

Visit
FREETESTPAPER.com
for more papers



Website: freetestpaper.com



[Facebook.com/freetestpaper](https://www.facebook.com/freetestpaper)



[Twitter.com/freetestpaper](https://www.twitter.com/freetestpaper)



Paya Lebar Methodist Girls' School (Secondary)
Preliminary Examination 2020
Secondary 4 Express / 5 Normal Academic

CANDIDATE NAME		CLASS		CLASS INDEX NUMBER	
CENTRE NUMBER				INDEX NUMBER	

SCIENCE (PHYSICS)

5076/01

Paper 1 Multiple Choice

31 Aug 2020

(Taken together with Sc(Chemistry))

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 class index number on the separate Answer Sheet in the spaces provided.

There are **twenty** questions in 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.

Each correct answer will score one mark. A mark will not be deducted for a wrong answer.

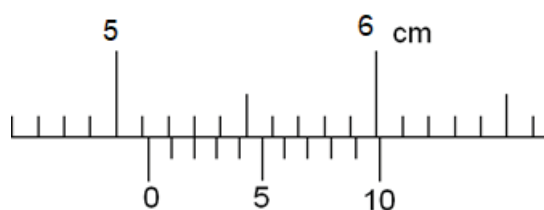
Any rough working should be done in this paper.

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

For Examiner's Use	
Total	/20

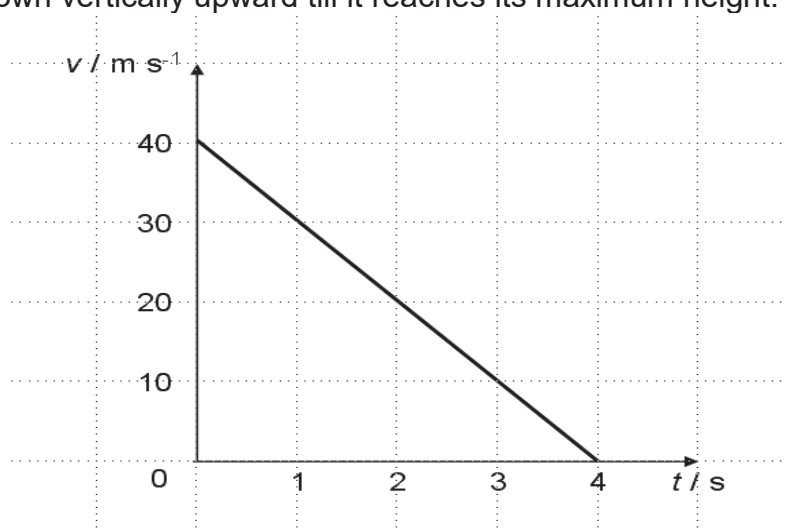
This document consists of 9 printed pages.

- 1 The diagram shows a vernier scale.



What reading is shown?

- A** 5.12 cm
B 5.21 cm
C 5.23 cm
D 5.32 cm
- 2 The graph below shows how the speed of an object changes with time, from the instant it is thrown vertically upward till it reaches its maximum height.



What is the maximum height reached by the object?

- A** 20 m **B** 40 m **C** 80 m **D** 160 m
- 3 A small submarine of mass 1000 kg sinks in water with a uniform speed of 2 m/s.

What is the resultant force exerted on the submarine as it sinks?

- A** 0 N
B 500 N downwards
C 2000 N downwards
D 10 000 N downwards

4 Which apparatus are required to determine the density of a liquid?

- A Beam balance and thermometer.
- B Beam balance and measuring cylinder.
- C Metre rule and thermometer.
- D Metre rule and measuring cylinder.

5 Which of the following statements are **true**?

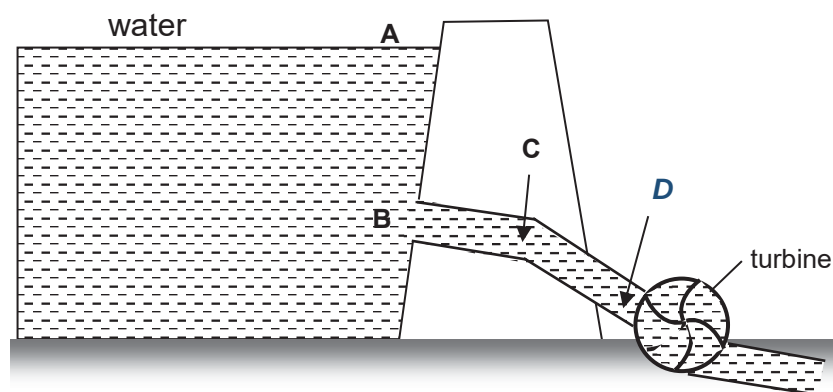
- 1 The centre of gravity of a triangular lamina is at one of its vertices.
- 2 The centre of gravity of a thin uniform rod is halfway along the rod.
- 3 The centre of gravity of any lamina is at a point on the lamina such that the lamina can be balanced at that point.
- 4 The centre of gravity of a uniform rectangular lamina is at the point of intersection of its diagonals.

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

6 Which object **A**, **B**, **C** or **D** exerts the greatest pressure on the ground?

	Weight / N	Area of contact with ground / cm ²
A	30	100
B	600	200
C	750	3000
D	10 000	4000

7 The diagram below represents a hydroelectric power station which generates electricity.

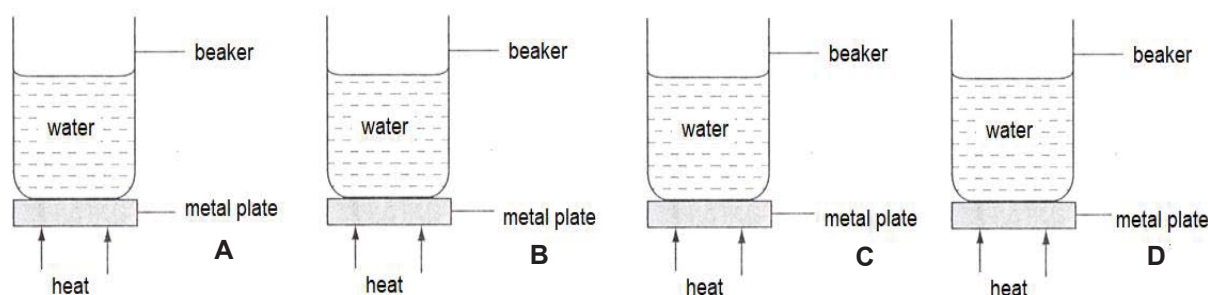


At which position, **A**, **B**, **C** or **D**, is the kinetic energy of the water greatest?

8 Which of the following increases when a liquid is boiling?

- A The average kinetic energy of the molecules.
- B The molecular size.
- C The molecular spacing.
- D The total number of molecules.

9 Four beakers containing the same amount of water at the same initial temperature are placed on four hot metal plates **A**, **B**, **C** and **D**. The plates are of the same size but are made from four different metals. The lower surfaces of the metal plates are kept at the same temperature with identical heat source.

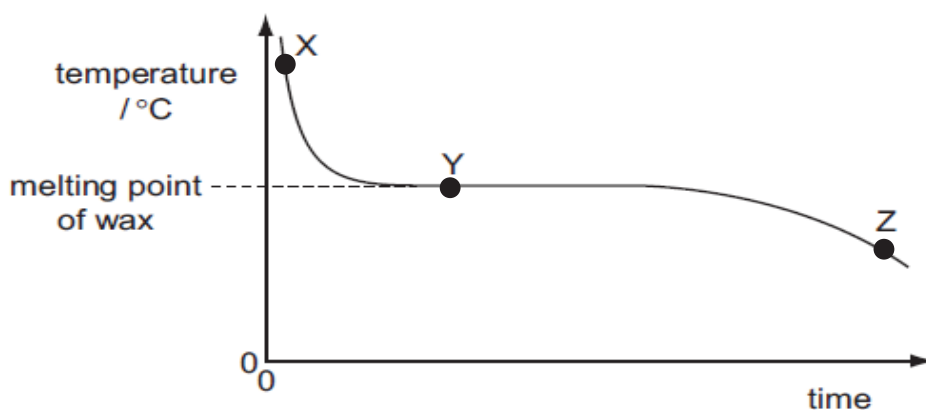


The time taken to produce the stated temperature rise of the water in each beaker is given in the table below.

Which metal plate is the poorest conductor of heat?

metal plate	temperature rise / °C	time / s
A	10	100
B	12	100
C	15	200
D	18	200

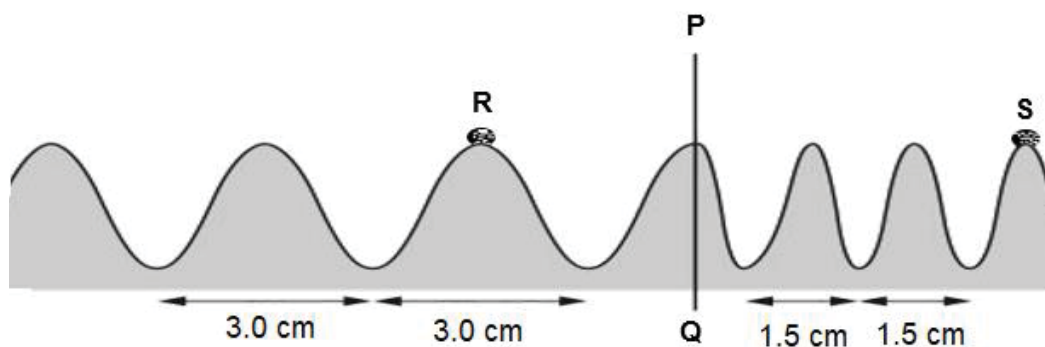
- 10 A student carries out an experiment to find the melting point of wax. The graph shows how the temperature of the wax changes as it cools.



Which statement is correct?

- A At X, the temperature drops more slowly than at Z.
- B At Y, thermal energy is being given out by the wax.
- C At Y, all the wax is solid.
- D At Z, the wax molecules are not moving.

- 11 The diagram shows a water wave in a ripple tank.



The wave has a speed of 12 cm/s at R. The wave crosses a boundary PQ where the distance between successive troughs changes from 3.0 cm to 1.5 cm.

What is the velocity of the wave at point S?

- A 6.0 cm/s
- B 12 cm/s
- C 18 cm/s
- D 24 cm/s

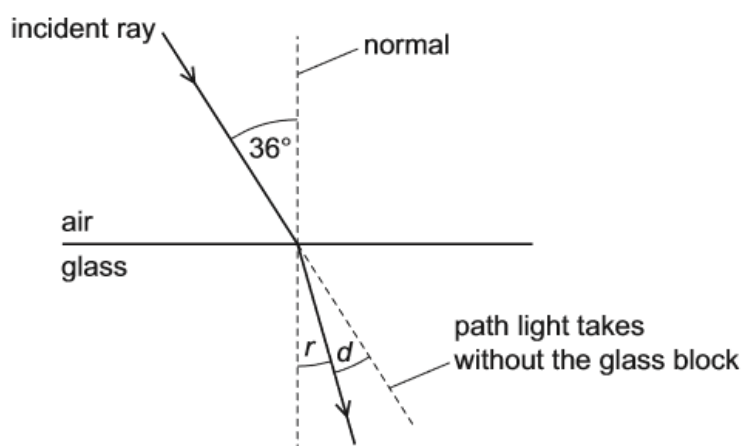
- 12 When a sound wave travels from air into water, what are the changes in the frequency, wavelength and wave speed?

	Frequency	Wavelength	Wave Speed
A	no change	decreases	decreases
B	no change	increases	increases
C	increases	no change	increases
D	decreases	no change	decreases

- 13 Which of the following is an application of gamma rays?

- A treats cancer
- B medical diagnosis of bone fractures
- C checking luggage at the airport
- D stage lighting at the concert

- 14 A ray of light is incident on the surface of a glass block. The diagram is not drawn to scale.
The refractive index of the glass is 1.5.

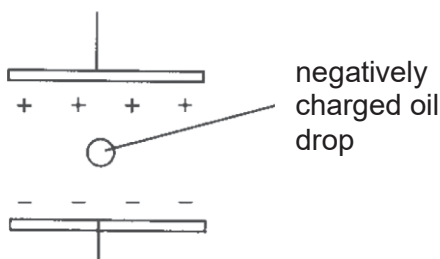


The angle of refraction is r . The angle between the refracted ray and the path the light takes without the glass block is d .

What are the angles r and d ?

	$r / ^\circ$	$d / ^\circ$
A	23	13
B	22	14
C	26	10
D	24	12

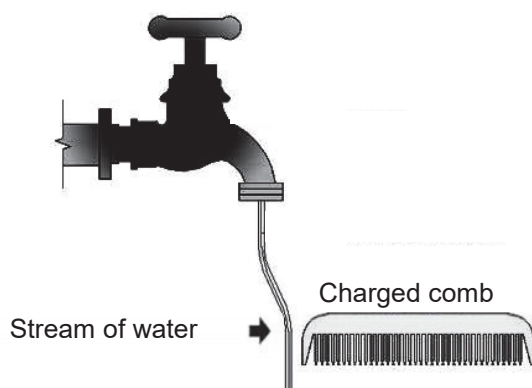
- 15 A negatively charged oil drop stays stationary in the electric field between two oppositely charged parallel plates as shown in the figure.



When the two plates are moved closer to each other, the electric field between the plates becomes closer.

What is the subsequent movement of the oil drop?

- A The oil drop moves downwards.
 - B The oil drop moves upwards.
 - C The oil drop moves towards the left.
 - D The oil drop moves towards the right.
- 16 A charged comb is brought close to a thin stream of running water. The stream of water moves towards the comb.



What is the explanation for this observation?

- A The charged comb attracts the uncharged stream of water by induction.
 - B The positively charged comb attracts the negatively charged stream of water.
 - C The charged comb attracts the charged stream of water by induction.
 - D The negatively charged comb attracts the positively charged stream of water.
- 17 How could the unit of charge, the coulomb, also be written?

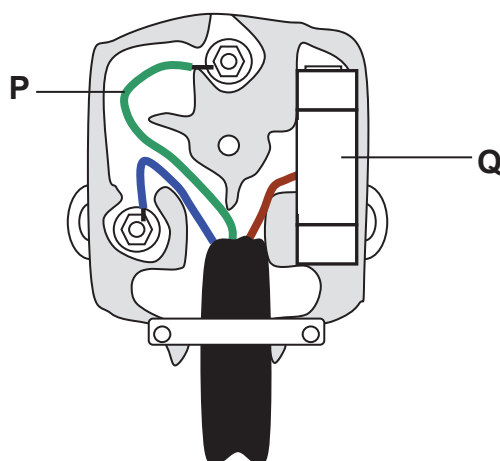
- A A
- B A/s
- C JV
- D As

- 18 X and Y are lamps with filaments made of the same material. The filament of lamp X is shorter and thicker than that of lamp Y. Each lamp is connected in parallel to the same electric source and switched on.

Which is the brighter lamp and which has the larger resistance?

	brighter lamp	larger resistance
A	X	X
B	X	Y
C	Y	X
D	Y	Y

- 19 The inside of a three pin-plug is shown in the diagram below.



What are the parts marked **P** and **Q**?

	Part P	Part Q
A	Live wire	Chord grip
B	Live wire	Fuse
C	Earth wire	Chord grip
D	Earth wire	Fuse

- 20** The table shows the usage of electricity in a household per day.

Appliance	Number of appliances in the household	Duration of usage for each appliance
60 W lamp	6	8 hours
3 kW water heater	1	2 hours

If one unit of electricity costs 25 cents, what is the total electrical bill for each day?

- A** 162 cents **B** 182 cents **C** 210 cents **D** 222 cents

End of Sc (Physics) Paper 1

Answers to 2020 Sec 4E5N Sc(Phy) Prelim Exam Paper 1

1	2	3	4	5	6	7	8	9	10
A	C	A	B	D	B	D	C	C	B
11	12	13	14	15	16	17	18	19	20
A	B	A	A	B	A	D	B	D	D



Paya Lebar Methodist Girls' School (Secondary)
Preliminary Examination 2020
Secondary 4 Express and 5 Normal Academic

CANDIDATE NAME		CLASS		CLASS INDEX NUMBER					
CENTRE NUMBER					INDEX NUMBER				

SCIENCE (PHYSICS)

5076/02

Paper 2

21 Aug 2020

1 hour 15 min

Candidates answer on the Question Paper.

No additional materials are required.

READ THESE INSTRUCTIONS FIRST

Write your name, class and index number on all the work you hand in.

Write in dark blue or black pen.

You may use a soft pencil for any diagrams or graphs.

Section A (45 marks)

Answer **all** questions in the spaces provided on the question paper.

Section B (20 marks)

Answer any **two** questions.

Write your answers in the spaces provided on the question paper.

At the end of the examination, fasten all your work securely together, if applicable.

The number of marks is given in brackets [] at the end of each question or part question.

For Examiner's Use	
Section A	/45
Section B	
10	
11	
12	
Total	/65

Section A (45 marks)

Answer **all** questions in the spaces provided on the question paper.

- 1 Aileen uses a pair of Vernier calipers to measure the internal and external diameter of a hollow pipe. The readings are shown in Fig. 1.1.

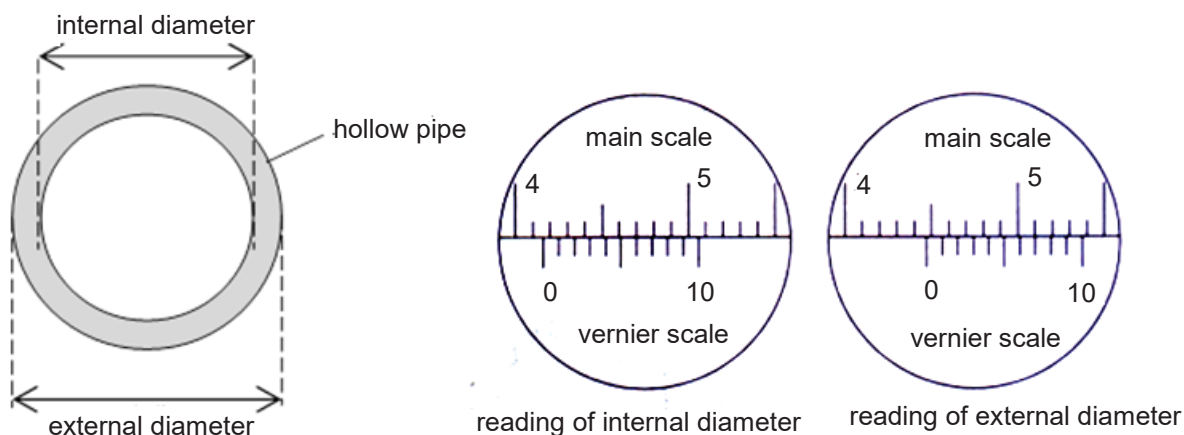


Fig. 1.1

- (a) If the Vernier calipers has a negative zero error of 0.02 cm, calculate the thickness of the pipe.

thickness = _____ cm [2]

- (b) Explain why using a ruler to measure the external diameter is likely to be less accurate than using a pair of Vernier calipers.

_____ [1]

- 2 State the base quantities that can be found in speed.

_____ [1]

- 3 Fig. 3.1 shows how the speed of an object changes with time.

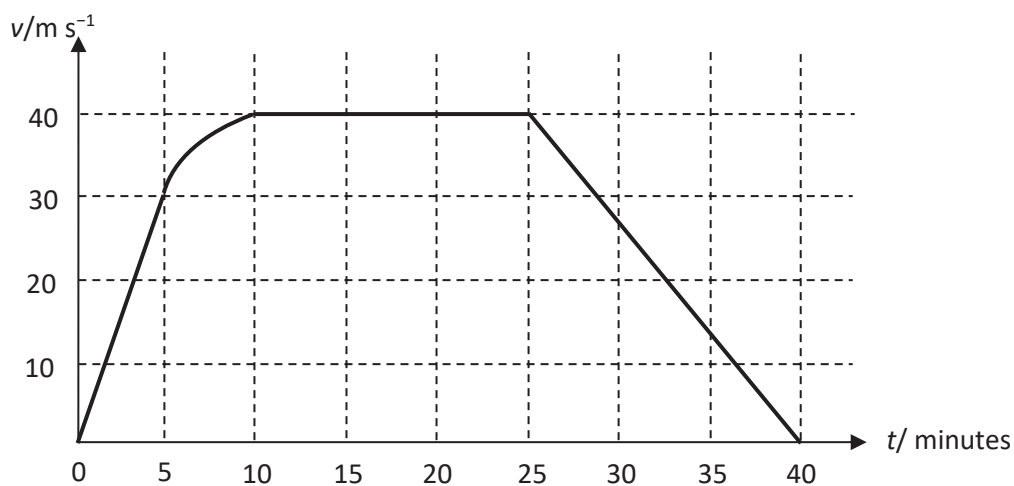


Fig. 3.1

- (a) Describe, with reference to the graph, how the speed of the object changes

(i) from $t = 0$ minutes to $t = 5$ minutes,

_____ [1]

(ii) from $t = 5$ minutes to $t = 10$ minutes.

_____ [1]

- (b) Calculate the acceleration of the object from $t = 25$ minutes to $t = 40$ minutes.
[Note: Convert your time to seconds]

acceleration = _____ m/s² [3]

- (c) Calculate the distance travelled by the object from $t = 10$ minutes to $t = 25$ minutes.

distance = _____ m [2]

- 4 A bag with unknown weight is suspended by two cables to the top of a ceiling as shown in Fig. 4.1. The tension in each cable is 10 N and the angle between the two cables is 100° .

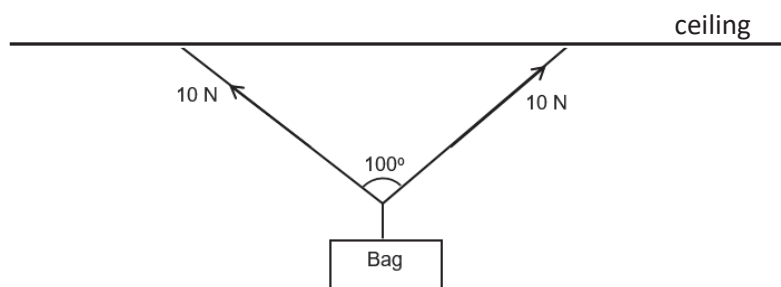


Fig. 4.1

By means of a vector diagram, find the weight of the bag.

Scale used: 1 cm represents _____

weight of bag = _____ N [4]

- 5 Fig 5.1 shows a car with a mass of 1 500 kg. It is at rest at $t = 0$ s and starts to move. The **forward driving force** on the car remains at 3 000 N throughout its motion. The total resistive force acting on the car increases as the speed of the car increases.

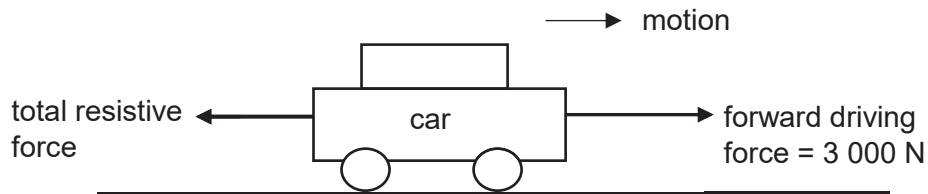


Fig. 5.1

- (a) State and explain at which time the car experiences the greatest acceleration.

[2]

- (b) At $t = 10$ s, the car moves with constant velocity. State the magnitude of the total resistive force.

[1]

- (c) At $t = 5$ s, the acceleration of the car is 1.5 m/s^2 . Calculate the total resistive force acting on the car at this instant.

total resistive force = _____ N [2]

- 6 A bucket of water is pulled up out of a well using a rope. Fig. 6.1 shows the rope winding on to a cylinder as the handle is turned.

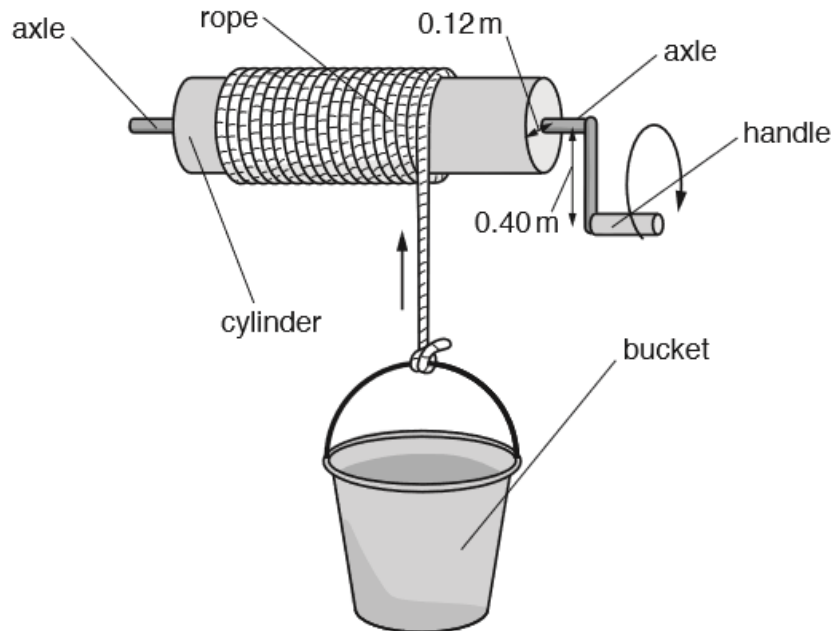


Fig. 6.1

The empty bucket has a mass of 1.0 kg. When the bucket is full, it contains $2.4 \times 10^{-2} \text{ m}^3$ of water. The density of water is 1000 kg / m^3 .

- (a) Calculate the total weight of the bucket and the water.

total weight = _____ N [3]

The radius of the cylinder is 0.12 m and the handle is 0.40 m from the axle of the cylinder. The weight of the bucket and the water produces a moment that acts on the cylinder.

- (b) (i) Calculate the moment due to the total weight of the bucket and water.

moment = _____ Nm [2]

- (ii) Calculate the minimum force on the handle that balances this moment in (b)(i).

minimum force = _____ N [2]

- (c) The bucket of water is lifted up at constant speed through a vertical height of 6 metres. Calculate the work done needed to lift the bucket of water.

work done = _____ J [2]

- 7 Fig. 7.1 shows a hand dryer.

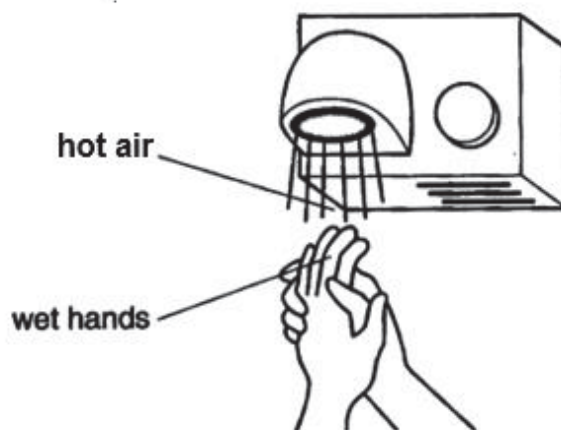


Fig. 7.1

The hot air that blows out of the dryer helps to dry the hands by removing water.

- (a) Name the process that causes the hot air to dry the hands.

_____ [1]

- (b) State two characteristics of the process that occurs in (a).

[2]

- 8 Fig. 8.1 shows light, in air, striking the vertical side of a rectangular glass block at an angle of incidence of 60° .

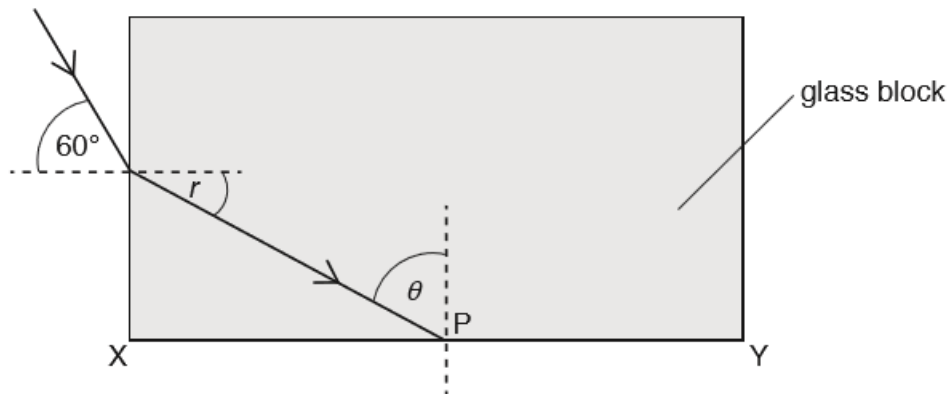


Fig. 8.1

The refractive index of the glass is 1.6. The light travels in the glass and strikes side XY at P.

- (a) At the point where the light enters the glass, the angle of refraction is r . Calculate angle r .

$r = \underline{\hspace{2cm}}^\circ$ [2]

- (b) Calculate the critical angle c for light travelling in the block.

$c = \underline{\hspace{2cm}}^\circ$ [2]

- (c) Light strikes the side XY at P with an angle of θ with respect to the normal. State and explain what happens to the light after it strikes side XY.

[2]

- (d) Explain what happens to the wavelength of the light as it enters the glass block.

[1]

- (e) State one difference between light and sound wave.

[1]

- 9 A student sets up the circuit shown in Fig. 9.1.

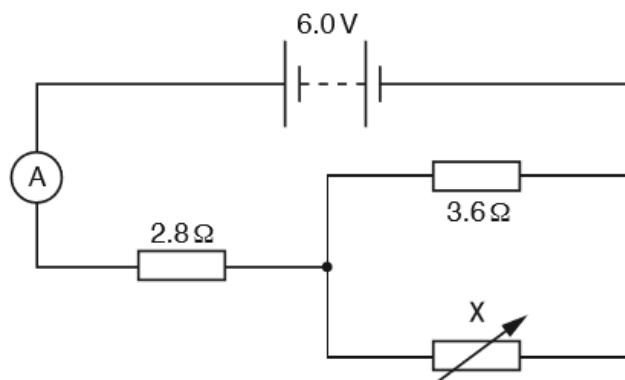


Fig. 9.1

The electromotive force (e.m.f.) of the battery is 6.0 V. The resistance of the variable resistor X is set to 1.8 Ω .

- (a) Calculate the total resistance of the entire circuit.

total resistance = _____ Ω [2]

- (b)** Calculate the current measured by the ammeter.

current = _____ A [2]

- (c)** Mark with the letter Y, on Fig. 9.1, the position of an ammeter to measure the current flowing through the $3.6\ \Omega$ resistor. [1]

Section B (20 marks)

Answer any **two** questions in this section. Write your answers in the spaces provided.

- 10** Fig. 10.1 shows four different positions of a 2 kg ball sliding down a smooth platform. The gravitational potential energy (GPE) and kinetic energy (KE) possessed by the ball at point **A** is 100 J and 0 J respectively.

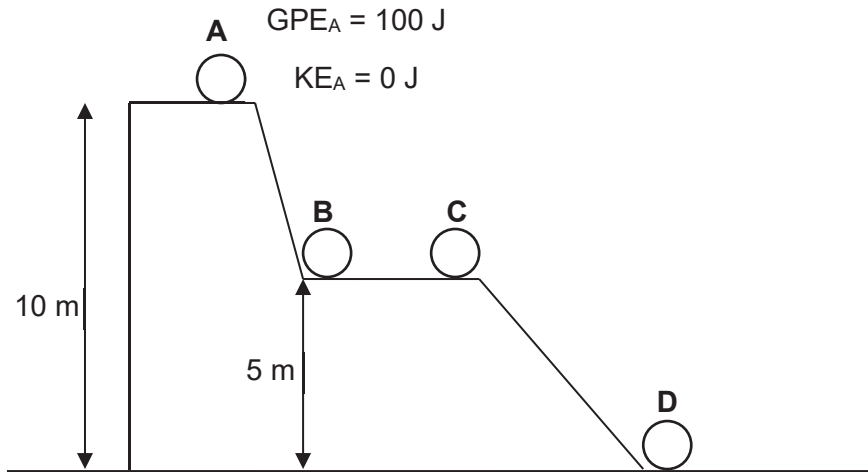


Fig. 10.1

- (a)** State the Principle of conservation of energy.

[1]

- (b)** Calculate the GPE and KE possessed by the ball at point **B**.

$KE_B =$ _____ J

$PE_B =$ _____ J [3]

- (c) Complete the table below showing the GPE and KE possessed by the ball at the different positions. [2]

Position of ball	GPE / J	KE / J
C		
D		

- (d) Calculate the speed of the ball at position **C**.

speed = _____ m/s [2]

- (e) What happens to the value of the kinetic energy of the ball when the speed of the ball is doubled? Show your working clearly.

[2]

- 11** Singapore experiences many thunderstorms every year. Tall buildings and trees have a higher likelihood of being hit by lightning in these storms. Fig. 11.1 shows a thunder cloud with a flat, positively charged base. It passes over a cluster of trees growing on a flat, open land.

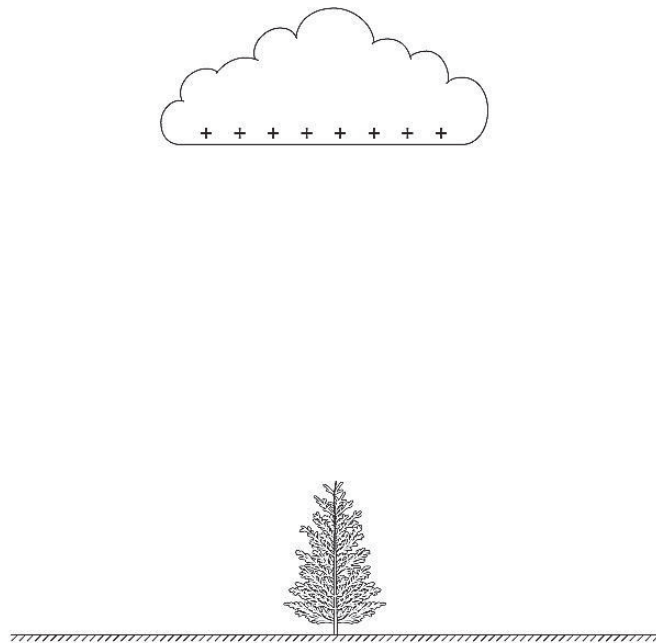


Fig. 11.1

- (a) (i)** On Fig. 11.1, mark the charges on the tree. [1]

- (ii)** Explain how the tree may be struck with lightning.

[2]

- (iii)** In the lightning strike, a charge of 620 C passes from the cloud to the tree. Given that the strike took place in 2.5×10^{-4} s, calculate the average current in the lightning strike.

average current = _____ A [2]

- (b) Jing Hui set up the apparatus as in Fig. 11.2 in a lab. Two flat metal plates are positioned horizontally with one above the other. She connected the positive terminal of a high voltage power supply to the bottom plate and the negative terminal to the top plate.

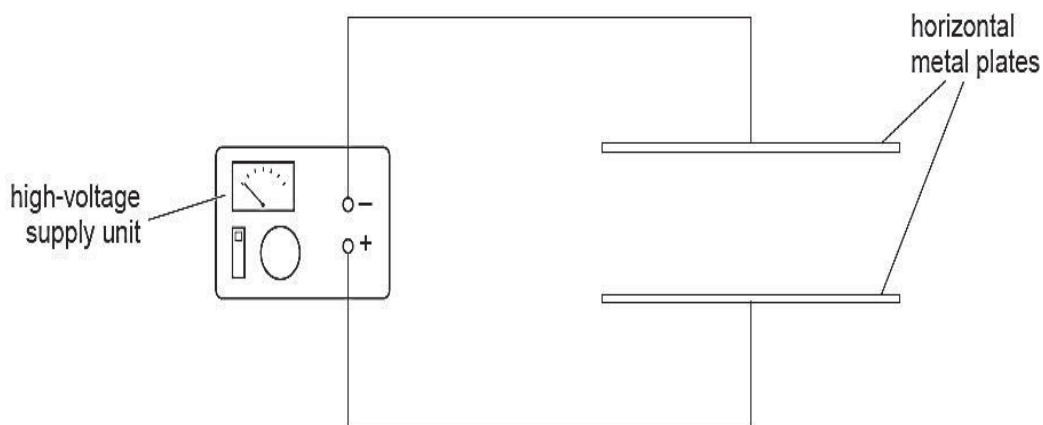


Fig. 11.2

- (i) On Fig. 11.2, draw the shape and direction of the electric field produced. [2]

- (ii) State what is meant by an *electric field*.

[1]

- (iii) Jing Hui observed that when a small, positively charged oil droplet was placed between the metal plates, it accelerated upwards. In terms of forces, explain how this motion occurs.

[2]

- 12** A metal filament lamp is connected to a power supply. The electromotive force (e.m.f.) produced by the supply can be varied. Fig. 12.1 is the circuit diagram.

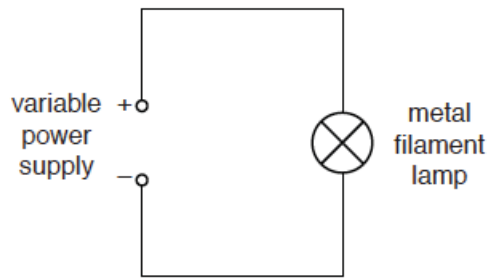


Fig. 12.1

- (a)** State what is meant by *electromotive force* (e.m.f.) of a source.

[1]

- (b)** In the box below, redraw and add appropriate circuit symbol to the circuit in Fig. 12.1 to have the following properties;

- a total of three lamps that can be independently switched on or off;
- a main switch to turn off all three lamps;
- the brightness of all three lamps can be adjusted.

[3]

- (c) A student adds meters to the circuit shown in Fig. 12.1 and makes different measurements of the current and voltage by varying the e.m.f of the power supply. He then plots the current/voltage graph shown in Fig. 12.2.

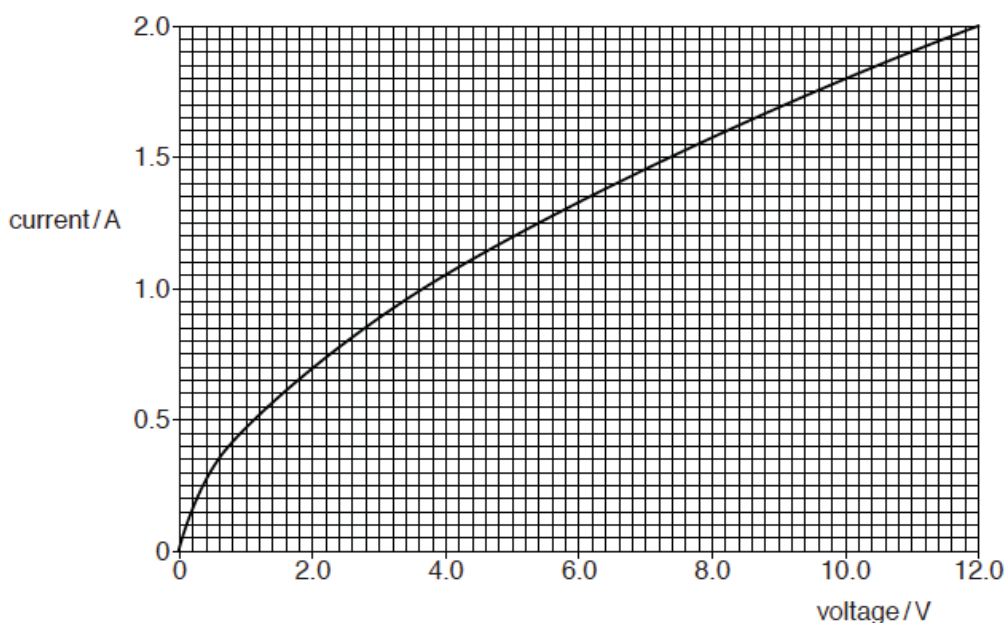


Fig. 12.2

- (i) Using values from Fig. 12.2, calculate the resistance of the lamp when the current is 0.70 A.

resistance = _____ Ω [2]

- (ii) Using the graph in Fig. 12.2, state and explain what happens to the resistance of the lamp as its voltage increases.

_____ [2]

- (iii) To ensure the lamp will not be blown due to large current, state the device that can be used for such purpose and explain how it works.

_____ [2]

The End

