XINMIN SECONDARY SCHOOL
新民中学
SEKOLAH MENENGAH XINMIN

Preliminary Examination 2022

CANDIDATE NAME					
CLASS				INDEX NUMBER	

SCIENCE (PHYSICS) 5105/01

Paper 1 Multiple Choice **01 August 2022**

Secondary 4 Normal (Academic) **Paper 1 and 2: 1 hour 15 minutes**

Setter: Ms Kris Chua
Vetter: Mr Zhuang Haoyang

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 Question Paper and 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**, **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.

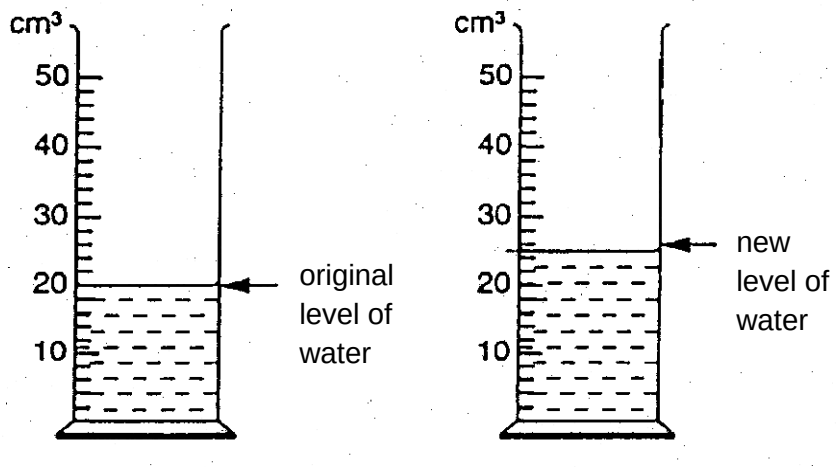
Answers to Paper 1 and Paper 2 must be handed in separately.
Each correct answer will score one mark. A mark will not be deducted for a wrong answer.
You are advised to spend no more than **30 minutes** on **Paper 1**.
You may proceed to answer Paper 2 as soon as you have completed Paper 1.
Any rough working should be done in this booklet.
The use of an approved scientific calculator is expected, where appropriate.

For Examiner's Use	
Total	20
Parent's Signature	

This document consists of **9** printed pages.

[Turn over

1 A student lets 100 drops of water fall into a measuring cylinder which already contains some water.



What is the average volume of one drop?

A 0.05 cm^3 **B** 0.25 cm^3 **C** 5.0 cm^3 **D** 25 cm^3

2 Acceleration is defined as the rate of change of

A speed **B** displacement **C** velocity **D** force

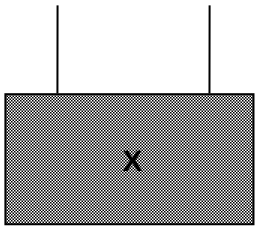
3 An apple of mass 0.15 kg is dropped from a height. It falls with a constant speed of 10 m/s when it is 2.0 m above the ground. What is the resultant force acting on the apple when it is 2.0 m above the ground?

A 0 N **B** 0.50 N **C** 5.0 N **D** 50 N

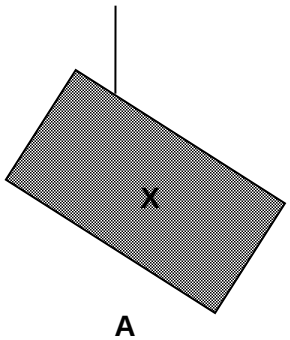
4 The density of iron is 7.9 g/cm^3. A hole of volume 1.0 cm^3 is drilled into an iron bar. Determine the density of the iron bar.

A 7.8 g/cm^3 **B** 7.9 g/cm^3 **C** 8.0 g/cm^3 **D** 8.1 g/cm^3

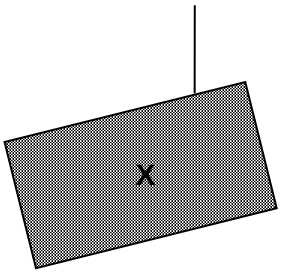
5 A picture frame, with centre of gravity at **X**, hangs from two strings as shown in the diagram below.



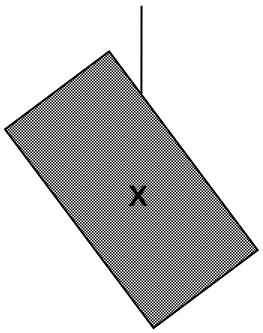
Which one of the following diagrams shows how the picture frame hangs when one of the strings breaks?



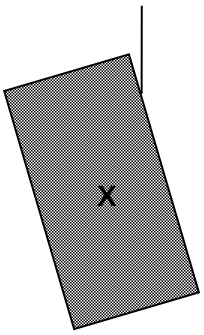
A



B

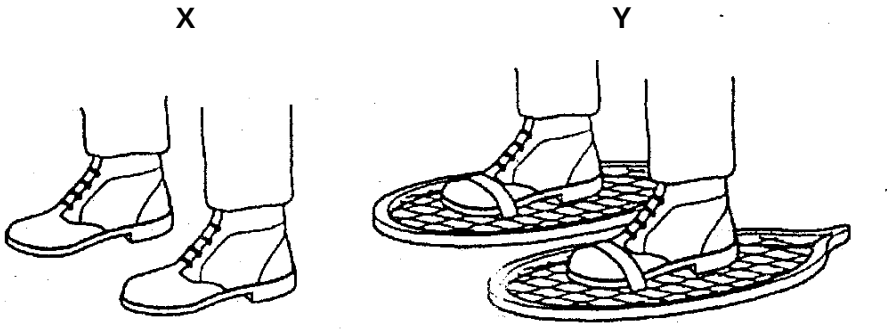


C



D

6 Two boys **X** and **Y** each have the same total weight and are standing on snow.



Which boy is more likely to sink into the snow and why?

	boy	pressure on snow
A	**X**	larger than **Y**
B	**X**	smaller than **Y**
C	**Y**	larger than **X**
D	**Y**	smaller than **X**

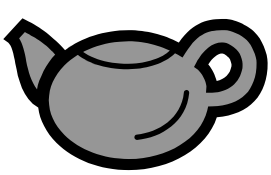
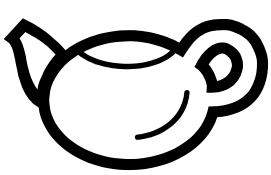
7 The power output of a lamp is 6 W.
How much energy does the lamp give out in 2 minutes?

A 3 J **B** 12 J **C** 120 J **D** 720 J

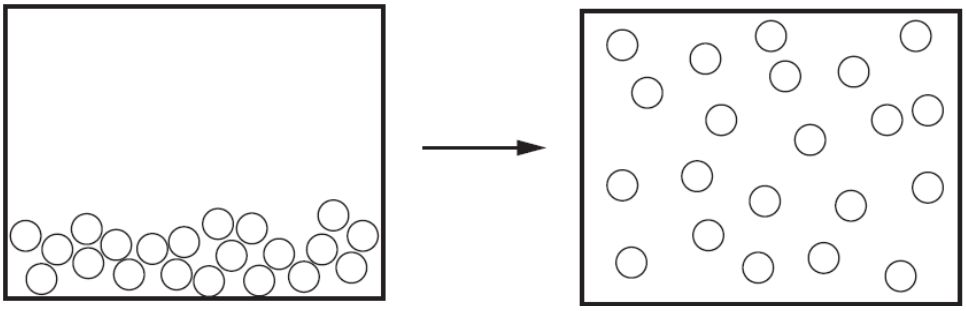
8 Which row describes the properties of liquids at constant temperature?

	forces between molecules	movement of molecules
A	strong	move throughout the liquid
B	strong	vibrate at fixed positions
C	weak	move throughout the liquid
D	weak	vibrate at fixed positions

9 The four teapots shown are similar and each contains an equal amount of hot tea initially at 90°C. Which teapot keeps the tea hot longest?

A	**B**	**C**	**D**
no lid	no lid	lid	lid
			
black teapot	white teapot	black teapot	white teapot

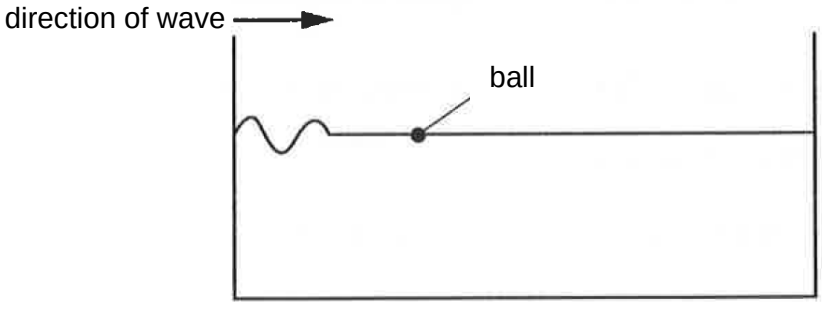
10 The diagram shows how the arrangement of the atoms in a substance changes during a change of state.



Which change of state is shown?

A gas to liquid **B** liquid to gas **C** liquid to solid **D** solid to liquid

11 The diagram shows a ball floating on a tank of water.



Which diagram shows the movement of the ball when the wave passes?

A **B** **C** **D**

12 What is meant by the term wavefront?

A the distance between successive peaks of a wave

B the distance between the trough and the peak of a wave

C a line joining points along the peak of a wave

D a line joining the trough and the peak of a wave

13 A student copies a diagram of the electromagnetic spectrum but makes a mistake.

radio waves	micro-waves	infra-red waves	visible light	X-rays	ultra-violet waves	gamma rays

long wavelength short wavelength

Which two terms should be interchanged so that the order is correct?

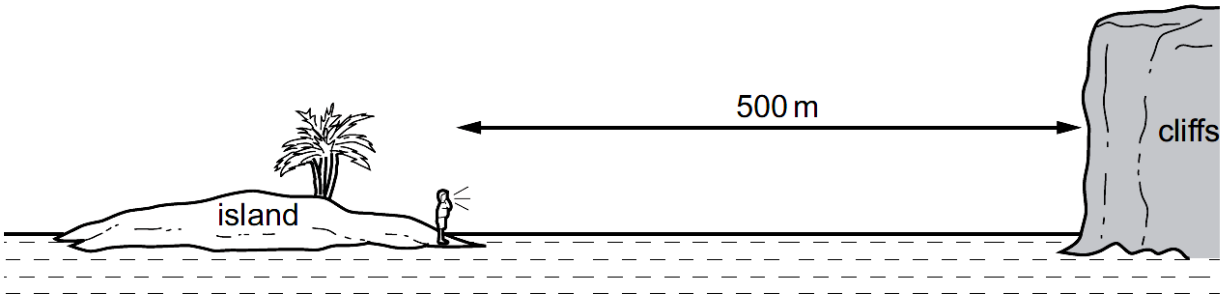
A infra-red waves and radios waves

B infra-red waves and ultra-violet waves

C radio waves and visible light

D ultra-violet waves and X-rays

14 A boy on an island is 500 m from some cliffs.

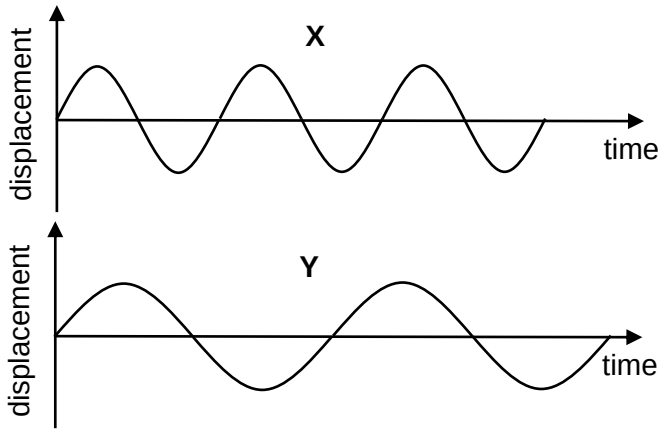


He shouts and he hears an echo from the cliffs.

Sound travels at 340 m/s through the air. What is the time interval between when the boy shouts and when he hears the echo?

A $\frac{500}{340}$ s **B** $\frac{2\times500}{340}$ s **C** $\frac{340}{2\times500}$ s **D** $\frac{2\times340}{500}$ s

15 The figure below shows the displacement-time graphs for two different sounds X and Y.



Which of the following statements about the two sounds is correct?

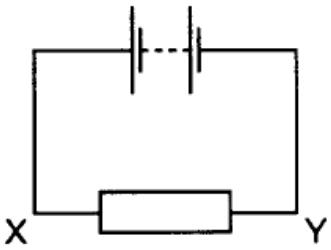
A Sound Y is louder than sound X.

B Sound X has the same pitch as sound Y.

C Sound Y has a lower pitch than sound X.

D Sound X has a lower pitch than sound Y.

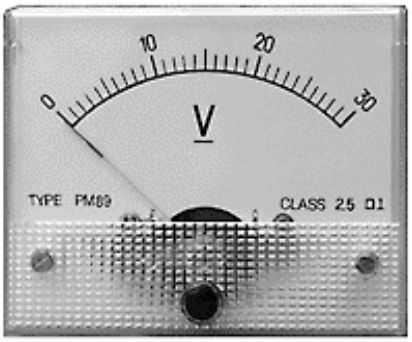
16 An electric circuit contains a resistor in series with a battery.



Which row shows the direction of the conventional current and the direction of the electron flow?

	conventional current	electron flow
A	X to Y	X to Y
B	X to Y	Y to X
C	Y to X	X to Y
D	Y to X	Y to X

17 A student uses a voltmeter to do some measurements in an electric circuit.



Which quantity does the voltmeter measure?

A potential difference

B current

C resistance

D temperature

18 The resistance of a wire is increased if

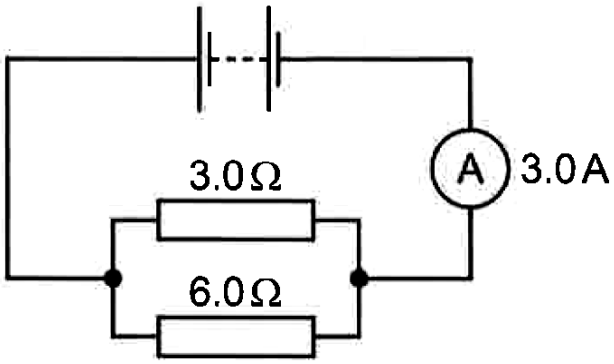
A its length is increased.

B its length is decreased.

C its cross-sectional area is increased.

D a large current passes through it.

19 A circuit consists of a battery, two resistors in parallel and an ammeter.



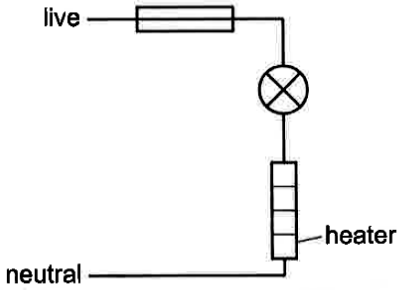
What is the electromotive force (e.m.f.) of the battery?

A 6.0 V **B** 9.0 V **C** 18.0 V **D** 27.0 V

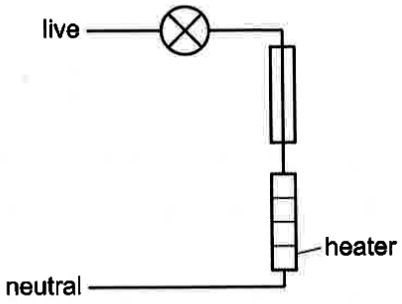
20 The diagrams show a fuse, a lamp and a heater.

In which diagram is the fuse placed correctly?

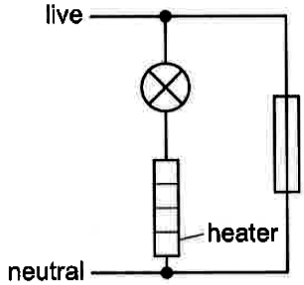
A



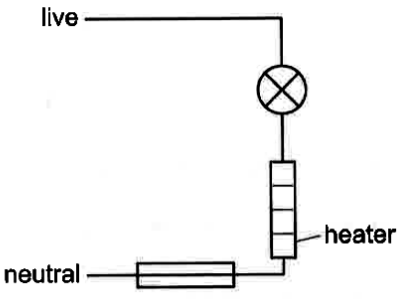
B



C



D



End of paper

XINMIN SECONDARY SCHOOL
新民中学
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Preliminary Examination 2022

CANDIDATE NAME					
CLASS				INDEX NUMBER	

SCIENCE (PHYSICS) 5105/02

Paper 2 **01 August 2022**

Secondary 4 Normal (Academic) **Paper 1 and 2: 1 hour 15 minutes**

Setter: Ms Kris Chua
Vetter: Mr Zhuang Haoyang

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 on both sides of the paper.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.

Answer **all** questions in Section A and any **two** questions in Section B.
The use of an approved scientific calculator is expected, where appropriate.
In calculations, you should show all the steps in your working, giving your answer at each stage.
You are advised to spend no longer than 30 minutes on Paper 1.
You may proceed to answer Paper 2 as soon as you have completed Paper 1.

At the end of the examination, hand in your answers to Paper 1 and Paper 2 separately.
The number of marks is given in brackets [ ] at the end of each question or part question.

For Examiner's Use	
Section A	/14
Section B	/16
Total	/30
Parent's Signature	

For Examiner's Use

Section A

Answer **all** questions in the spaces provided.

1 **(a)** State the unit used for the moment of a force.

…….. [1]

(b) A warehouse worker is about to close a large door, as shown in Fig. 1.1.

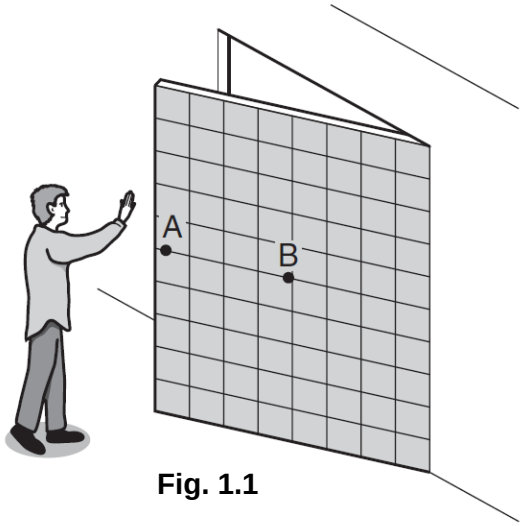


Fig. 1.1

State, with a reason, which of the two positions, A or B, will enable him to close the door with a lesser force.

……...

…….. [1]

2 Fig 2.1 shows a bottle of sauce which had been kept inside a refrigerator for some time. A student tried to open the cap of the bottle by unscrewing it but was unsuccessful.

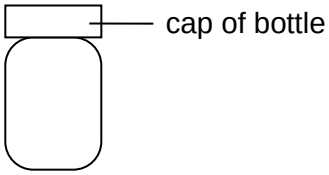


Fig 2.1

(a) The student then tried to tie a rubber band around the cap of the bottle to open it again. Suggest why tying a rubber band around the cap might help to open the cap of the bottle.

……...

…….. [1]

(b) Suggest another method to help the student open the bottle. Explain why your method works.

……...

…….. [2]

For Examiner's Use

3 Fig. 3.1 shows the distance-time graph of a car during a particular journey.

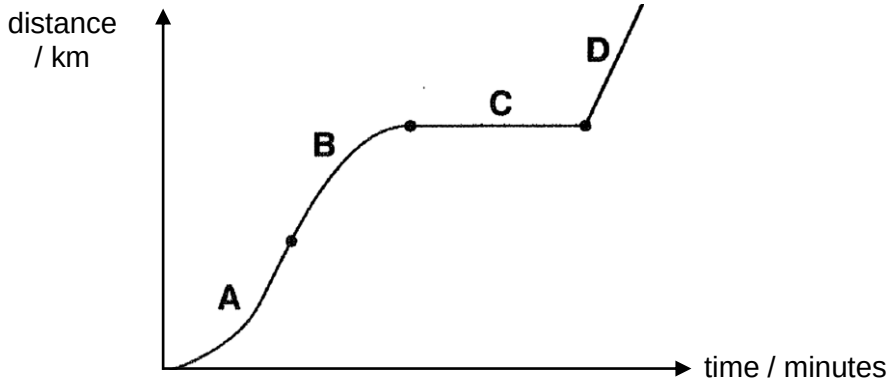


Fig 3.1

(a) Describe what happens to the speed of the car at

(i) section A.

……..……. [1]

(ii) section D.

……..……. [1]

(b) The distance the car travels for the whole journey is 60 km and the time taken is 40 min. Calculate the average speed of the car for the whole journey.

speed = …… m/s [2]

For Examiner's Use

4 Fig. 4.1 shows a heater used to heat a tank of cold water.

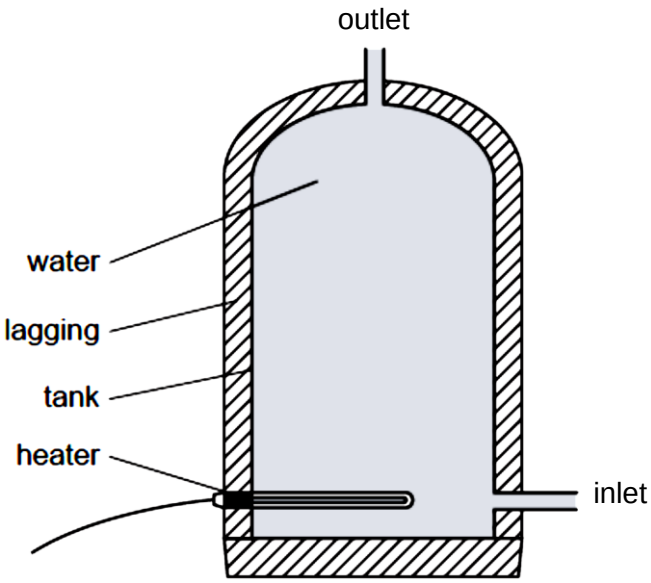


Fig 4.1

(a) Describe the process by which heat energy is transferred **throughout the water**.

……...

……...

……...

……... [2]

(b) Lagging is a material that contains air pockets. Explain why the tank has to be covered with lagging and how it works.

……...

……... [1]

(c) The sides of the lagging of the tank are often shiny. Explain how this helps to reduce heat loss from the tank.

……...

……... [1]

(d) Suggest an advantage of placing the heater in the centre of the tank instead of at the bottom.

……...

……... [1]

For Examiner's Use

Section B

Answer any **two** questions from this section in the spaces provided.

5 A sound wave in air is illustrated in Fig 5.1.

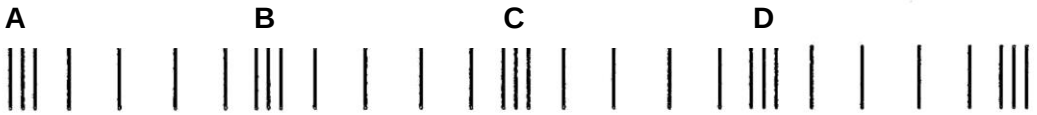


Fig 5.1 **not to scale**

(a) Points A, B, C and D are at the centre of regions of compression.
Describe how sound energy is transferred in air.

……...

……...

…… [2]

(b) The sound wave in Fig 5.1 has a frequency 1 kHz and a speed 320 m/s.

(i) Define the frequency of a wave.

…… [1]

(ii) Calculate the distance between points A and D.

distance = …… cm [3]

(iii) The time taken for one oscillation in **another** sound wave is 5.0 ms.
Calculate the frequency of this wave.

frequency = …… Hz [2]

For Examiner's Use

6 Fig. 6.1 shows a ball bearing rolling down a **hemispherical** track with centre C and radius 6 cm. The ball bearing with a mass of 8 g is initially at rest.

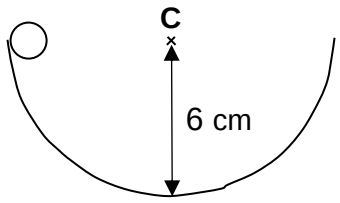


Fig 6.1

(a) State the *principle of conservation of energy.*

……...

……...

…… [2]

(b) Calculate the gravitational potential energy of the ball bearing when it is at the top of the track. Use g = 10 N/kg in your calculations.

gravitational potential energy = …… J [2]

(c) State the kinetic energy the ball bearing has at the bottom of the track.

kinetic energy = …… J [1]

(d) Calculate the maximum possible speed of the ball bearing at the lowest point of the track.

speed = …… m/s [2]

(e) Explain why the speed of the ball bearing is expected to be less than that calculated in **(d)**.

……... [1]

For Examiner's Use

7 A student sets up the apparatus below to measure the current through resistor X when different voltages are used. Fig. 7.1 shows the circuit diagram of the apparatus used.

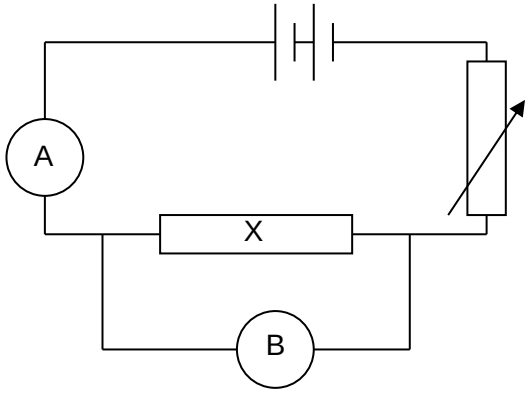


Fig 7.1

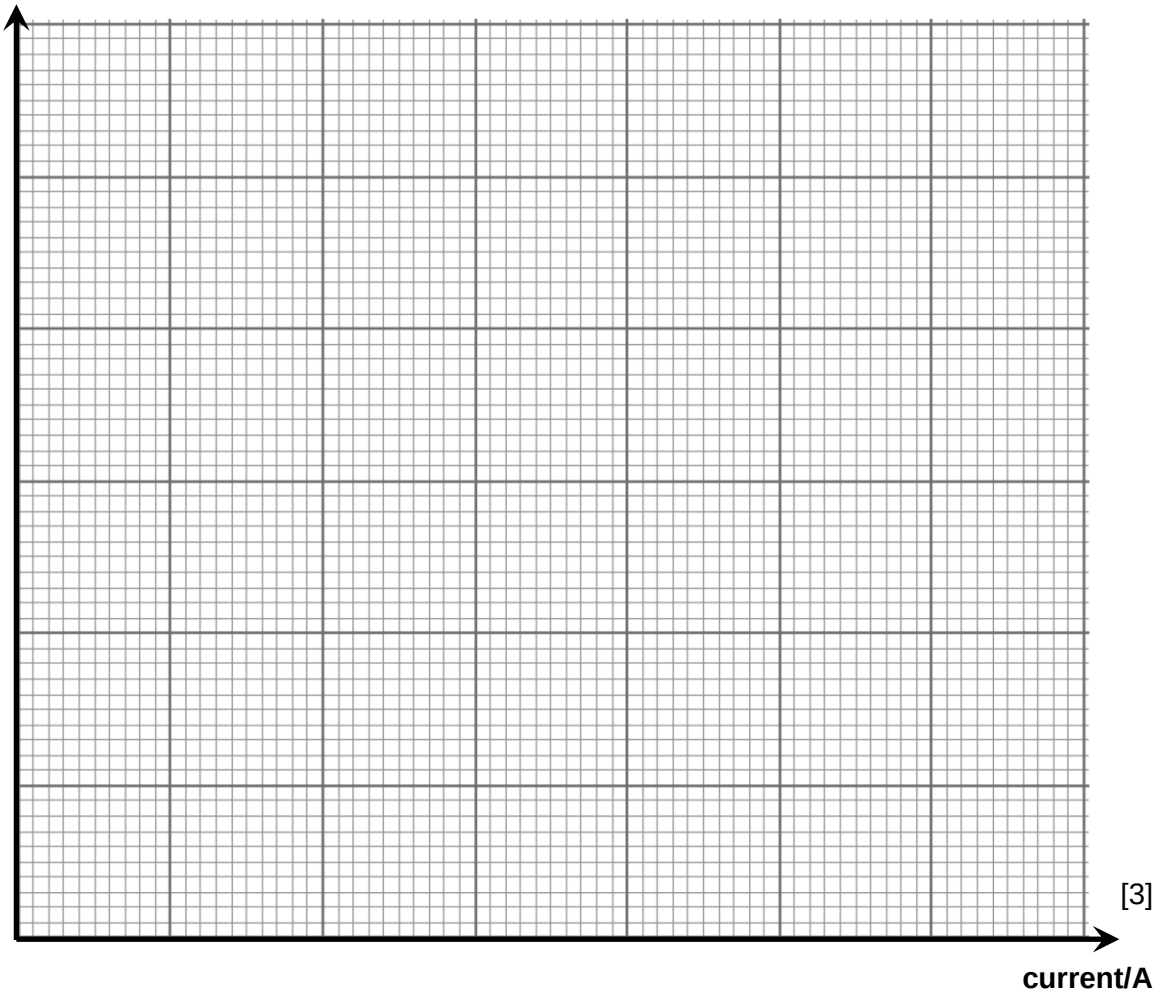
(a) State the name of meter A and meter B.

A : ……..... B: ……..... [2]

(b) The table shows the results.

current/A	0.10	0.20	0.30	0.40	0.50
voltage/V	0.12	0.24	0.36	0.48	0.60

On the graph given, plot the results. Join the points with a straight line.



[3]

(c) When resistor X is replaced with another resistor Y, a different set of results was obtained.

current/A	0.10	0.20	0.30	0.40	0.50
voltage/V	0.10	0.20	0.30	0.40	0.50

On the same graph given, plot the results. Join the points with a straight line. [1]

(d) State if resistor Y has a higher resistance, a lower resistance or the same resistance as resistor X. Explain your answer.

……

……

…… [2]

**********End of Paper**********