

SULIT

4531/1

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Fizik

Kertas 1

September

2005

1 1/4 jam



MAKTAB RENDAH SAINS MARA

PEPERIKSAAN PERCUBAAN SPM 2005

FIZIK

Kertas 1

Satu jam lima belas minit

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. *Kertas soalan ini adalah dalam dwibahasa.*
2. *Soalan di halaman kiri adalah dalam bahasa Melayu. Soalan di halaman kanan adalah yang sepadan dalam bahasa Inggeris*
3. *Calon dikehendaki membaca maklumat di halaman 2 atau halaman 3.*

Kertas solan ini mengandungi 53 halaman bercetak dan 1 halaman tidak bercetak.

4531/1

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[Lihat sebelah
SULIT]

INFORMATION FOR CANDIDATES

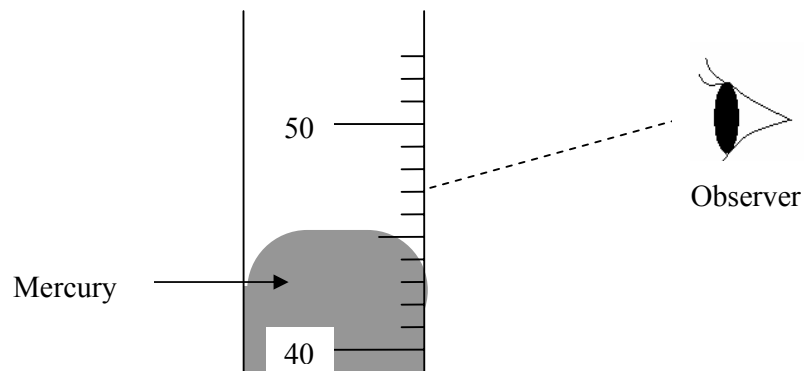
1. *This question paper consists of 50 questions.*
2. *Answer **all** questions.*
3. *Answer each question by darkening the correct space on the answer sheet.*
4. *Darken only **one** space for each question.*
5. *If you wish to change your answer, erase the darkened mark that you have made
Then darken the space for the new answer.*
6. *The diagram in the questions provided are not drawn to scale unless stated.*
7. *You may use a non-programmable scientific calculator.*
8. *A list of formulae is provided on page 5.*

The following information may be useful. The symbols have their usual meaning.

1. $a = \frac{v-u}{t}$
2. $v^2 = u^2 + 2as$
3. $s = ut + \frac{1}{2}at^2$
4. Momentum = mv
5. $F = ma$
6. Kinetic energy = $\frac{1}{2}mv^2$
7. Potential energy = mgh
8. Elastic potential energy = $\frac{1}{2}Fx$
9. $\rho = \frac{m}{V}$
10. Pressure, $P = \frac{F}{A}$
11. Pressure, $P = h\rho g$
12. Heat, $Q = mc\theta$
13. $\frac{pV}{T} = \text{constant}$
14. $E = mc^2$
15. $v = f\lambda$
16. Power, $P = \frac{\text{Energy}}{\text{time}}$
17. $\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$
18. $\lambda = \frac{ax}{D}$
19. $n = \frac{\sin i}{\sin r}$
20. $n = \frac{\text{real depth}}{\text{apparent depth}}$
21. $Q = It$
22. $V = IR$
25. Power, $P = IV$
26. $\frac{N_s}{N_p} = \frac{V_s}{V_p}$
25. Efficiency = $\frac{I_s V_s}{I_p V_p} \times 100\%$
26. $g = 10 \text{ m s}^{-2}$

Each question is followed by either **three, four or five options**. Choose the best option for each question, then shade the correct space on the answer sheet.

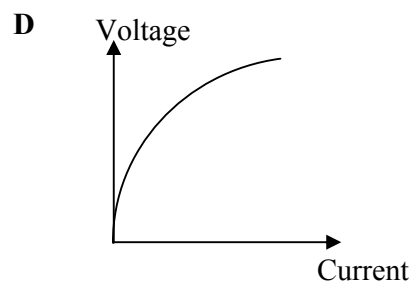
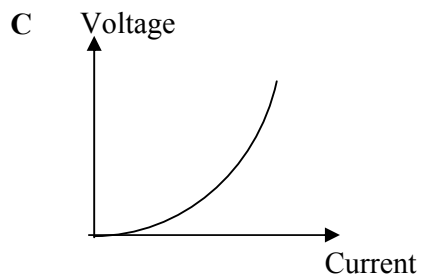
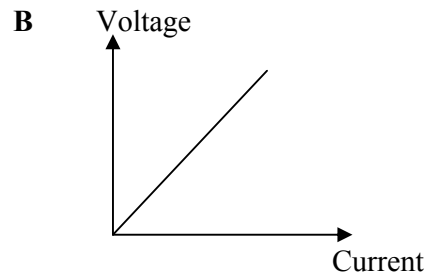
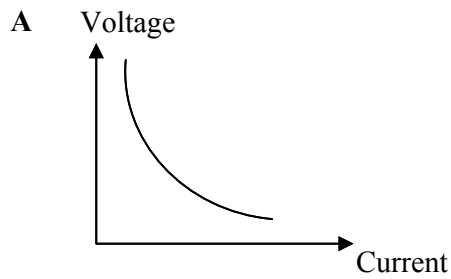
- 1 Which of the following derived quantity is obtained by multiplying two or more basic quantities ?
- A Density
 - B Acceleration
 - C Volume
 - D Velocity
- 2 The diagram shows a student taking a temperature reading from a thermometer incorrectly.



Which of the following is the correct way to take the thermometer reading?

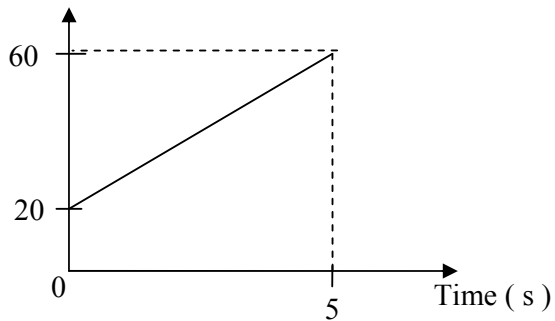
- A Using a more sensitive thermometer
- B Repeating the measurement and calculating the mean value
- C Using a magnifying glass to take the reading
- D Keeping the observer's eye perpendicular to the scale when taking the reading

3 Which graph represents an increasing resistance value ?



4 The diagram shows the graph representing the motion of a car.

Velocity (m s^{-1})

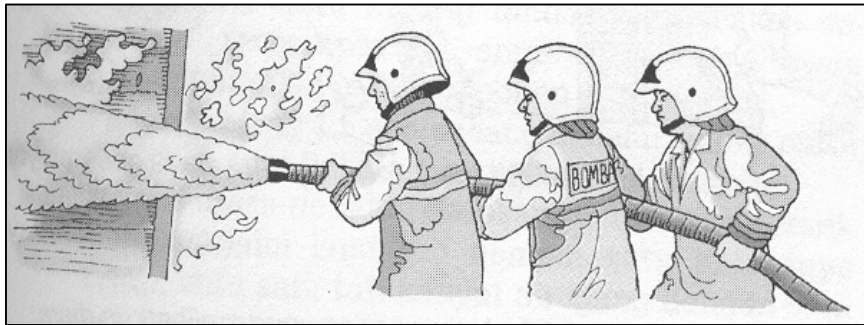


What is the acceleration and displacement of the car ?

	Acceleration / m s^{-2}	Displacement / m
A	8	100
B	8	150
C	8	200
D	12	150
E	12	200

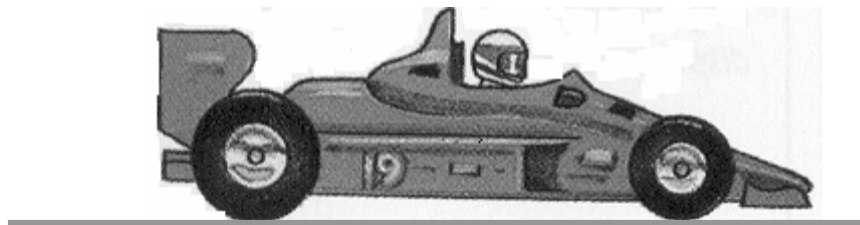
- 5 What happens to an astronaut's inertia when he is on the moon ?
- A Decreases
 - B Increases
 - C Remains unchanged

- 6 The picture below shows firemen holding a hose spraying out water.



Several firemen are needed to hold the hose

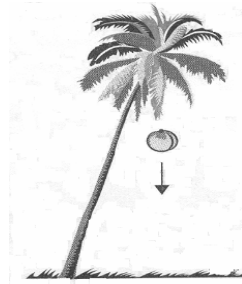
- A to support the weight of the hose.
 - B to increase the mass of water coming out
 - C to increase the speed of the water in the forward direction.
 - D to reduce the large recoil effect
- 7 The diagram shows an Formula-1 racing car.



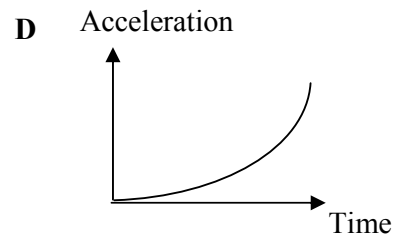
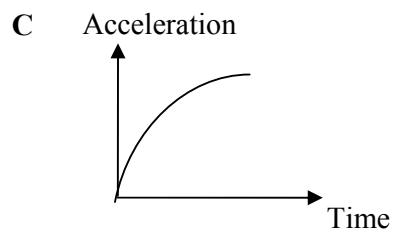
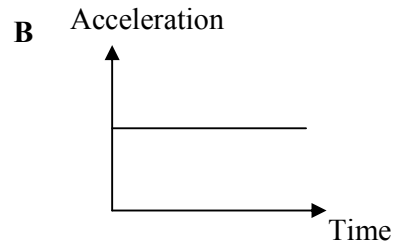
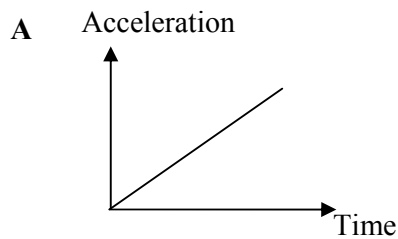
Why does the car's design engineer use light composite materials for making the body of the car although its engine is powerful ?

- A Acceleration increases if mass decreases.
- B A small mass produces a large force.
- C A large force produces a large inertia.
- D Composite material of small mass reduces cost.

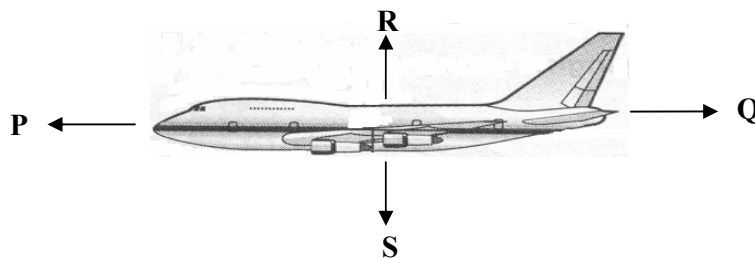
8 The diagram shows a coconut falling from the tree.



Which of the following acceleration–time graphs represents the motion of the coconut ?



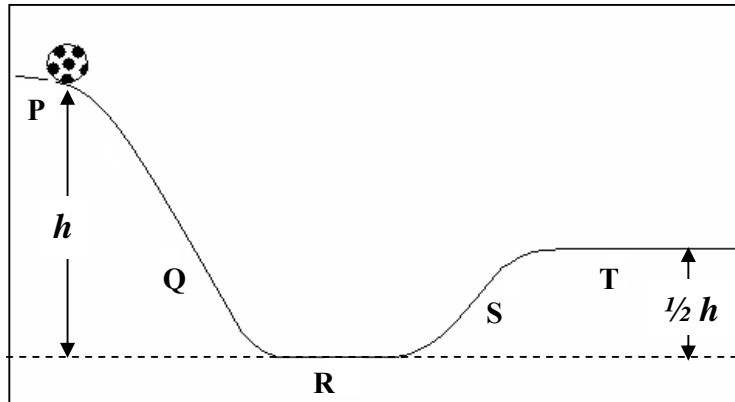
9 The diagram shows forces P, Q, R and S acting on an aeroplane flying at a constant velocity and altitude. acceleration



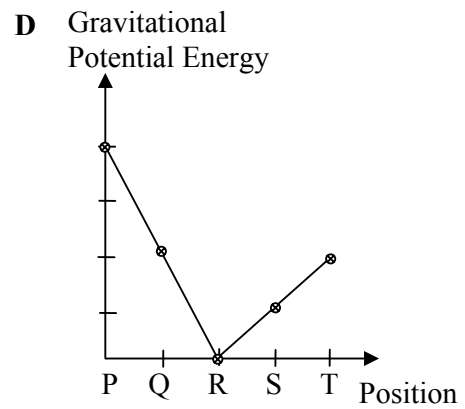
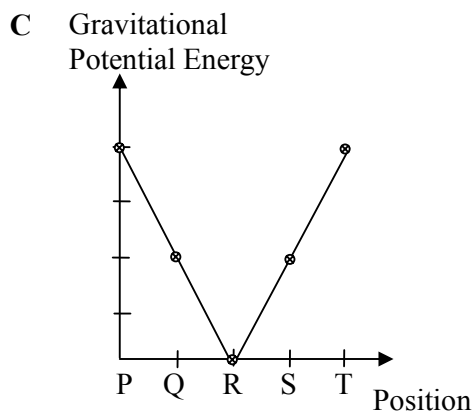
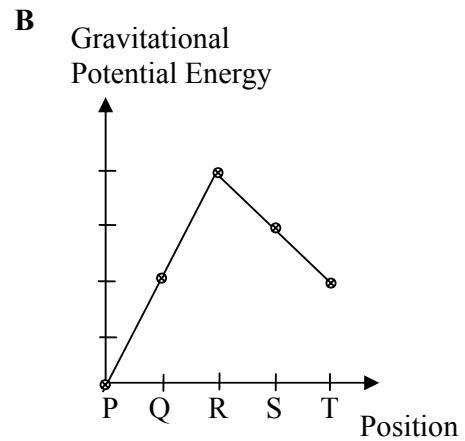
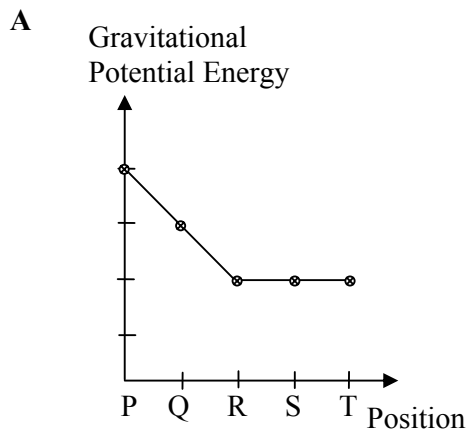
Which of the following is correct about the magnitude of P, Q, R and S ?

	Horizontal	Vertical
A	$P = Q$	$R = S$
B	$P > Q$	$R > S$
C	$P < Q$	$R < S$
D	$P > Q$	$R = S$

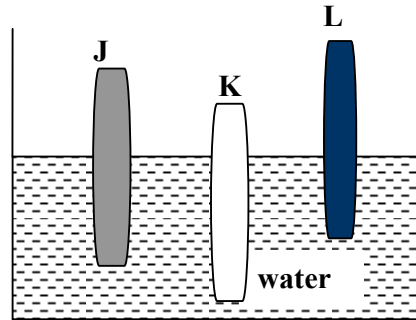
10 The diagram shows a ball which is released at P and rolls down a smooth slope.



Which of the following shows how the gravitational potential energy of the ball changes with its position ?



- 11 The diagram shows three cylinders J, K dan L floating in water. J, K and L have the same volume but are made of different materials.



Which of the following is true about the upthrust acting on each cylinder ?

	Big Upthrust	Moderate Upthrust	Small Upthrust
A	K	L	J
B	L	J	K
C	K	J	L
D	J	K	L

- 12 Figure (i) shows a plastic ruler which is bent upon hanging a weight from it. Figure (ii) shows the arrangement of particles in the ruler when the ruler is bent.

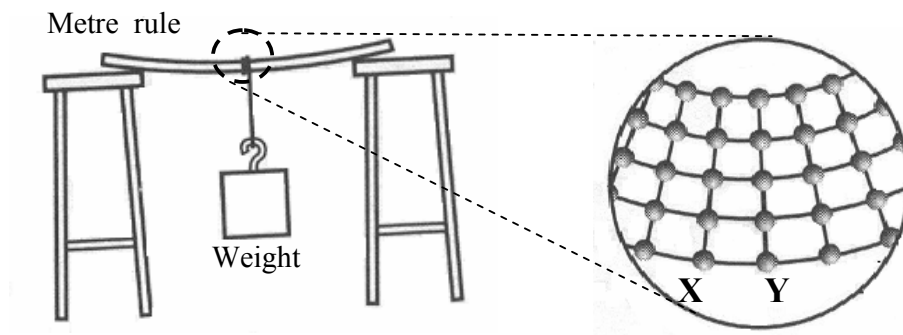


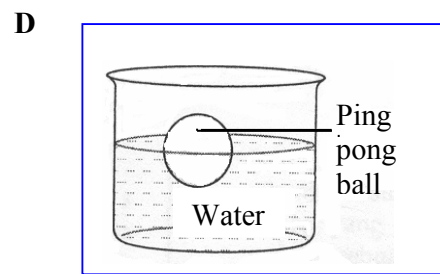
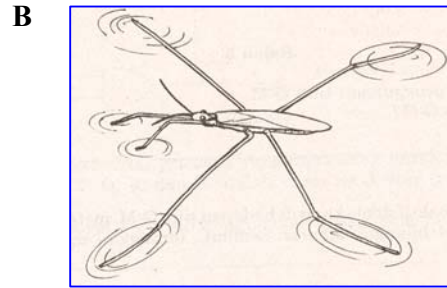
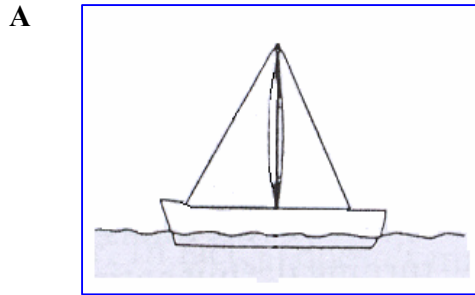
FIGURE (i)

FIGURE (ii)

What happens to the attractive force between particles X and Y ?

- A Increases
- B Decreases
- C Remains unchanged

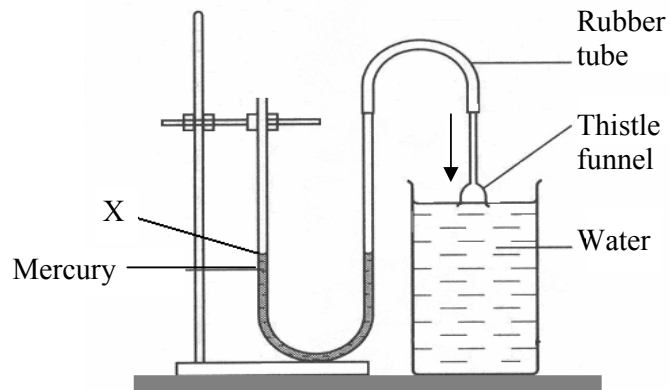
13 Which of the following demonstrates the effect of surface tension ?



14 Which of the following affects the pressure by an object on a surface ?

- A Surface type
- B Object's volume
- C Object's weight
- D Object's temperature

- 15 The diagram shows a thistle funnel connected to a mercury manometer.



When the funnel is pushed deeper into the water, what happens to the mercury level X in the manometer ?

- A Remains unchanged
 - B Rises
 - C Drops
- 16 The diagram shows a boy in a raft .

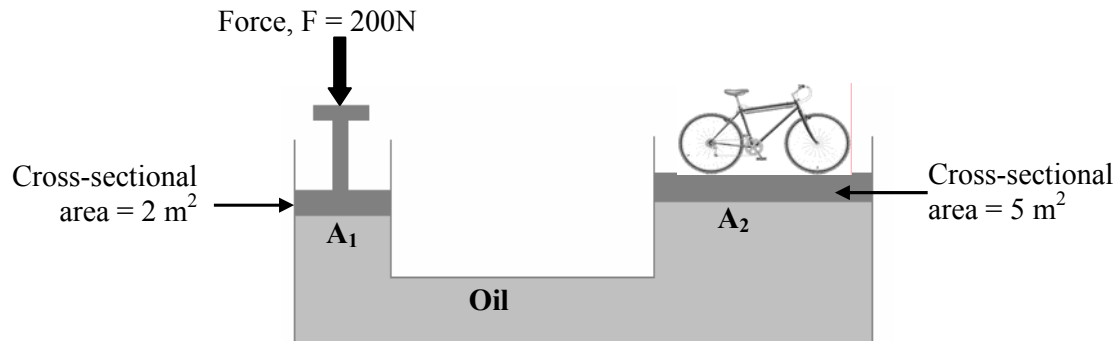


If the weight of the boy and the raft is 1200 N, what is the volume of the raft which is submerged ?

[Density of water = 1000 kg m^{-3}]

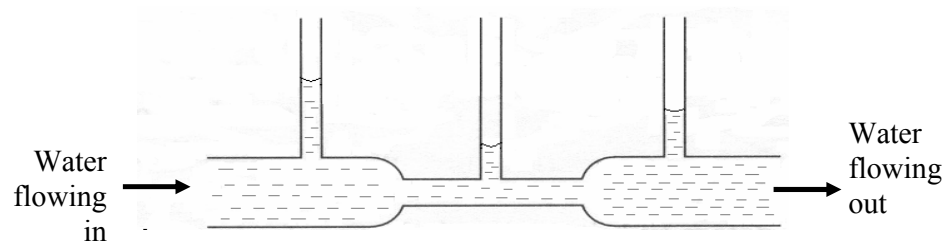
- A 0.12 m^3
- B 0.83 m^3
- C 1.20 m^3
- D 8.33 m^3
- E 12.00 m^3

- 17 The diagram shows a simple hydraulic system.



Which of the following statements is correct about the above system ?

- A Force , F is larger than the weight of the bicycle
 - B The above system is based on Bernoulli's principle
 - C The maximum weight which can be lifted is 200 N
 - D The pressure at A_1 and is the same as the pressure at A_2
- 18 The diagram shows a set-up that can be used to investigate a physics principle in the laboratory.



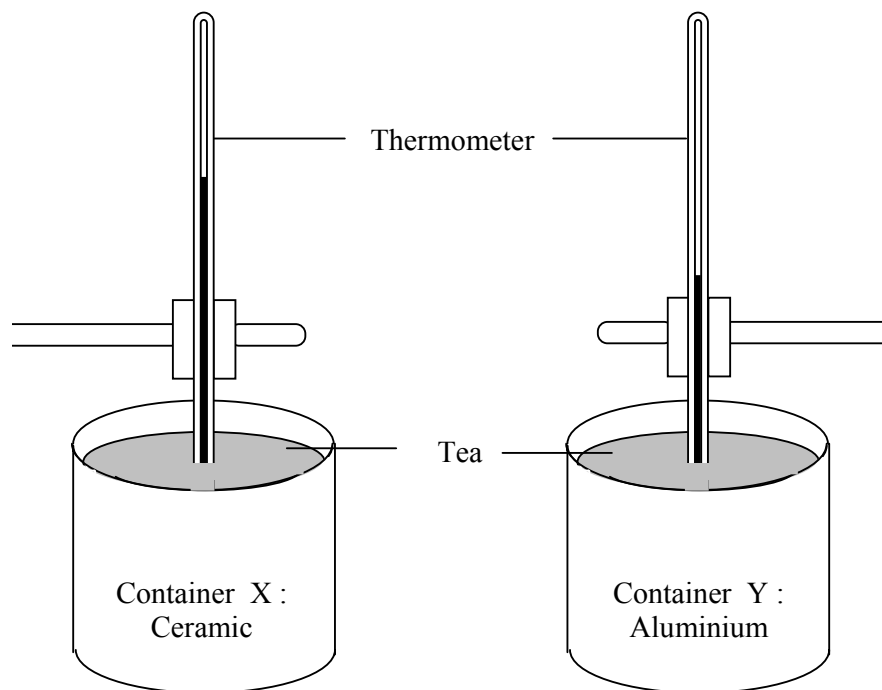
Which device works on the above principle ?

- A Mercury barometer
- B Bunsen burner
- C Hydrometer
- D Syringe

19 Which of the following is **incorrect** ?

	<u>Thermometric property</u>	<u>Type of thermometer</u>
A	Volume of gas	Constant volume gas thermometer
B	Volume of liquid	Mercury thermometer
C	Electromotive force	Thermocouple thermometer
D	Wire resistance	Resistance thermometer

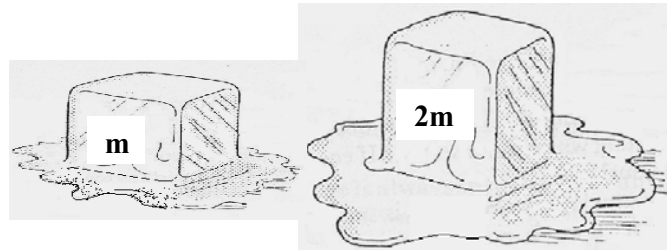
20 Equal volumes of tea at 80°C are poured into two containers of different materials. The diagrams show the thermometer readings after 10 minutes.



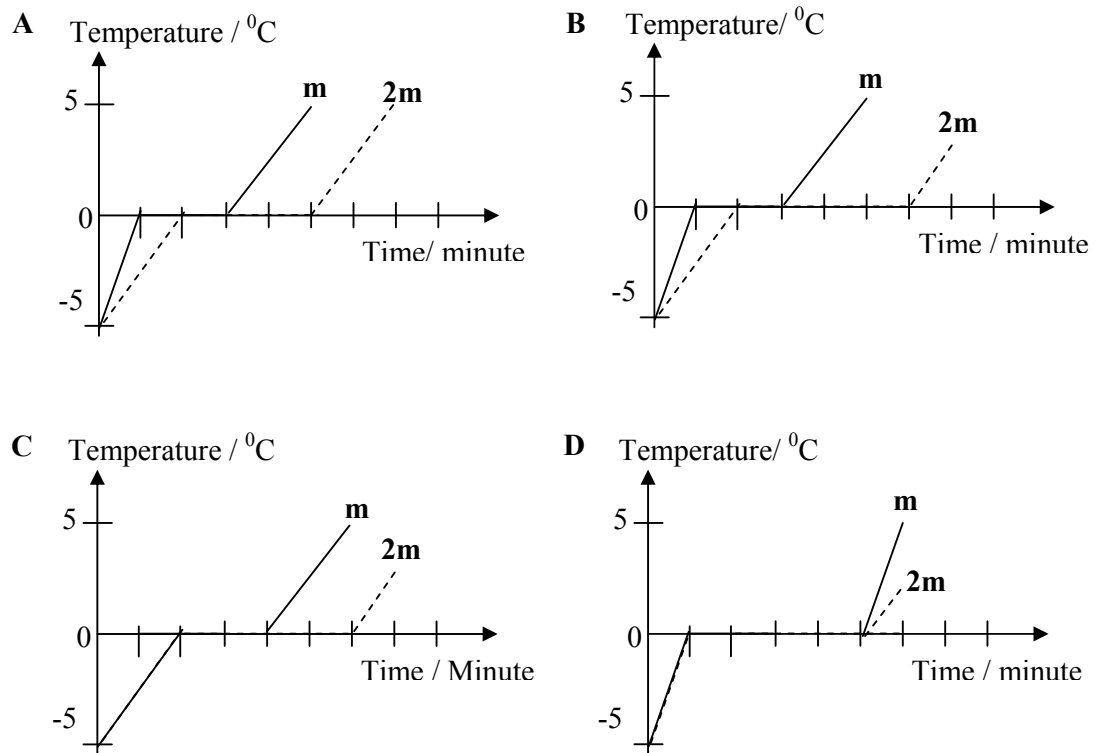
The thermometer readings differ because

- A the heat capacity of container X > the heat capacity of container Y
- B the heat capacity of container X < the heat capacity of container Y
- C the heat capacity of container X > the heat capacity of tea
- D the heat capacity of container Y > the heat capacity of tea

- 21 The diagram shows two ice cubes of masses m and $2m$, melting at room temperature. The ice cubes were initially at -5°C .

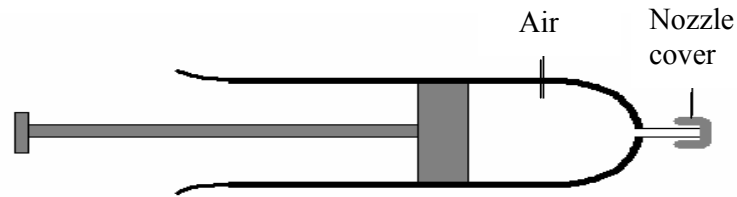


Which graph shows the correct temperature versus time relationship for the two ice cubes ?



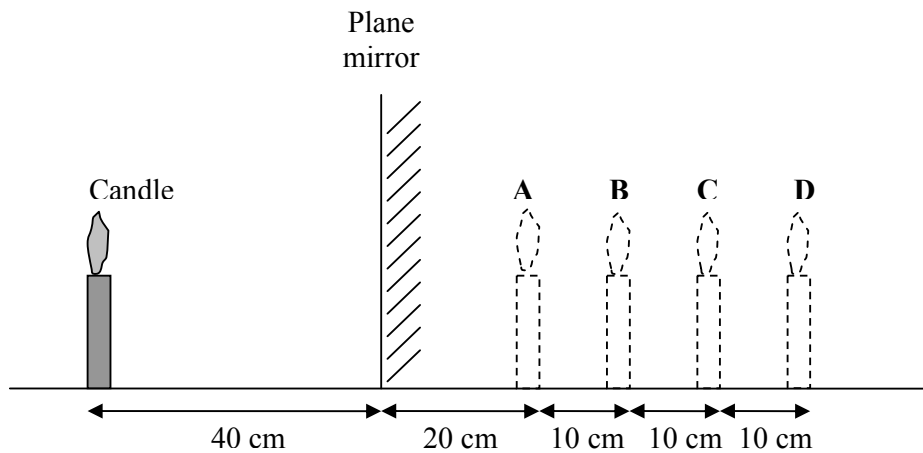
- 22 What happens when the body is sweating ?
- A Body temperature increases.
 - B Sweat absorbs heat from the surroundings.
 - C Molecules in sweat have low kinetic energy.
 - D Body heat is lost as latent heat of vaporization.

- 23 The diagram shows in a sealed syringe with 3 cm^3 of air at 27°C .



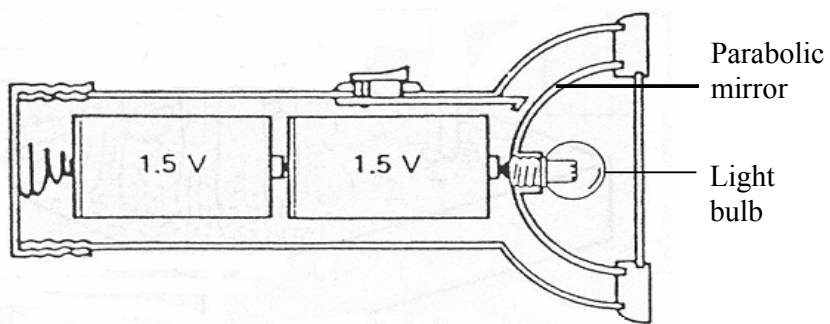
If the syringe is placed in boiling water, what will be the volume of the air in the syringe? The boiling point of water = 100°C .

- A 1.13 cm^3
 B 2.41 cm^3
 C 3.73 cm^3
 D 4.53 cm^3
 E 11.22 cm^3
- 24 The diagram shows a candle placed in front of a plane mirror.



Referring to the above diagram, which is the correct position of the image of the candle?

- 25 The diagram shows of a parabolic mirror in a torch light.



The light bulb in the torch light is positioned at the focal point of the mirror so that

- A light is dispersed.
- B light is focussed.
- C all light is reflected.
- D light is reflected as a parallel beam.

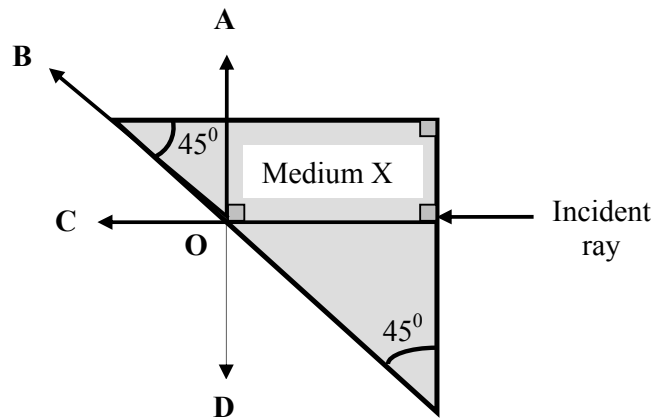
- 26

Stars appear to twinkle
Production of rainbow colours by a prism
The bottom of a pool appears shallower than its actual depth

Which wave property causes all of the above phenomena ?

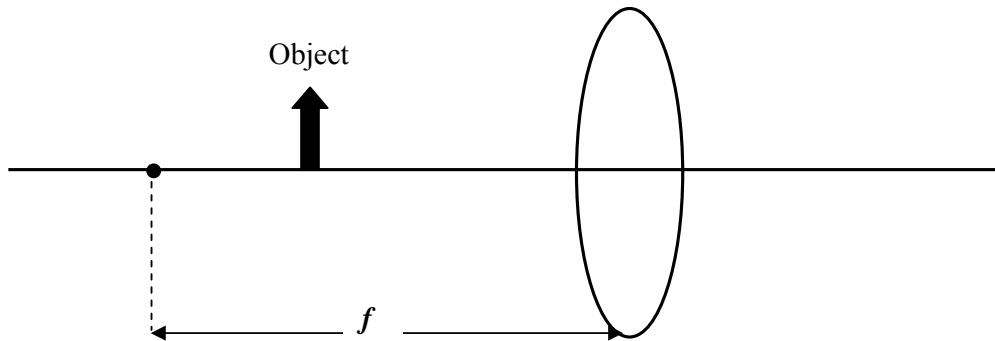
- A Diffraction
- B Reflection
- C Refraction
- D Total internal reflection

- 27 The critical angle for medium X is 42° .



Referring to the above diagram, what is the light path after point O ?

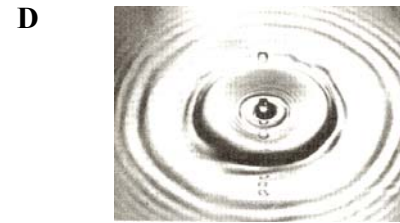
- 28 The diagram shows an object placed in front of a convex lens with a focal length f .



The image obtained is

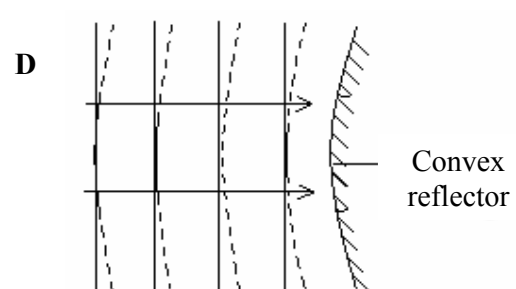
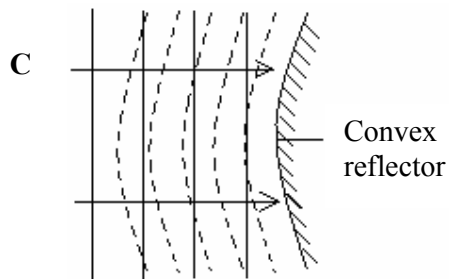
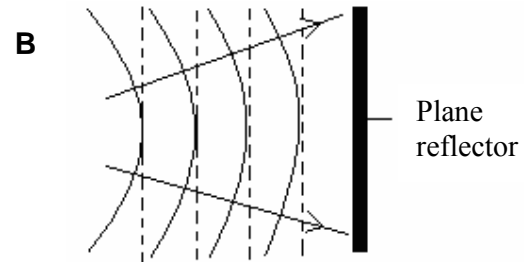
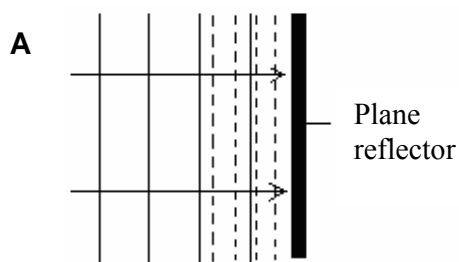
- A real , diminished and upright
- B virtual , magnified and upright
- C real , magnified and inverted
- D virtual , diminished and inverted

29 Which of the following produces longitudinal waves ?

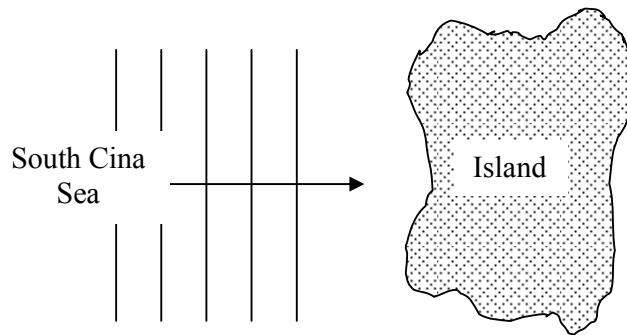


30 Which of the following diagrams shows the correct reflected wave ?

— Represents the incident wave front
 - - - - Represents the reflected wave front.

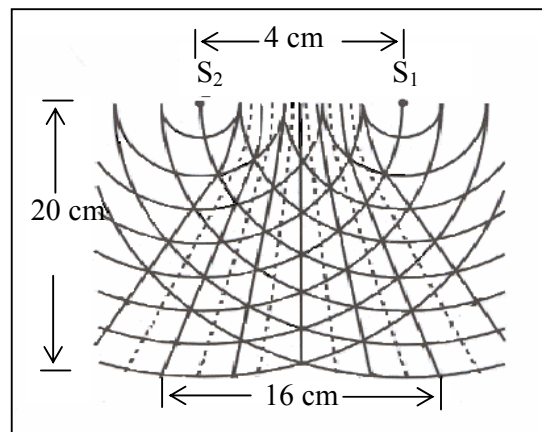


- 31 The diagram shows water waves approaching an island in the South China Sea.



What happens to the water waves after passing the island ?

- | | <u>Velocity</u> | <u>Wavelength</u> | <u>Amplitude</u> |
|---|-----------------|-------------------|------------------|
| A | Increases | Decreases | No change |
| B | Decreases | Increases | Increases |
| C | No change | No change | Decreases |
| D | No change | No change | No change |
- 32 The diagram shown represents the phenomenon of interference of water waves.



Key

S_1 : Wave source 1

S_2 : Wave source 2

What is the wavelength of the water waves ?

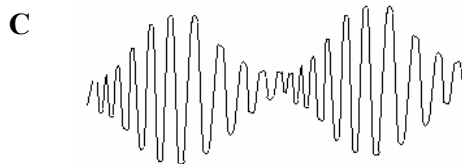
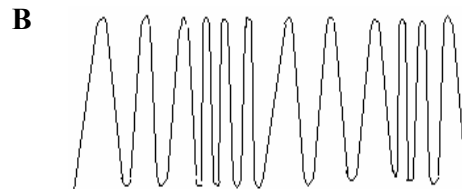
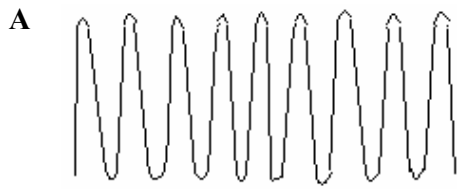
- A 0.8 cm
 B 1.2 cm
 C 3.2 cm
 D 5.0 cm
 E 20.0 cm

- 33 A person on the ground hears the sound of an aeroplane flying above in the air a few seconds after the aeroplane has passed him.

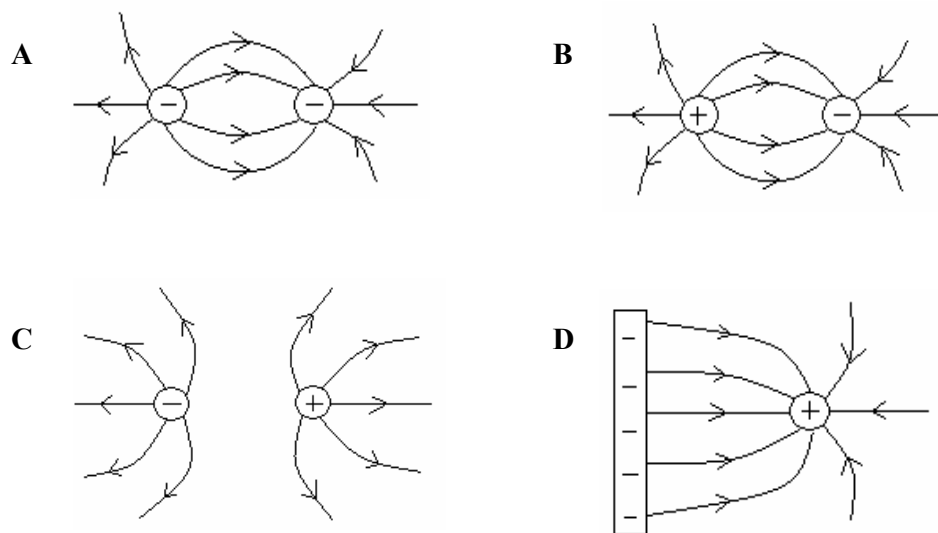
This occurs because sound is

- A absorbed by air
 - B refracted by the cloud
 - C reflected by the ground
 - D travels slower than light waves
- 34 Which of the following is a characteristic of electromagnetic waves?
- A It can travel through vacuum
 - B It is a longitudinal wave
 - C It cannot be diffracted
 - D It has a negative charge
- 35 A radio signal and an audio signal are combined in a modulator by means of frequency modulation.

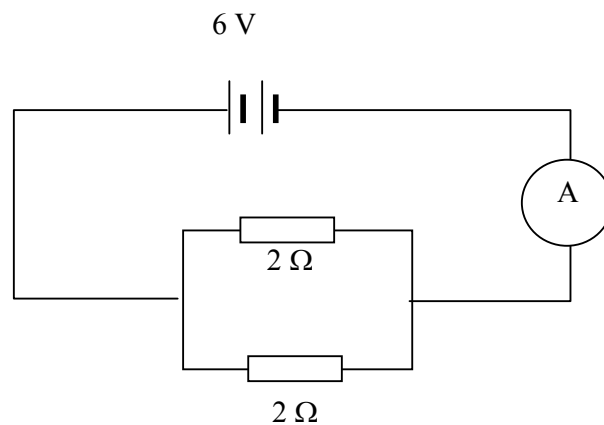
Which of the following shows the correct wave produced ?



36 Which diagram shows the correct electric field pattern ?



37 The diagram shows two resistors, each with a resistance of $2\ \Omega$ connected in parallel in a circuit.

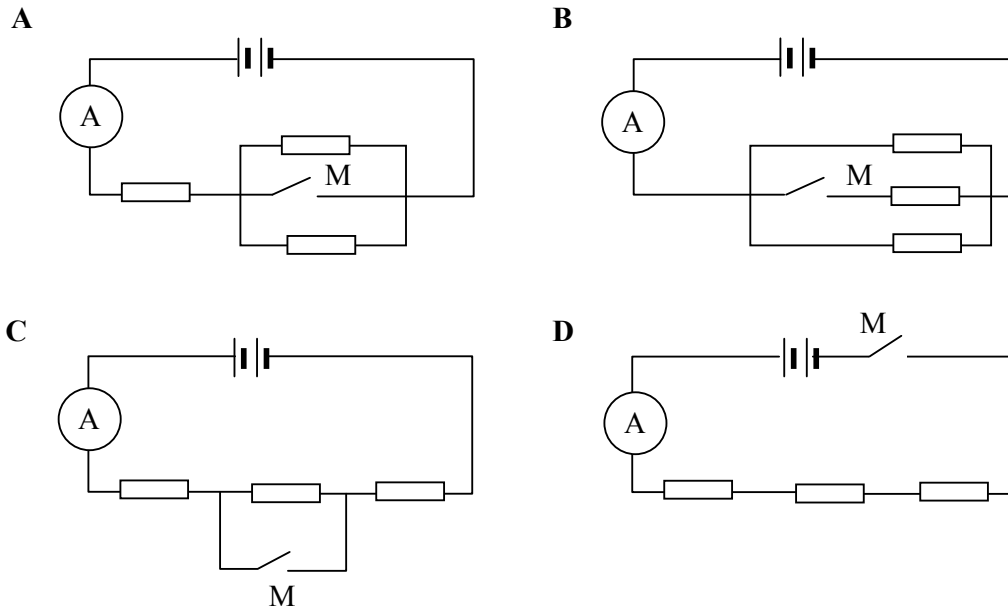


What is the reading on the ammeter ?

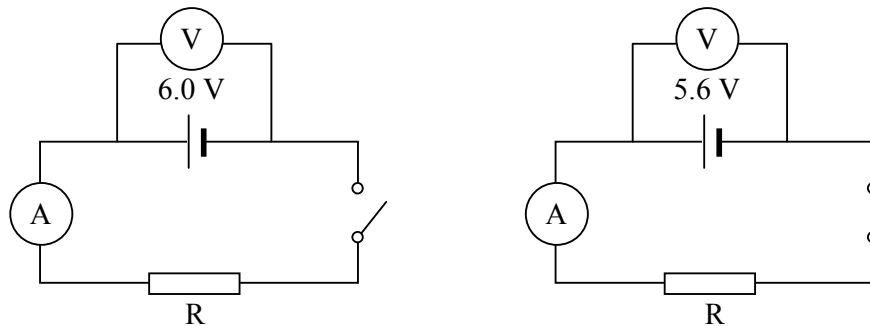
- A 1.5 A
- B 3.0 A
- C 4.5 A
- D 6.0 A
- E 7.5 A

38 Three similar resistors are connected in four different ways in circuits A, B, C and D.

Which arrangement gives the largest ammeter reading when switch M is closed ?



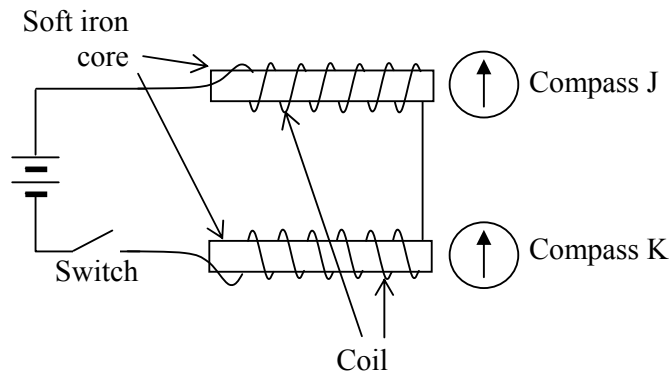
39 The diagram shows a circuit before and after the switch is closed.



A drop in the voltmeter reading occurs because

- A energy is needed to move charges in the circuit
- B voltage is needed to accelerate charges in the circuit
- C energy is needed to accumulate charges in the circuit
- D voltage is lost across the internal resistance of the cell

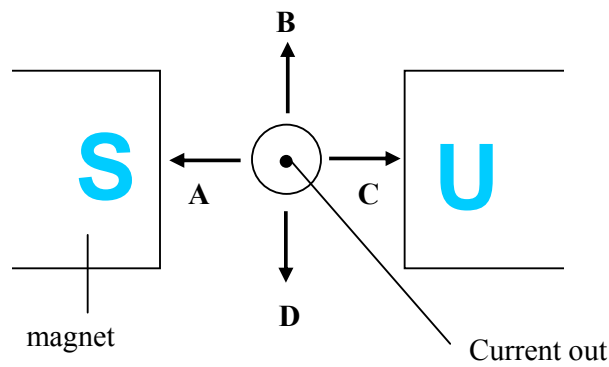
40 The diagram shows two compasses placed at the ends of two coils .



Which of the following shows the position of the compass needles when the switch is closed ?

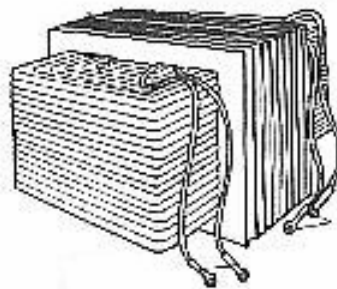
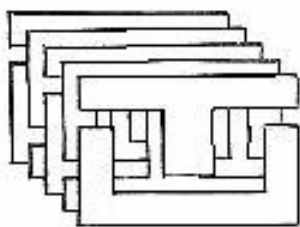
	Compass J	Compass K
A		
B		
C		
D		

41 The diagram shows a current- carrying conductor placed between two magnet poles.



Of the marked directions **A**, **B**, **C** and **D** , which shows the direction of motion of the conductor ?

- 42 The diagram shows one method used to increase the efficiency of a transformer.



Based on the diagram, which statement is true ?

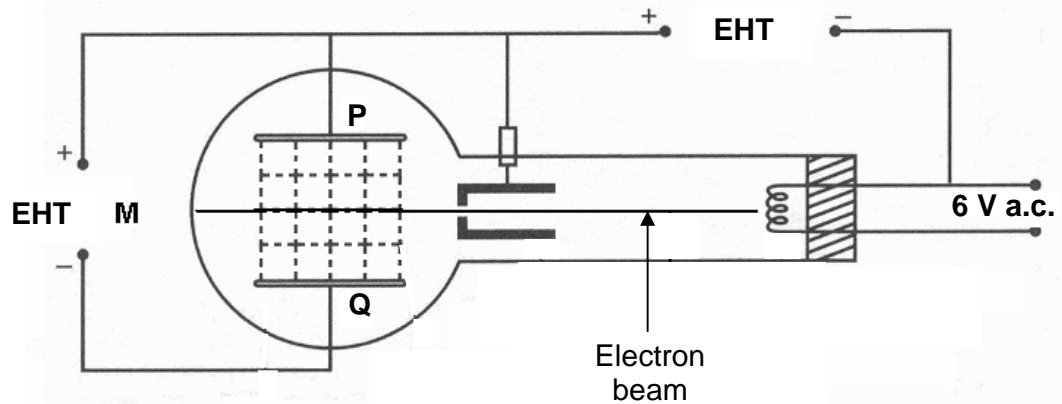
	Modification	Reason
A	Use a wire of larger diameter	Reduces energy loss in the form of heat
B	Use laminated iron core	Reduces eddy currents
C	Use a soft iron core	Reduces flux leakage
D	Both the primary and secondary coils are wound tightly	Reduces the energy needed to magnetize and demagnetize the iron core.

- 43 A current of 50 A flows through a 0.3Ω cable for electrical power transmission.

Calculate the power dissipated as heat.

- A 15 W
- B 45 W
- C 150 W
- D 450 W
- E 750 W

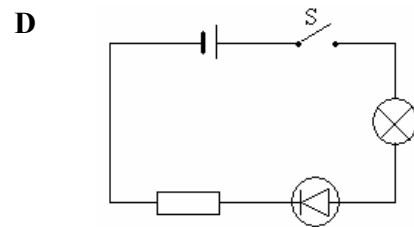
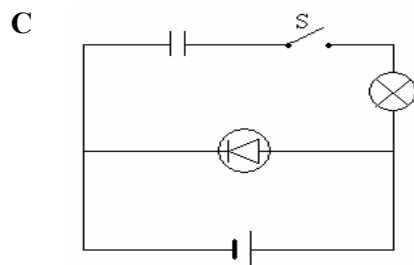
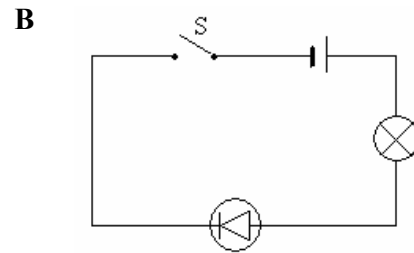
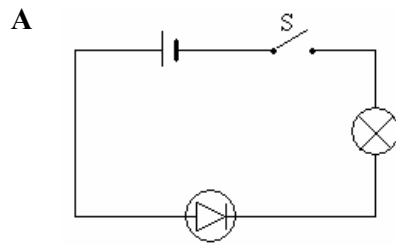
44 The diagram shows the path of an electron beam in a deflection tube.



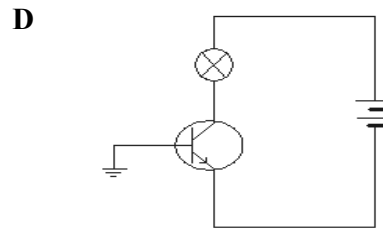
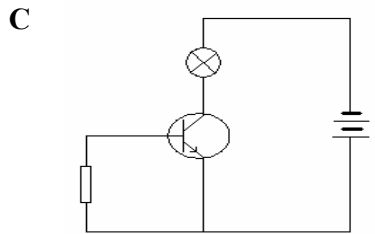
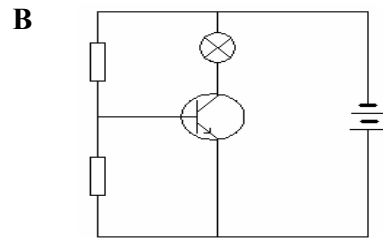
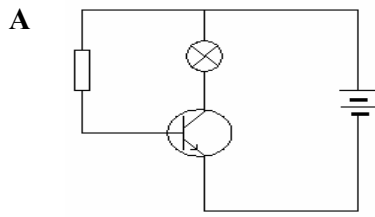
What happens to the electron beam when the EHT supply **M** is switched on?

- A Bends towards plate P
- B Bends towards plate Q
- C Remains in a straight line

45 Determine the circuit where the light bulb **does not** light up when switch S is closed.



46 Which circuit is connected correctly ?



47 Figure (i) shows the combination of three logic gates. Figure (ii) shows the input signals P and Q.

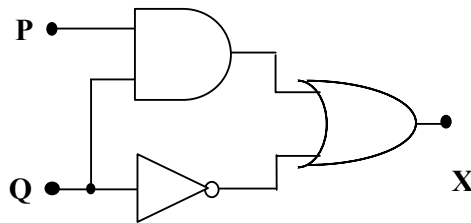


FIGURE (i)

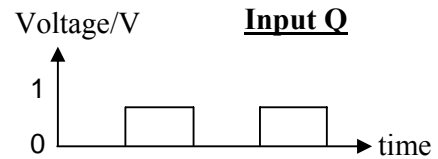
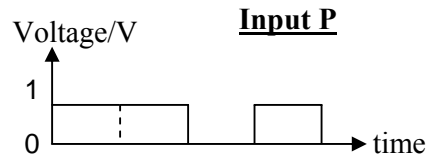
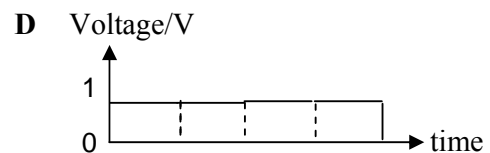
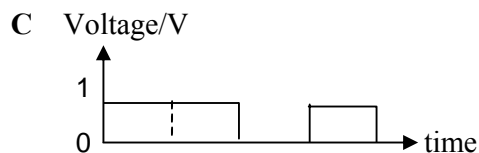
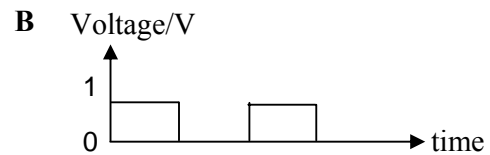
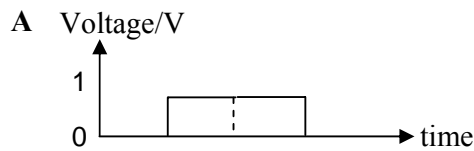


FIGURE (ii)

Which of the following shows the output signal X ?



- 48 The radioactive decay of an isotope is represented by the following reaction



What is the value of the nucleon number P and the proton number Q ?

	Nucleon number P	Proton number Q
A	208	80
B	210	81
C	212	79
D	215	83
E	214	84

- 49 Choose the statement which **does not** explain the half life of an isotope.

- A Time is halved
- B Isotope's activity is halved
- C Isotope's mass is halved
- D The number of unstable nuclei is halved

- 50 A radioisotope can be used as a tracer to determine the position of blood clots by injecting the radioisotope into the the patient's blood vessel.

Which radioisotope should be used ?

Radioisotope	Type of radiation emitted	Half-life
A	β and γ	3 hours
B	β and γ	8 days
C	γ	6 hours
D	β	15 days

END OF QUESTION PAPER