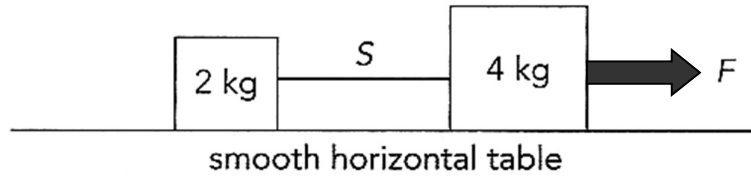
R the downward force of the Earth on the parachute

S the downward force of the man on the parachute

Which two forces are a Newton's action-reaction pair?

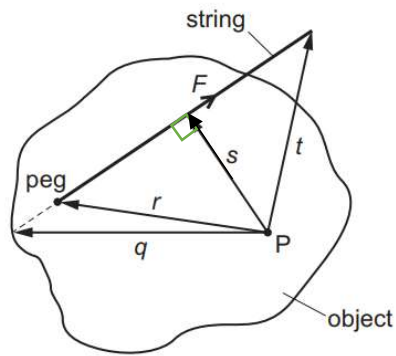
- A** P and Q
- B** P and R
- C** P and S
- D** Q and R

- 8 Two blocks are connected by a light string S as shown in the figure. Under the action of a constant force, F , they move with a uniform acceleration of 3 m s^{-2} .



What will the acceleration of the 4 kg block be if the string S suddenly breaks?

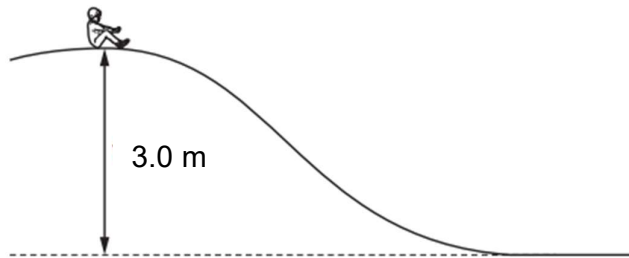
- A 4.0 m/s^2
 - B 4.5 m/s^2
 - C 5.0 m/s^2
 - D 6.0 m/s^2
- 9 An object is pivoted at point P. A student ties a length of string to a peg on the object. He pulls the string with a force F .



What is the moment of the force F about the point P?

- A $F \times q$
- B $F \times r$
- C $F \times s$
- D $F \times t$

- 10** A child, who weighs 260 N, slides down a slide. The height of the slide is 3.0 m.



The work done against friction as the child travels down the slide is 200 J.

What is the change in energy in the gravitational potential store and the final energy in the kinetic store of the child?

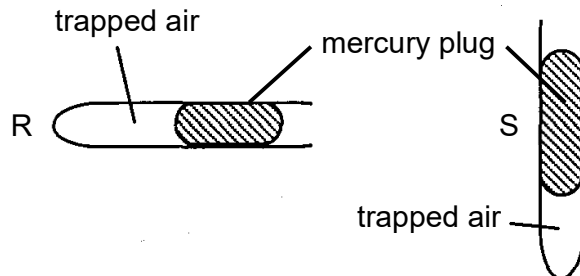
	change in energy in the gravitational potential store	final energy in the kinetic store of the child
A	780 J	580 J
B	780 J	780 J
C	7 800 J	7 600 J
D	7 800 J	7 800 J

- 11** A machine applied a force on a 2.0 kg box. The box accelerates at 0.6 m/s^2 . It travels 50 m in 8 s.

What is the power of the machine?

- A** 7.5 W
- B** 12.5 W
- C** 75 W
- D** 125 W

- 12** Some air is trapped between the closed end of a glass tube and a mercury plug. The atmospheric pressure is 76 cm Hg.



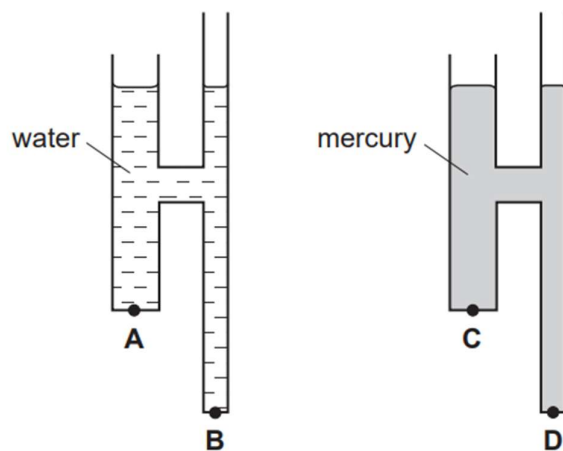
The length of the mercury plug is 10 cm in both positions shown.

What is the pressure of the trapped air in the tube for positions R and S respectively?

	pressure of trapped air in position R / cm Hg	pressure of trapped air in position S / cm Hg
A	10	76
B	10	86
C	76	10
D	76	86

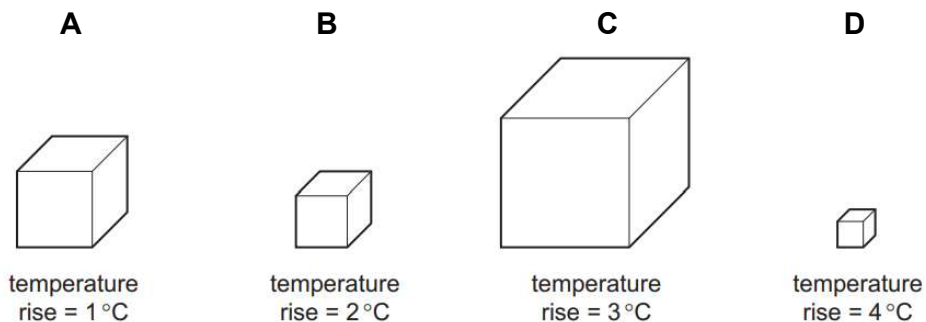
- 13** The diagram shows two identical pieces of apparatus. One is filled with water and the other is filled with mercury. Water is less dense than mercury.

At which point is the liquid pressure the greatest?



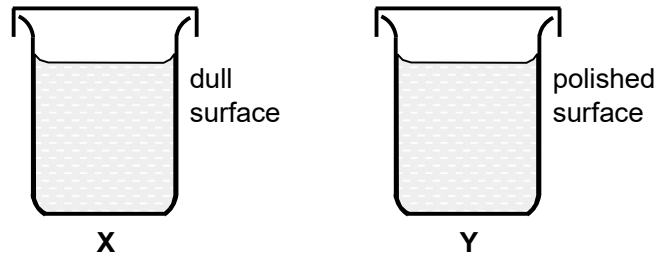
- 14 A sealed rigid container containing gas is placed in the freezer.
Which statement about the gas in the container is correct?
- A The volume of each gas particle decreases.
 - B The average kinetic energy of the gas particles remains the same.
 - C The average distance between the particles remains the same.
 - D The particles collide with the walls of the container at the same rate.

- 15 Four different metal blocks are given the same quantity of thermal energy.
Which block has the greatest thermal capacity?



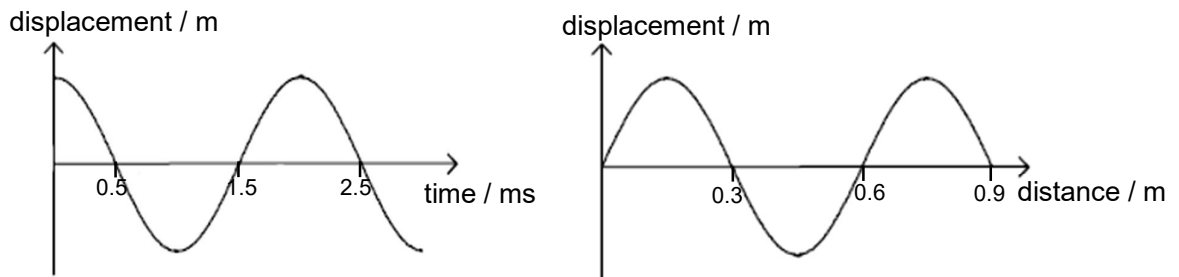
- 16 A tray for making ice cubes holds 0.008 kg of water. The specific latent heat of fusion of ice is 3.3×10^2 kJ/kg.
Which of the following statement is true?
- A 2.6×10^1 J of energy is absorbed to change it into ice at 0°C.
 - B 2.6×10^3 J of energy is removed to change it into ice at 0°C.
 - C 4.1×10^4 J of energy is absorbed to change it into ice at 0°C.
 - D 4.1×10^7 J of energy is removed to change it into ice at 0°C.
- 17 Which action will **not** produce convection current in a container filled with water at 30 °C?
- A dropping a piece of hot metal into the water
 - B floating a piece of ice on the water
 - C lighting a candle beneath the container
 - D placing a 100 W lighted bulb just above the water surface

- 18** In the diagram, two copper cans **X** and **Y** with outer surface of different texture are filled with the same amount of water at boiling point and left in the room.



Which of the following statements about the temperature of the two cans after a short while is true?

- A** X is cooler because a dull surface is a good absorber.
 - B** X is cooler because a dull surface is a good emitter.
 - C** X is warmer because a dull surface is a good absorber.
 - D** X is warmer because a dull surface is a good emitter.
- 19** The two graphs shown below refer to the same wave.



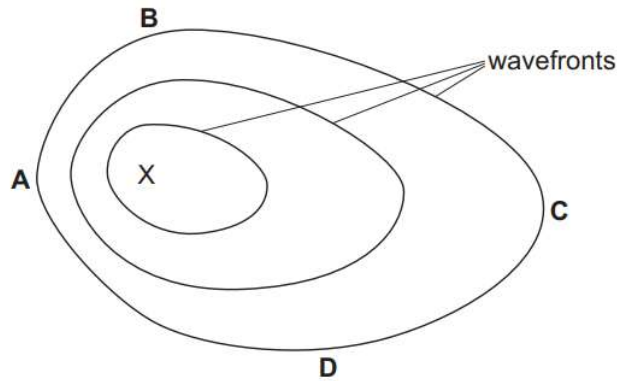
What is the speed of the wave?

- A** 0.3 m/s
- B** 1.2 m/s
- C** 150 m/s
- D** 300 m/s

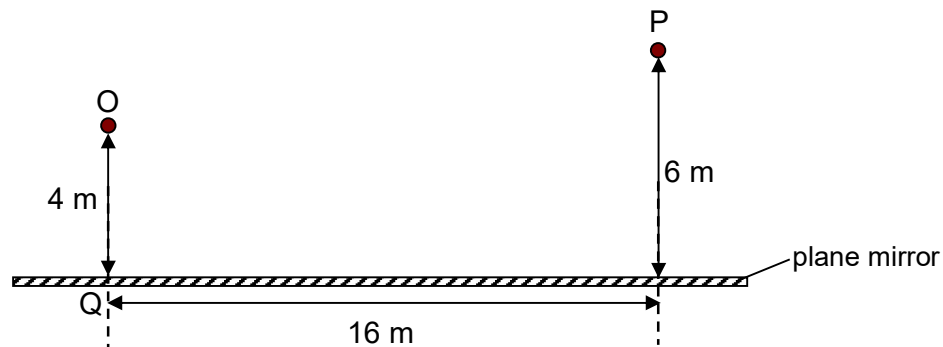
- 20** Waves travel more quickly on the surface of water when the water is deep.

A stone is dropped at point X into a pool of varying depth. The diagram shows the first three wavefronts on the surface of the pool.

The region between X and which labelled point is likely to be the deepest?



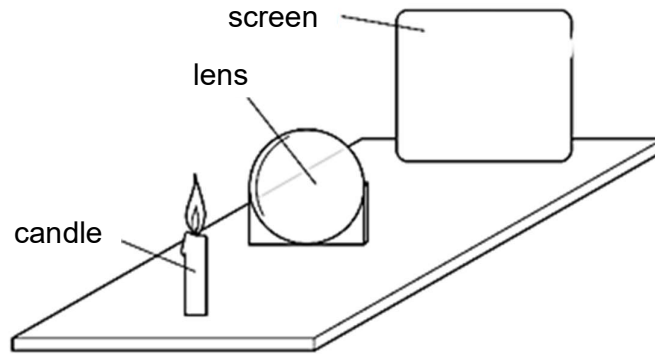
- 21** An object is placed at P, 6 m away from a plane mirror. An observer stands at O, 4 m away from the mirror.



Which of the following statement is true?

- A** The light ray is reflected at a point 6.4 m away from the point Q.
- B** The light ray is reflected at a point 8 m away from the point Q.
- C** The light ray is refracted at a point 9.6 m away from the point Q.
- D** The light ray is refracted at a point 12 m away from the point Q.

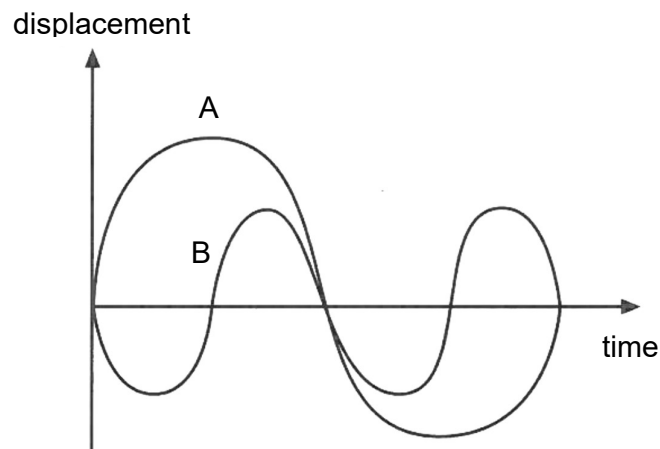
- 22 A thin converging lens is used to produce an image of a candle.



The lens is moved backwards, away from the candle.

Which statement is true?

- A The image is always at the principal focus of the lens.
 - B The image is always inverted and real.
 - C The screen must be moved to the other side of the lens to form a sharp image.
 - D The screen must be moved backwards, away from the candle to form a virtual image.
- 23 An electronic synthesizer produces two pure notes A and B as shown.

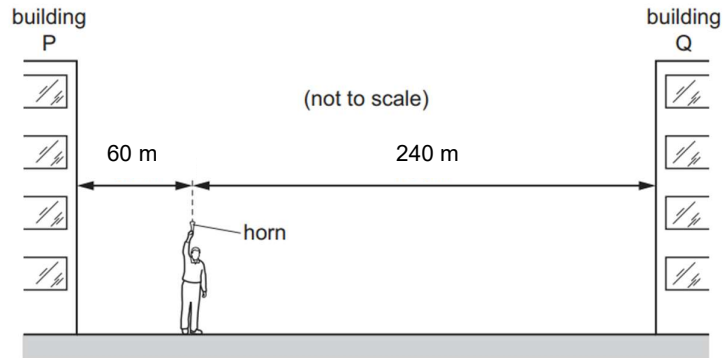


Which of the following statement about A and B is **wrong**?

- A B is softer than A.
- B Pitch of A is higher than B.
- C A and B has the same speed.
- D B has a lower wavelength than A.

- 24** A man stands between two buildings, P and Q. He is 60 m from P and 240 m from Q. He sounds a horn, and he hears some echoes.

The speed of sound is 300 m/s.



What is the timing of the first two echoes?

	timing of 1 st echo	timing of 2 nd echo
A	0.20 s	0.40 s
B	0.20 s	0.80 s
C	0.40 s	0.80 s
D	0.40 s	1.60 s

- 25** A communications system uses microwaves with a wavelength of 15 cm.

The speed of light is 3.0×10^8 m/s.

What is the frequency of the microwaves?

- A** 2.0×10^7 Hz
- B** 4.5×10^7 Hz
- C** 2.0×10^9 Hz
- D** 4.5×10^9 Hz

- 26** Waves P and Q are components of the electromagnetic spectrum. P has a longer wavelength than Q.

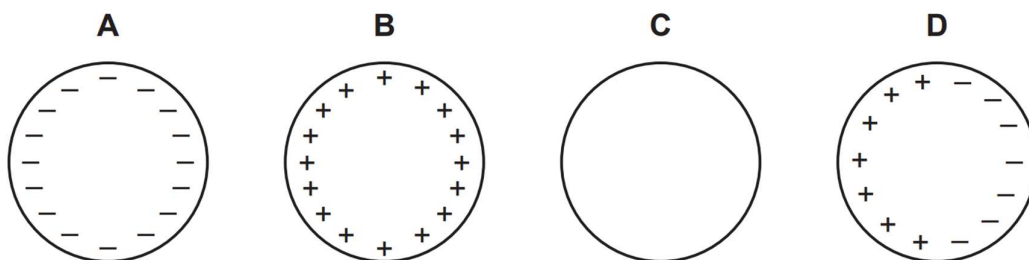
Which statement about P and Q is likely to be true?

- A** P can travel faster in vacuum than Q.
 - B** P is radio wave and Q is infra-red radiation.
 - C** Q has a lower frequency than P.
 - D** Q is ultra-violet radiation and P is X-ray.
- 27** A negatively-charged sphere X is brought up to an identical uncharged sphere Y. The spheres do not touch.

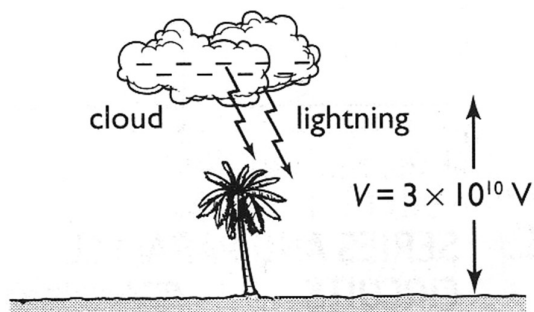


Sphere Y is 'earthed' by touching it with a finger, which is then removed. Sphere X is then moved away from sphere Y.

What is the final charge, if any, on sphere Y?

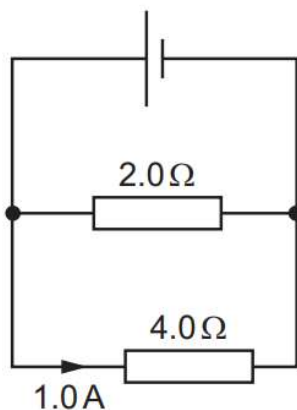


- 28** During a thunderstorm, a lightning sent an electric charge of 90 C from a thundercloud to the earth. The potential difference between the thundercloud and the earth was 3×10^{10} V during the discharge.



How much energy was produced during the lightning?

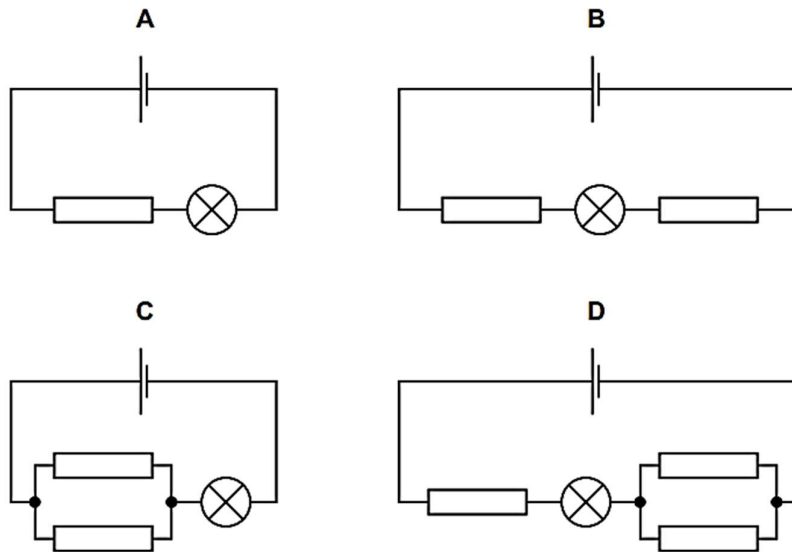
- A** $2.7 \times 10^{10} \text{ J}$
 - B** $2.7 \times 10^{12} \text{ J}$
 - C** $3.0 \times 10^{12} \text{ J}$
 - D** $1.3 \times 10^{13} \text{ J}$
- 29** A cell is connected to a parallel combination of a $2.0 \, \Omega$ resistor and a $4.0 \, \Omega$ resistor. The current in the $4.0 \, \Omega$ resistor is 1.0 A.



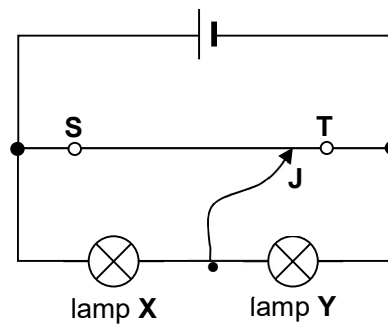
What is the current in the cell?

- A** 1.0 A
- B** 1.5 A
- C** 2.0 A
- D** 3.0 A

- 30** The cells, lamps and resistors in the circuits are identical.
In which circuit is the lamp the brightest?



- 31** A bare resistance wire **ST** is connected to two identical lamps in a circuit as shown.



What will happen to the brightness of the lamps as the jockey **J** slides along the resistance wire from **S** to **T**?

- A** Both lamps become dimmer.
- B** Lamp **X** becomes brighter while lamp **Y** becomes dimmer.
- C** Lamp **X** becomes dimmer while lamp **Y** becomes brighter.
- D** There is no change in the brightness of both lamps.

- 32** A heating coil is marked 240 V, 1 000 W. A plug is fitted with a 13 A fuse.

What is the maximum number of heating coils that can be connected to the plug?

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

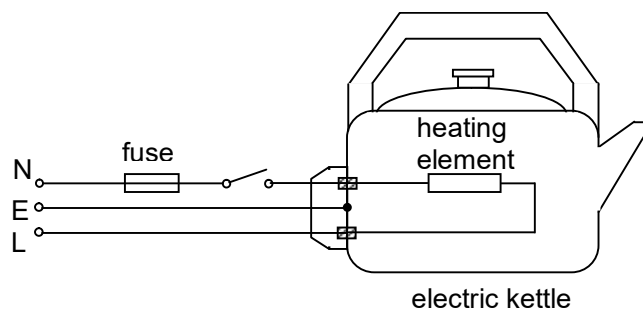
- 33** The cost of electrical energy is 30 cents per kWh.

A hotplate rated 1 500 W is switched on for 40 minutes and an oven rated 2 000 W is switched on for 3.0 hours.

What is the cost of using the hotplate and oven?

- A** \$0.30
- B** \$1.80
- C** \$2.10
- D** \$19.80

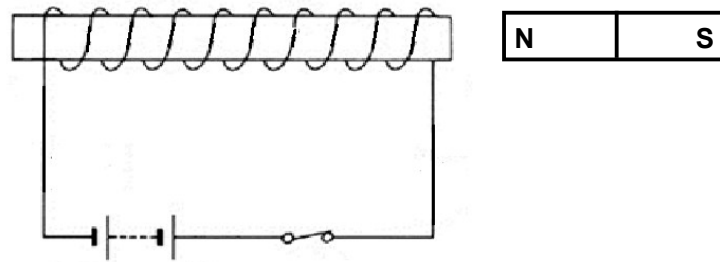
- 34** The switch and the fuse of an electric kettle are incorrectly connected to the neutral wire of the mains supply.



Which statement is correct?

- A** The kettle will not operate when the switch is closed.
- B** The kettle will still operate when the switch is opened.
- C** The kettle will still operate when the switch is closed, but the fuse will not blow even if there is an excessive current passing through the circuit.
- D** The kettle will still operate when the switch is closed, but the heating element will remain at high potential even when the switch is opened.

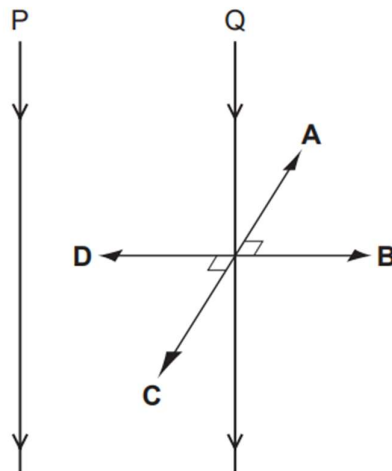
- 35** A brass rod is placed in the solenoid connected to a direct current power supply as shown in the diagram. A permanent magnet is then placed near the solenoid, with its North pole facing the brass rod.



What will happen to the permanent magnet?

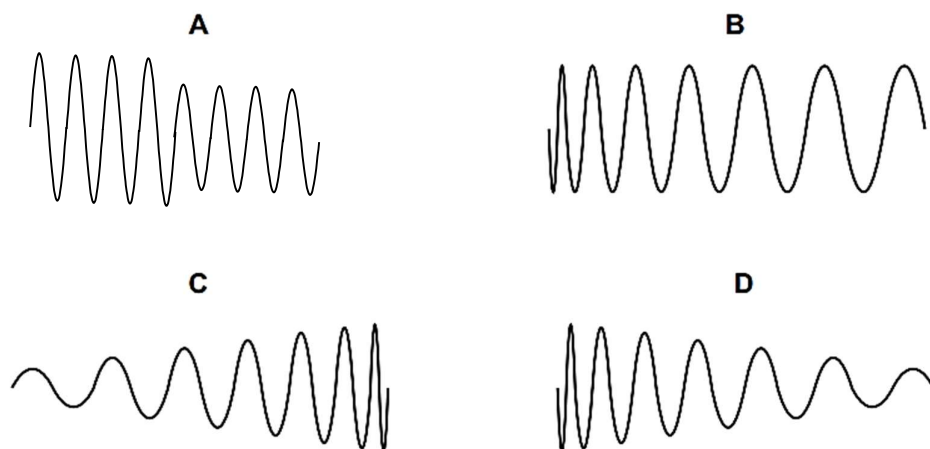
- A** It will move towards the solenoid.
 - B** It will move away from the solenoid.
 - C** It will move towards and then away from the solenoid.
 - D** Nothing happens.
- 36** Two parallel vertical wires P and Q are a small distance apart in air. There is a downwards electric current in both wires. A force acts on Q owing to the current in P. This force is perpendicular to the wire Q.

What is the direction of the force on Q?



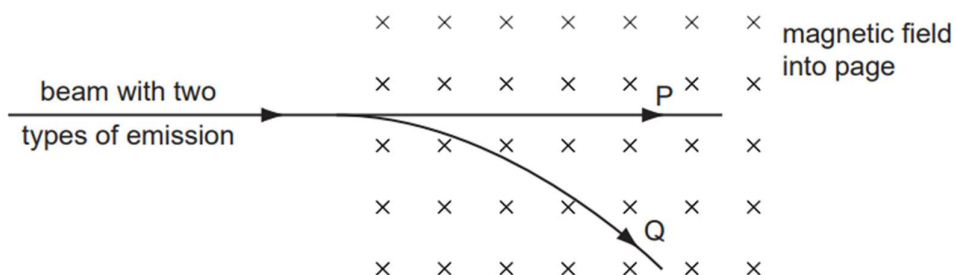
- 37** In an alternating current (a.c.) generator, a magnet rotates near a coil of wire. The induced electromotive force (e.m.f.) in the coil is displayed.

Which trace is produced as the magnet slows down?



- 38** Two types of emission from a radioactive source are separated by passing them through a magnetic field.

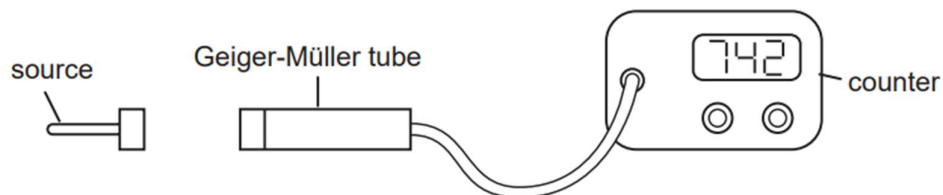
The deflections are shown in the diagram.



What are the emissions P and Q?

	emission P	emission Q
A	alpha-particles	gamma-rays
B	beta-particles	gamma-rays
C	gamma-rays	alpha-particles
D	gamma-rays	beta-particles

- 39** A radioactive source is placed 3 cm from a Geiger-Müller tube in air. The average count rate is 742 counts / minute.



Three measurements are taken with sheets of different materials placed between the source and the tube.

The results are recorded in the table.

material of sheet between source and tube	thin card	aluminium foil	thick lead
average count rate / counts per minute	273	275	68

Which types of radiation does the source emit?

- A** alpha and beta only
 - B** alpha and gamma only
 - C** beta and gamma only
 - D** alpha, beta and gamma
- 40** In a fission reactor, which particle causes a Uranium-235 nucleus to split?
- A** alpha-particle
 - B** gamma ray
 - C** neutron
 - D** proton