West Spring Secondary School
PRELIMINARY EXAMINATION 2018

SCIENCE (PHYSICS, CHEMISTRY) **5076/01**
Paper 1 Multiple Choice

SECONDARY 4/5 EXPRESS/ NORMAL ACADEMIC

Name _____ ( ) **Date** **17 September 2018**

Class _____ **Duration** **1 hour**

Additional Materials: Optical Mark Sheet

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.
Do not use staples, paper clips, glue or correction fluid.
Write your name, index number and class on the Multiple Choice Answer Sheet provided.
Write in dark blue or black pen.

There are **forty** 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 the Multiple Choice Answer Sheet provided.

Each correct answer will score one mark. A mark will not be deducted for a wrong answer.
A copy of the periodic table is provided.
The use of an appropriate scientific calculator is expected, where appropriate.

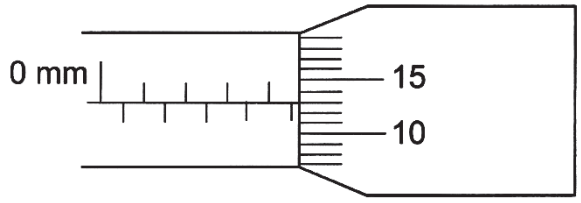
This document consists of **17** printed pages including this cover page.

Setter: Mr Mok KF and Ms Priscilla Yu **[Turn over]**

www.KiasuExamPaper.com

Downloaded from SingaKids.com

1 In the diagram below, a micrometer screw guage is used to measure the diameter of a ball bearing.



The actual diameter of the ball bearing is 4.65 mm.

What is the zero error of this micrometer?

A -0.52 mm

B -0.02 mm

C +0.02 mm

D +0.52 mm

2 The diameter of four spherical objects W, X, Y and Z are tabulated below.

Object	Diameter
W	17 μm
X	4.88×10^{3} km
Y	3.74 nm
Z	6.7×10^{-2} m

Which of the following correctly lists the objects in **ascending** order of diameter?

A X, W, Z, Y

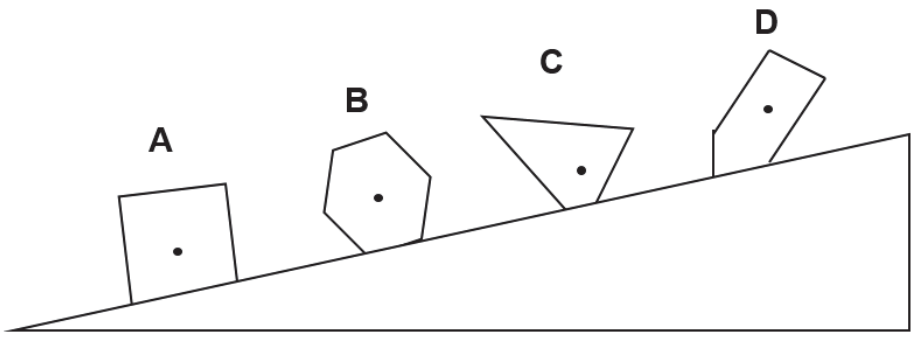
B Y, W, Z, X

C Y, Z, W, X

D Z, Y, X, W

3 The diagram below shows four objects placed on a slope. The dot in each object indicates its centre of gravity.

Which object is the most unstable?

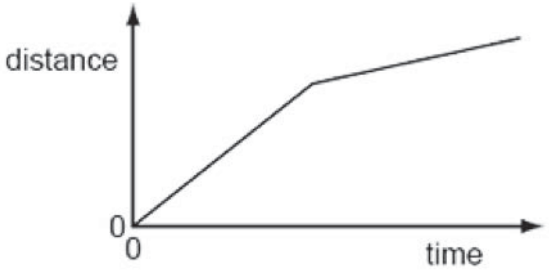


Downloaded from SingaKids.com

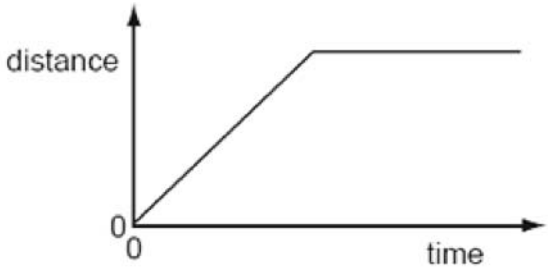
4 Elfie is jogging initially at constant speed around a track. He gets distracted by a friend at the grandstand and then jogs at a lower constant speed.

Which of the following shows the distance-time graph of Elfie's jog?

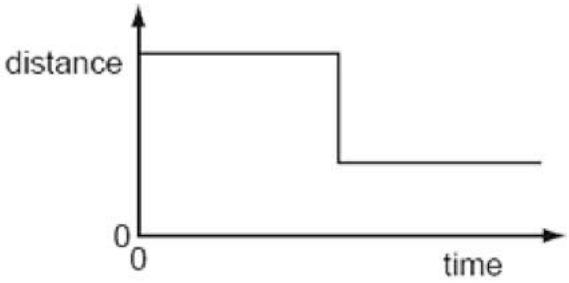
A



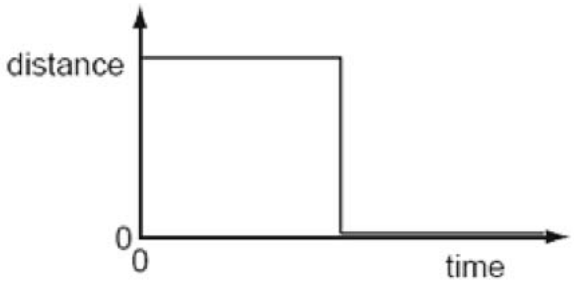
B



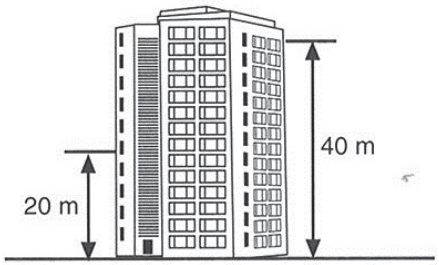
C



D



5 Two similar balls are dropped from a building at the same time. One falls from 40 m from the ground while the other from 20 m.



Assuming that air resistance is negligible, which physical quantity is the same for both balls just before they reach the ground?

A acceleration

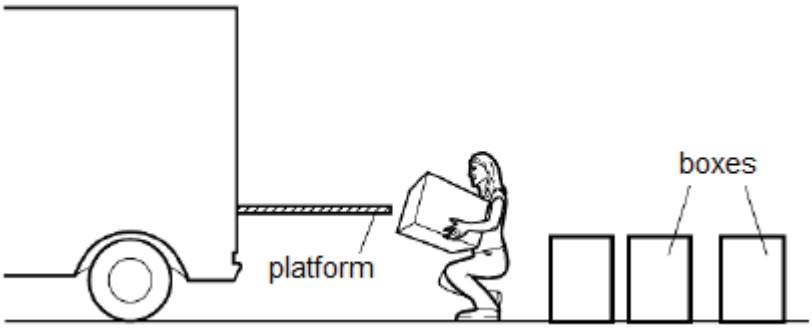
B final velocity

C displacement

D kinetic energy

Downloaded from SingaKids.com

6 A person lifts boxes of equal weight onto a platform.



Which quantity would **not** affect the total work done by the person?

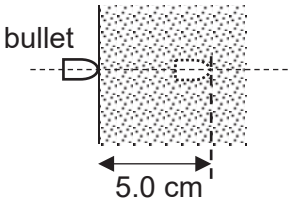
A the mass of the boxes

B the number of boxes lifted

C the time taken to lift the box

D the height of the platform above the ground

7 A bullet of mass 0.040 kg enters a wooden target horizontally. Its speed of entry is 300 m/s and it comes to rest 5.0 cm into the target, at the same height as the point of entry, as shown.



What is the frictional force exerted on the bullet by the wooden target? Assume the frictional force is constant.

A 120 N

B 360 N

C 1800 N

D 36000 N

8 The diagram shows a tractor on muddy ground.



Why does the tractor need to have big and wide tires?

A to travel a further distance

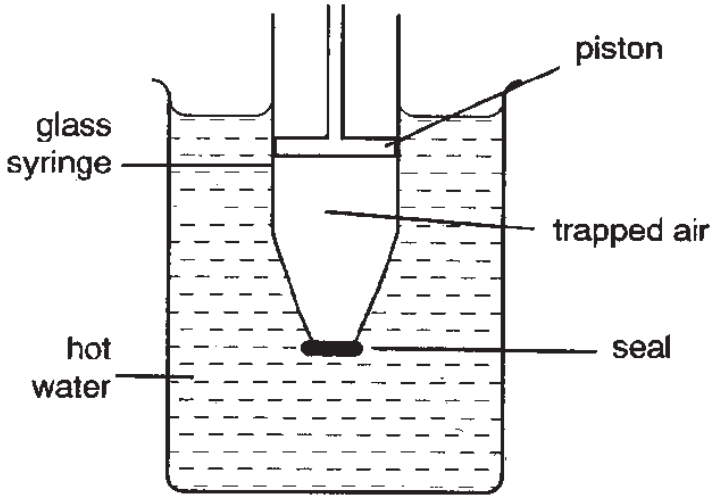
B to avoid skidding on the ground

C to support the weight of the tractor

D to reduce the pressure on the ground

Downloaded from SingaKids.com

9 The outlet of a glass syringe is sealed so that air is trapped below the piston as shown in the diagram below.



Which of the following explains why the piston begins to rise when the syringe is placed in hot water?

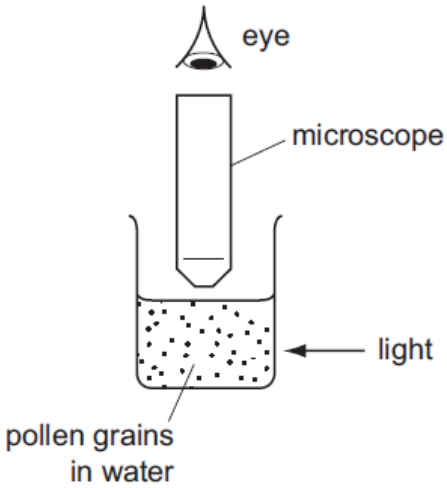
A Convection is occurring inside the syringe.

B The glass is expanding.

C The molecules of trapped air become bigger.

D The trapped air molecules are hitting the piston more often with greater force.

10 The diagram below shows very small pollen grains suspended in a beaker of water. A bright light shines from the side of the beaker. Small, bright dots of light are seen through a microscope. The dots move in rapidly changing and random directions.



Which of the following statements explains the observation?

A Convection current due to energy from the light source causing the pollen grains to collide with water molecules.

B Convection current due to energy from the light source causing the water molecules to collide with the pollen grains.

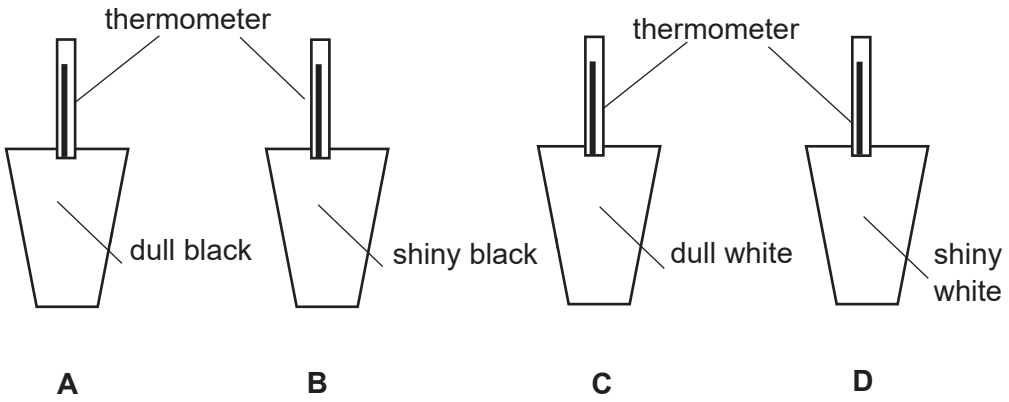
C Random collision between pollen grains.

D Random collision between water molecules and pollen grains.

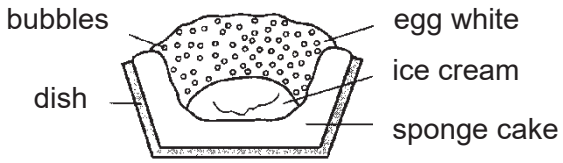
Downloaded from SingaKids.com

11 Hot water of the same temperature are poured simultaneously into four similar cups with different type of surfaces.

Which of the cups will register the fastest fall in temperature?



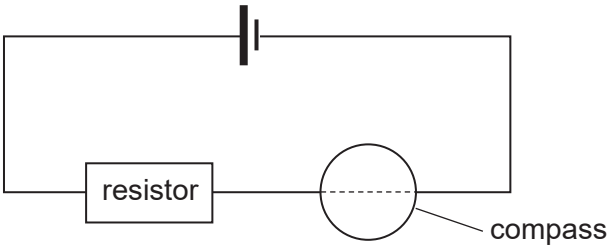
12 A cook makes the pudding 'baked Alaska'. The pudding is placed in a very hot oven until the top of the egg white turns brown. It is then removed from the oven.



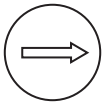
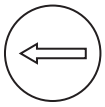
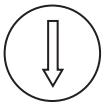
Why does the ice cream stay cold?

A Air is a good conductor of heat and conducts the heat away from the ice cream.
B Air is a poor conductor of heat and reduces the heat transfer to the ice cream.
C The metal dish is a good conductor of heat and conducts the heat away from the ice cream.
D The metal dish is a poor conductor of heat and reduces the heat transfer to the ice cream.

13 The diagram below shows a plotting compass placed **above** a current carrying wire.

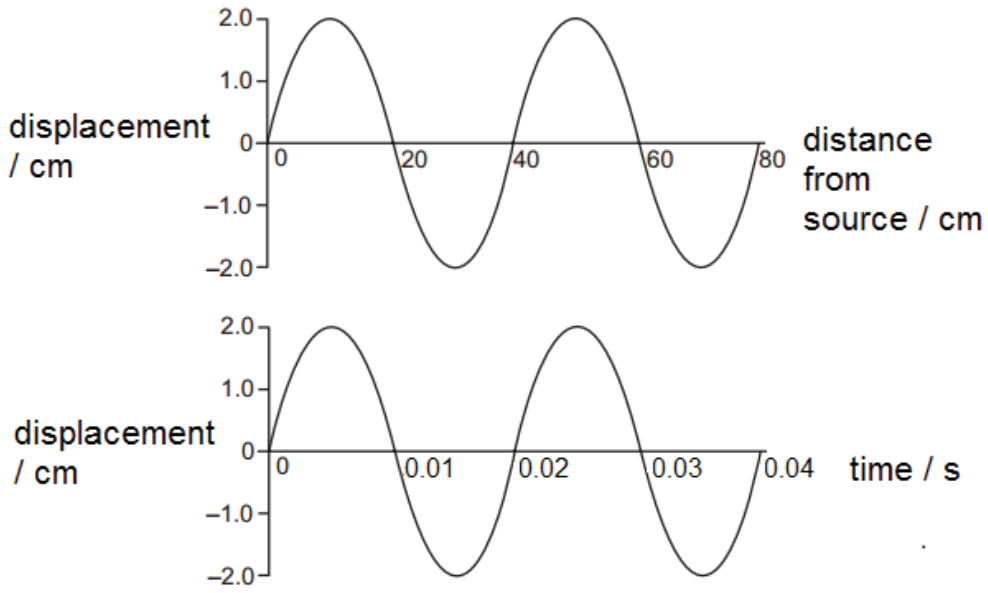


Ignoring effects of the Earth's magnetic field, which of the following shows the direction which the compass needle will point towards?

A 
B 
C 
D 

Downloaded from SingaKids.com

14 The displacement-distance and displacement-time graphs are shown below for a water wave in an ocean.



What is the frequency of the water wave?

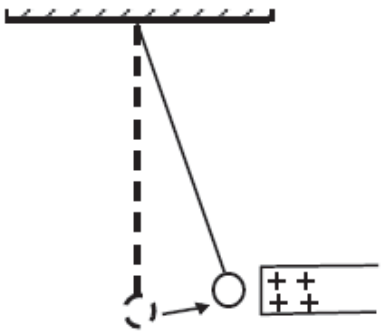
A 0.025 Hz

B 0.05 Hz

C 50 Hz

D 100 Hz

15 A small conducting sphere is suspended by an insulated thread. When a positively charged rod is brought near the sphere, the sphere is attracted as shown in the diagram below.



Which of the following is/are reasonable deduction(s)?

I The sphere may carry a positive charge.
II The sphere may carry a negative charge.
III The sphere may be neutral.

A I and II only

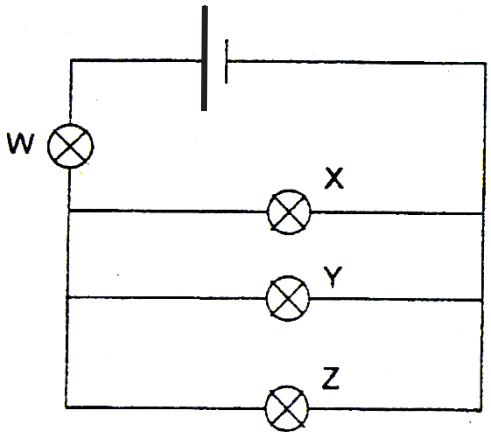
B I and III only

C II and III only

D III only

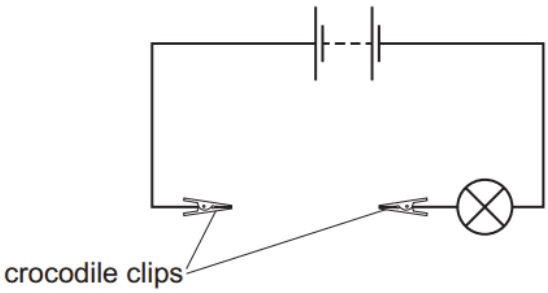
Downloaded from SingaKids.com

16 The diagram shows four similar light bulbs connected to a battery. Each bulb operates at normal brightness. If bulb X breaks, what happens to the brightness of the remaining bulbs?

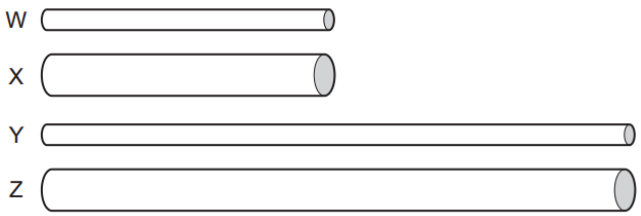


	Bulb W	Bulb Y	Bulb Z
A	decreases	decreases	decreases
B	decreases	increases	increases
C	increase	unchanged	unchanged
D	increase	increases	increases

17 A battery is connected to two crocodile clips and a lamp. There is a gap between the crocodile clips.



Four wires W, X, Y and Z, made of the same material but have different lengths and thicknesses, are connected in turn between the crocodile clips.

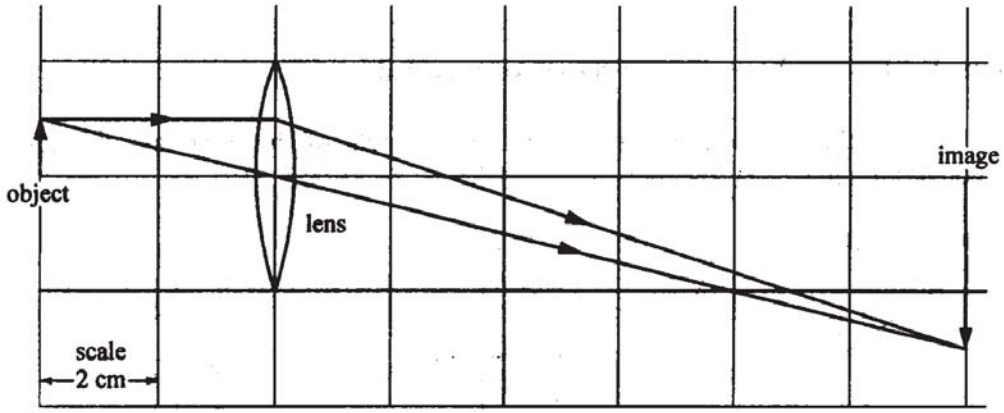


Which wire will make the lamp glow the most brightly and which wire will make the lamp glow the least brightly?

	most brightly	least brightly
A	X	Y
B	Y	Z
C	W	Y
D	W	Z

Downloaded from SingaKids.com

18 The ray diagram below shows the formation of a real image by a converging lens.



What is the focal length of the lens?

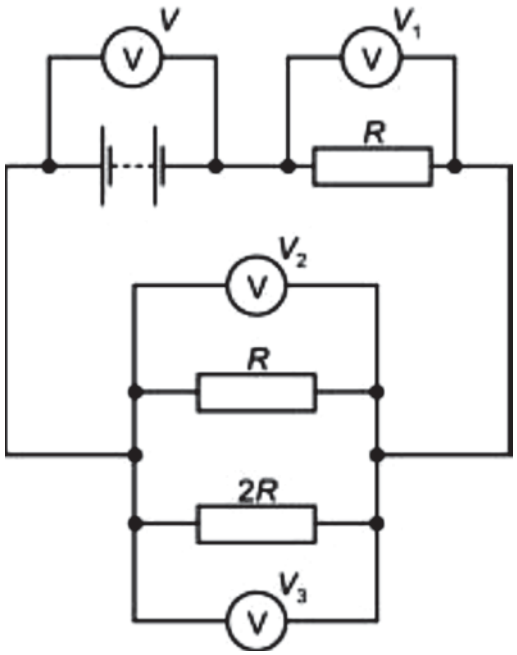
A 1.5 cm

B 3 cm

C 4 cm

D 12 cm

19 The diagram below shows a circuit with four voltmeter readings V_1, V_2, V_3 *and* V.



Which equation relating the voltmeter readings must be true?

A $V = V_1 + V_2 + V_3$

B $V + V_1 = V_2 + V_3$

C $V = V_1 + V_3$

D $V_2 = 2V_3$

Downloaded from SingaKids.com

20 An electric cooker is connected to the power supply by a 3 core cable. When the cooker is working correctly, which wires, if any, carry the same current?

A the live and the earth wires

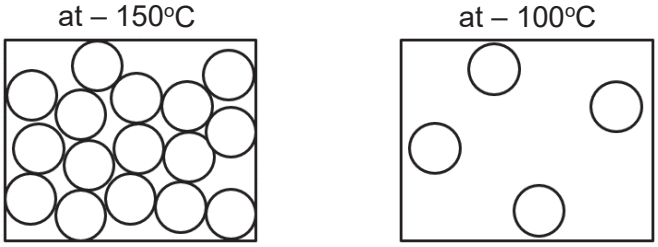
B the live and the neutral wires

C the live, the neutral and the earth wires

D none of the three wires carry the same current

Downloaded from SingaKids.com

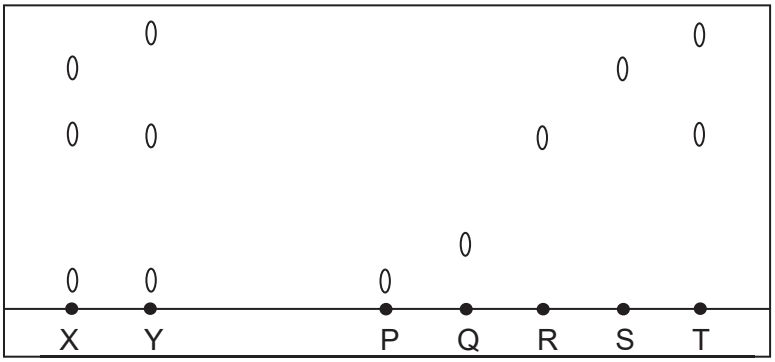
21 The diagrams show the arrangement of molecules in a substance at a pressure of 1 atm and at two different temperatures.



Which substance could the diagrams represent?

substance	melting point/ °C	boiling point/ °C
A	–183	–89
B	–169	–112
C	–155	–93
D	–114	–85

22 The following diagram shows the result of a chromatogram obtained from two mixtures, X and Y.



Which substance(s) is/are present in mixture X but not mixture Y?

A Q and S only

B R and T only

C S only

D T only

23 A pale green solution of compound E reacts with aqueous sodium hydroxide to form a blue precipitate. When acidified silver nitrate is added to the solution of compound E, a white precipitate is observed. What is E?

A copper(II) chloride

B copper(II) sulfate

C iron(II) chloride

D iron(II) sulfate

Downloaded from SingaKids.com

24 An element, F, has p protons and n neutrons in its nucleus.

Which row gives a possible correct number of protons, neutrons and electrons in a positive ion of an isotope of F?

	protons	neutrons	electrons
A	p	n + 1	p + 1
B	p	n + 1	p – 1
C	p + 1	n	p + 1
D	p + 1	n	p – 1

25 How many electrons are shared in a molecule of methane?

A 2 **B** 4 **C** 6 **D** 8

26 The table shows some properties of sodium chloride and ethane. Which properties are in the wrong column?

	sodium chloride	ethane
A	ionically bonded	covalently bonded
B	solid at room temperature	gas at room temperature
C	soluble in water	soluble in water
D	has strong forces between its ions	has weak forces between its molecules

27 Element L is in Group I, while element M has an electronic configuration of 2,6. The two elements react to form a chemical compound.

What is the correct chemical equation for the reaction between element L and element M?

A $L + 2M \rightarrow LM_2$

B $2L + M \rightarrow L_2M$

C $2L + M_2 \rightarrow 2LM$

D $4L + M_2 \rightarrow 2\ L_2M$

28 4.0 g of calcium are completely burnt in oxygen.

$$2Ca + O_2 \rightarrow 2CaO$$

Which volume of oxygen is used in this reaction at room temperature and pressure?

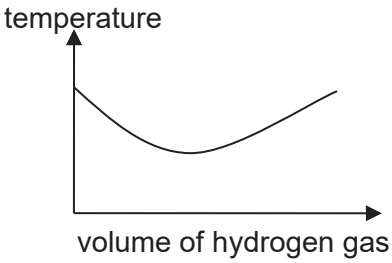
A 0.05 dm^3 **B** 0.10 dm^3 **C** 1.20 dm^3 **D** 2.40 dm^3

Downloaded from SingaKids.com

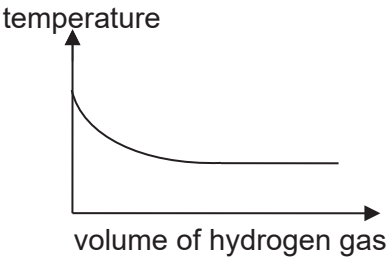
29 The formation of hydrogen chloride gas from hydrogen and chlorine gas is exothermic.

Which graph shows the change in temperature when hydrogen gas is reacted with excess chlorine gas?

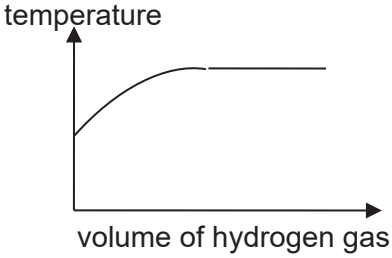
A



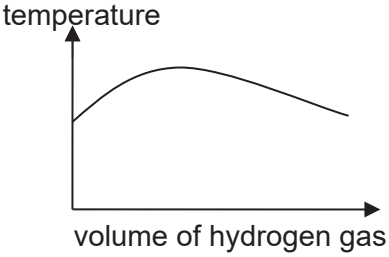
B



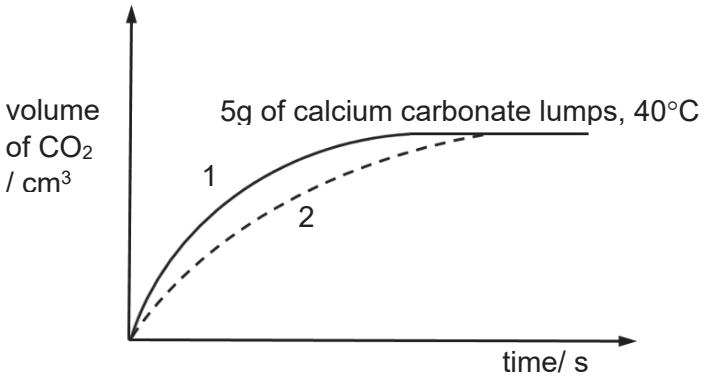
C



D



30 Curve 1 shows the volume of carbon dioxide given off when 5 g of calcium carbonate lumps react completely with an excess of hydrochloric acid at 40°C.



What change could result in curve 2?

A Using a lower temperature.

B Using a more concentrated solution of the acid.

C Using 3 g of calcium carbonate lumps.

D Using 5 g of calcium carbonate powder.

Downloaded from SingaKids.com

31 Part of some chemical reactions are shown.

In which reaction is the underlined substance oxidised?

A $\underline{Br_2}$ (l) + $2e^-$ → $2Br^-$ (aq)

B $\underline{Cu^{2+}}$ (s) + $2e^-$ → Cu (s)

C $\underline{Fe^{3+}}$ (aq) + e^- → Fe^{2+} (aq)

D $\underline{Mg}$ (s) → Mg^{2+} (aq) + $2e^-$

32 The table gives information about three indicators.

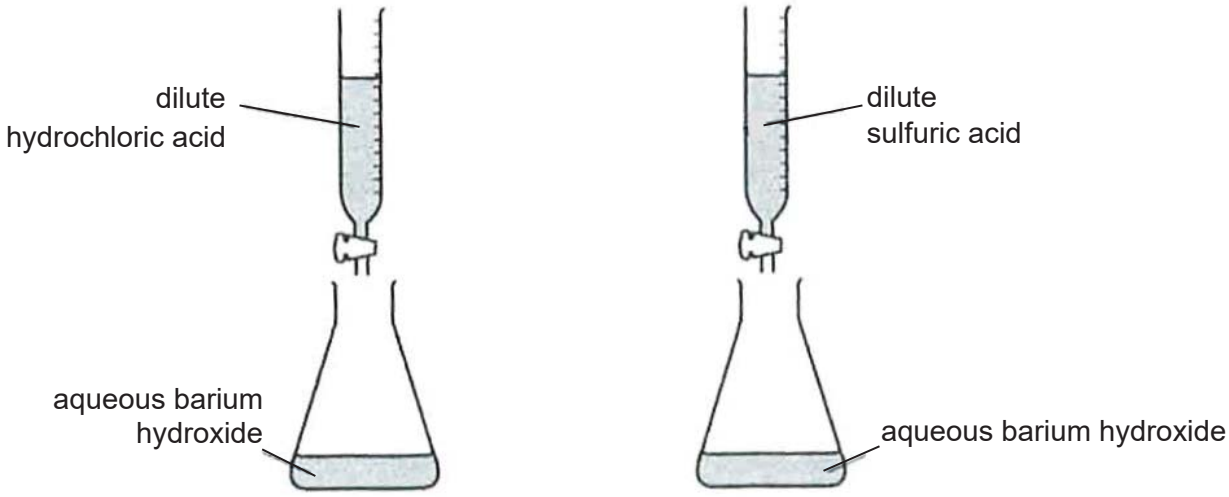
indicator	colour at pH 1	pH at which colour changes	colour at pH 12
thymol blue	red	3	yellow
congo red	blue	5	red
phenolphthalein	colourless	10	red

Which colour would be obtained when each indicator is added separately to pure water?

	thymol	congo red	phenolphthalein
A	red	blue	colourless
B	red	blue	red
C	yellow	blue	red
D	yellow	red	colourless

Downloaded from SingaKids.com

33 The diagrams show two experiments, one to make barium chloride and the other to make barium sulfate.



In each experiment, the acid is run into the conical flask until the pH is 7.

Which are the next steps needed to obtain solid samples of each salt?

	barium chloride	barium sulfate
A	crystallisation	crystallisation
B	crystallisation	filtration
C	filtration	crystallisation
D	filtration	filtration

34 Which statement about Groups in the Periodic Table is correct?

A All elements in the Periodic Table are not coloured.

B All Groups contain both metallic and non-metallic atoms.

C Elements become more metallic across the Periodic Table from left to right.

D Atoms of elements in the same Group have the same number of valence electrons.

35 Lithium, sodium, potassium and rubidium are elements in Group I in the Periodic Table.

Which of the following shows the correct trends down the Group for the melting point and density for the four elements?

	melting point	density
A	decreases	increases
B	decreases	decreases
C	increases	increases
D	increases	decreases

Downloaded from SingaKids.com

36 Metals P and Q display the chemical behaviours as shown below when added to the various solutions.

aqueous solution	metal P added	metal Q added
magnesium nitrate	no reaction	no reaction
zinc nitrate	zinc displaced	no reaction
iron(ii) nitrate	iron displaced	no reaction
copper(ii) nitrate	copper displaced	copper displaced

Which of the following is the correct arrangement of metals in order of decreasing reactivity?

A magnesium, P, zinc, iron, Q, copper

B magnesium, zinc, iron, P, Q, copper

C P, magnesium, zinc, iron, Q, copper

D magnesium, P, zinc, iron, copper, Q

37 Many countries have taken measures to ensure that the amount of sulfur in unleaded petrol and diesel fuels are kept low. Which of the following could be the reason for such measures?

A To cut down the amount of fuel used in vehicles.

B To reduce the acidity of the rain.

C To reduce the greenhouse effect.

D To protect the ozone layer.

38 Bitumen is made from crude oil. It is used _____.

A as an aircraft fuel

B for making polishes

C for making roads

D in oil stoves

39 The table shows the observations made when an organic compound R undergoes certain processes.

process	observation
combustion	white precipitate produced in limewater
bromination	reddish-brown solution decolourises
hydrogenation	margarine is produced

Which homologous series does compound R belong to?

A alcohols

B alkanes

C alkenes

D carboxylic acids

Downloaded from SingaKids.com

40 Alcohols S and T have the molecular formulae C_xH_7OH and $C_yH_{11}OH$ respectively. What are the relative molecular masses of S and T?

	relative molecular mass of S	relative molecular mass of T
A	59	88
B	60	88
C	60	90
D	62	90

END OF PAPER

Downloaded from SingaKids.com

West Spring Secondary School

PRELIMINARY EXAMINATION 2018

SCIENCE **5076 /02**
Physics

SECONDARY 4 Express/ 5 Normal (Academic)

Name _____ ( ) **Date** 11 Sep 2018

Class _____ **Duration** 1 h 15 min

Additional Materials: NIL

READ THESE INSTRUCTIONS FIRST

Section A (45 Marks)
Answer **all** questions.
Write your answers in the spaces provided on the question paper.
Show **all** relevant working.

Section B (20 Marks)
Answer **TWO out of THREE** questions.
Write your answers in the spaces provided on the question paper.
Show **all** relevant working.

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

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.

FOR EXAMINER'S USE	
Section A	/45
Section B	/20
Total	/65

This document consists of **18** printed pages including the cover page.

Setter(s) **Mr Mok Kai Fore** **[Turn over**

www.KiasuExamPaper.com

Downloaded from SingaKids.com

Section A

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

1 Fig. 1.1 shows the total forces acting forward and backward on a car at different times **X** and **Y** during a journey. In each case, the car is moving forward.

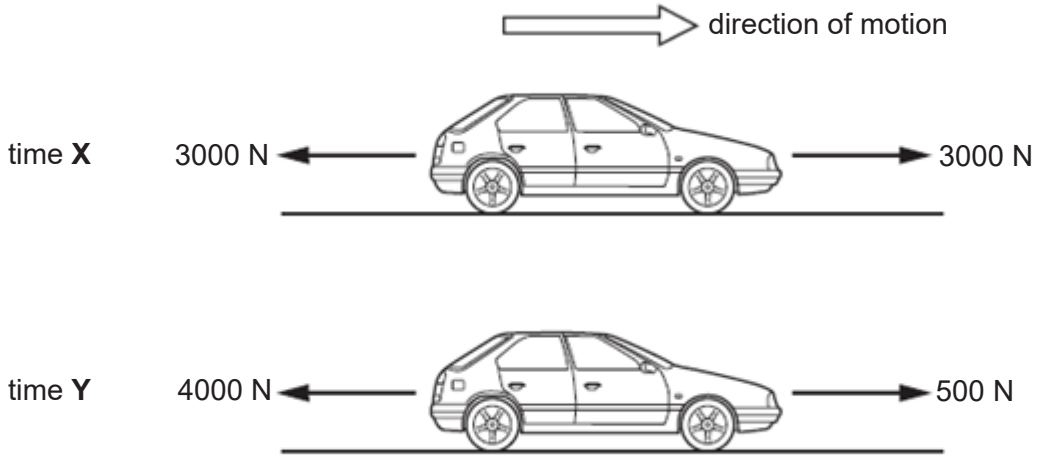


Fig. 1.1

(a) State the name of **one** of the forces that is acting in the opposite direction to the motion of the car.

.....[1]

(b) State whether the speed of the car is changing at time **X**.

.....[1]

(c) State whether the speed of the car at time **Y** is increasing, decreasing or constant.

.....[1]

2 Fig. 2.1 shows a cylinder filled with air. It is fitted with a freely moving piston.

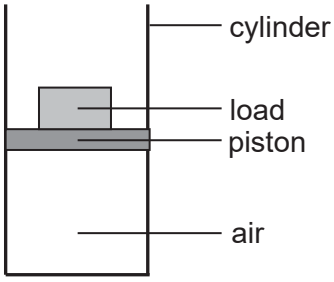


Fig. 2.1

The area of the piston is 0.10 m^2 and the area of the load is 0.05 m^2. Calculate the mass of the load needed to balance the piston when the pressure exerted by the air is 15 Pa.

mass = ...kg [2]

Downloaded from SingaKids.com

3 A student slowly heats a sample of solid wax in a test tube. Fig. 3.1 shows how the temperature of the wax varies with time *t*.

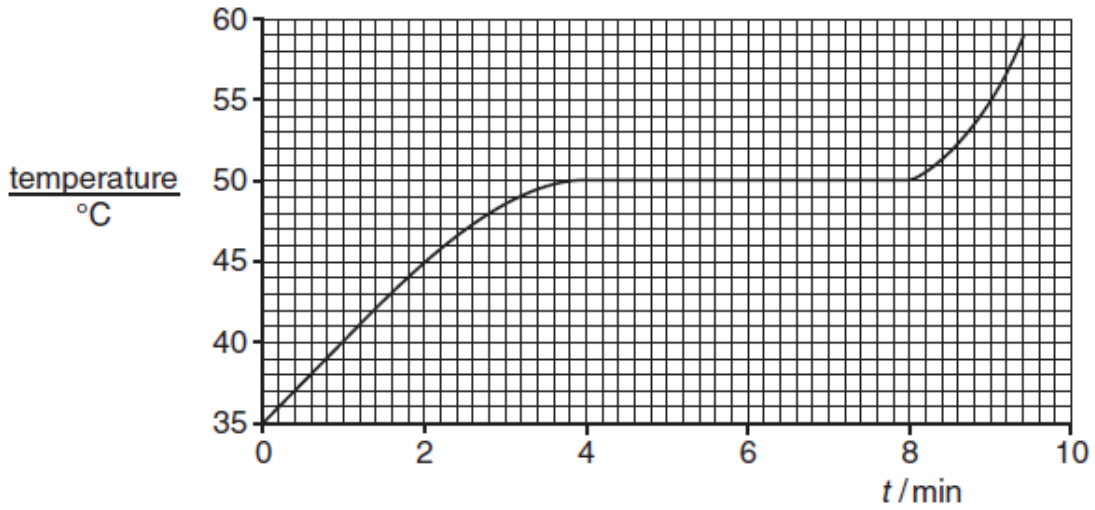


Fig. 3.1

(a) State the melting point of wax.

Melting point = ...…… ˚C [1]

(b) Thermal energy passes into the wax throughout the experiment.

(i) Describe what effect this energy has on the wax particles between *t* = 0 min and *t* = 4 min in terms of motion and spacing.

.....

.....

..... [2]

(ii) Describe what effect this energy has on the wax particles between t = 4 min and t = 8 min in terms of motion and arrangement.

.....

.....

..... [2]

(c) The wax expands as the temperature rises. It expands more between *t* = 8 min and 9 min than between *t* = 0 and 1 min. Explain why.

.....

.....

.....

.....[2]

Downloaded from SingaKids.com

4 Fig. 4.1 shows how the speed of two cars change as they move from rest along a straight road.

car **A**	
time / s	speed / (m/s)
0	0
5.0	20
10.0	40
15.0	60
20.0	60
25.0	60
30.0	60

car **B**	
time / s	speed / (m/s)
0	0
5.0	10
10.0	20
15.0	30
20.0	40
25.0	50
30.0	60

Fig. 4.1

(a) Plot and draw the speed-time graphs in Fig. 4.2 for both cars **A** and **B**. Label your graphs clearly. [2]

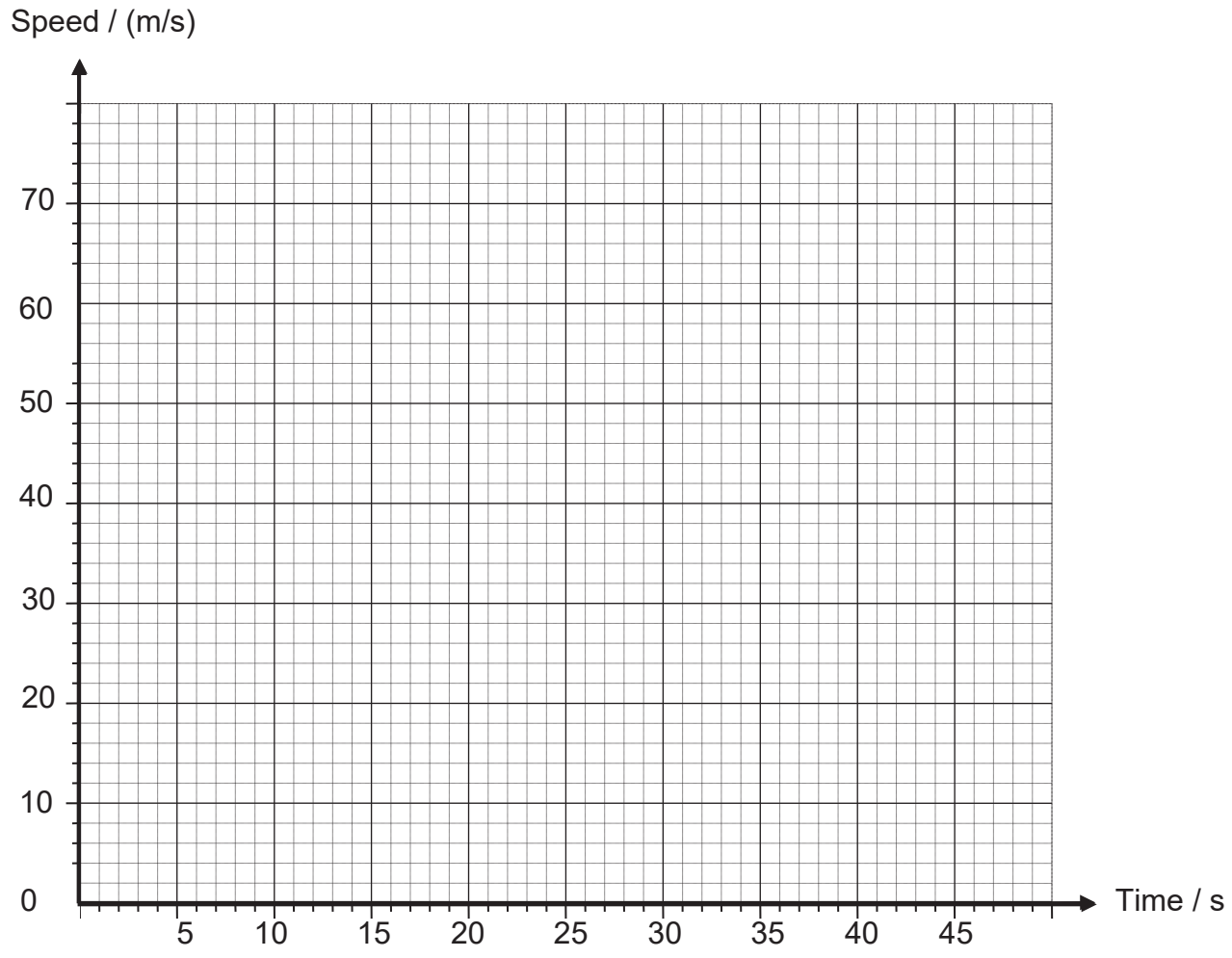


Fig. 4.2

Downloaded from SingaKids.com

(b) At the end of 30.0 s, calculate the distance between the two cars.

distance = ... m [2]

(c) If the mass of the car **B** is 500 kg, calculate the net force acting on it.

Net force = ... N [2]

5 A student wanted to find the density of an unknown liquid using a bottle and obtained the measurements as shown in Fig. 5.1.

Calculate the density of the unknown liquid, given that the density of coconut oil is 0.924 g/cm^3.

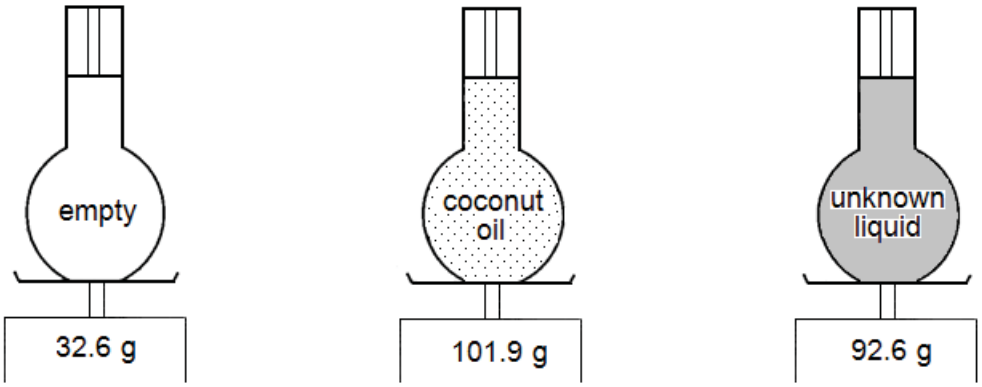


Fig. 5.1

density = ... g/cm^3 [3]

Downloaded from SingaKids.com

6 An iron block has mass of 10 kg on Earth.

The block is teleported to Krypton, a planet with a gravitational field strength **twice** that of Earth. Given that the gravitational field strength on Earth is 10 N/kg, state and/or calculate the mass and weight of the iron block on Krypton.

Mass of block = ... kg [1]

weight of block = ... N [1]

7 Bats use echolocation to determine their surroundings in the dark. They send out a pulse of ultrasound, which will be reflected when it hits an object. They listen for the echo of this pulse, and are able to deduce the distance of the object from where they are located.

Fig. 7.1 shows a bat in a cave. It lets out a pulse of ultrasound of 5 kHz towards the back of the cave.

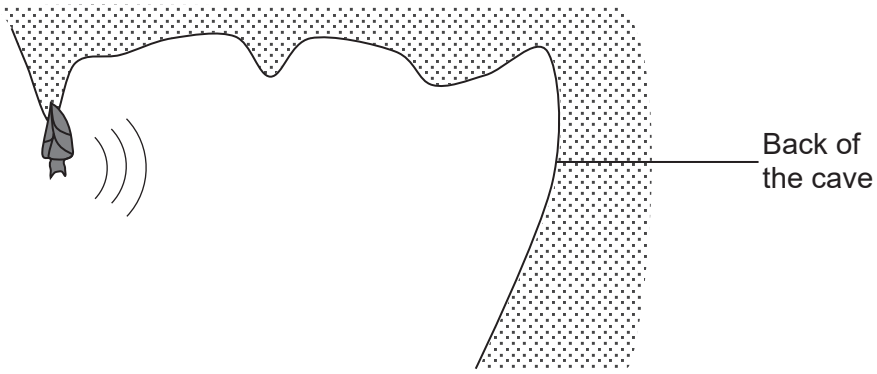


Fig. 7.1

(a) Calculate the wavelength of the ultrasound pulse if the ultrasound travels at 330 m/s.

wavelength = ... m [2]

(b) The pulse that the bat sends out is reflected back 12 s after the pulse was sent out. Calculate the distance from the bat to the back of the cave.

Downloaded from SingaKids.com

distance = ...…… m [2]

8 Fig. 8.1 shows the path of a light ray passing through a rectangular block.

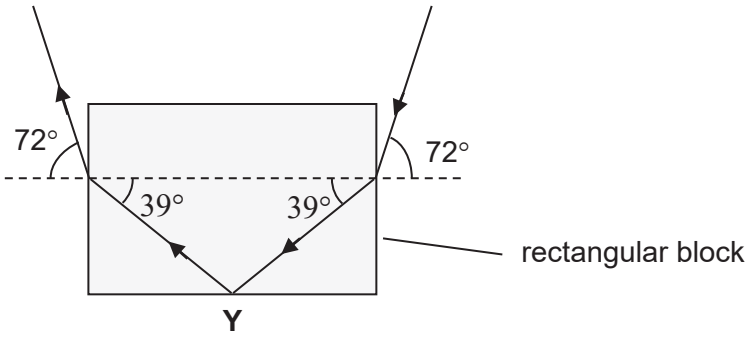


Fig. 8.1

(a) Calculate the refractive index of the rectangular block.

refractive index = ...…… [2]

(b) Calculate the critical angle of the rectangular block.

critical angle = ...…… ° [1]

(c) Explain why the light ray does not exit the rectangular block at **Y**.

...……...……...

...……..... [1]

Downloaded from SingaKids.com

9 **(a)** The list below shows three components of the electromagnetic spectrum.

infra-red **gamma rays** **visible light**

Arrange the components in order of **increasing** wavelength.

..... [1]

(b) Satellites are used in the transmission of some television signals.

Fig. 9.1 shows a satellite above the television station where a television signal is generated. The satellite is orbiting at a distance of 36 000 km from the television station.

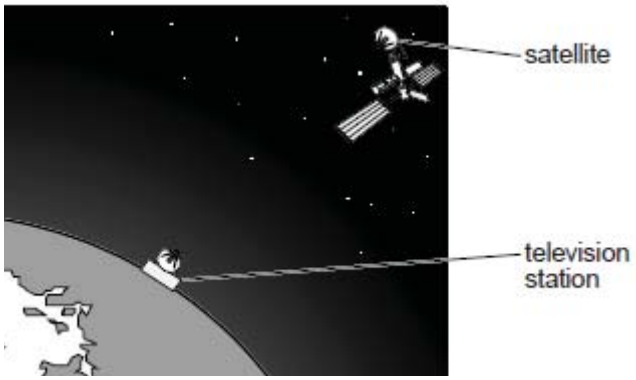


Fig. 9.1

(i) State which component of the electromagnetic spectrum is used to transmit the television signal to the satellite.

..... [1]

(ii) Given that the component in **b(i)** travels at a speed of 3.00×10^8 m/s, calculate the time the television station takes to send a signal to the satellite.

time = ... s [2]

Downloaded from SingaKids.com

10 Fig. 10.1 shows the circuit diagram of a metal filament lamp which is connected to a power supply. The electromotive force (e.m.f.) produced by the power supply can be varied.

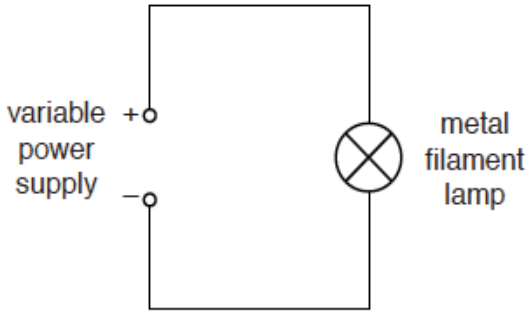


Fig. 10.1

(a) State what is meant by electromotive force (e.m.f.).

.....

..... [1]

(b) In the space below, **redraw and add** appropriate circuit symbols to the circuit diagram in Fig. 10.1 to show the positions of

(i) an ammeter that measures the current in the circuit, and [1]

(ii) a voltmeter that measures the voltage across the lamp. [1]

Downloaded from SingaKids.com

11 Fig. 11.1 shows a rigid wire being held between the poles of a U-shaped magnet. When the switch is closed, there is an upward force on the wire as indicated.

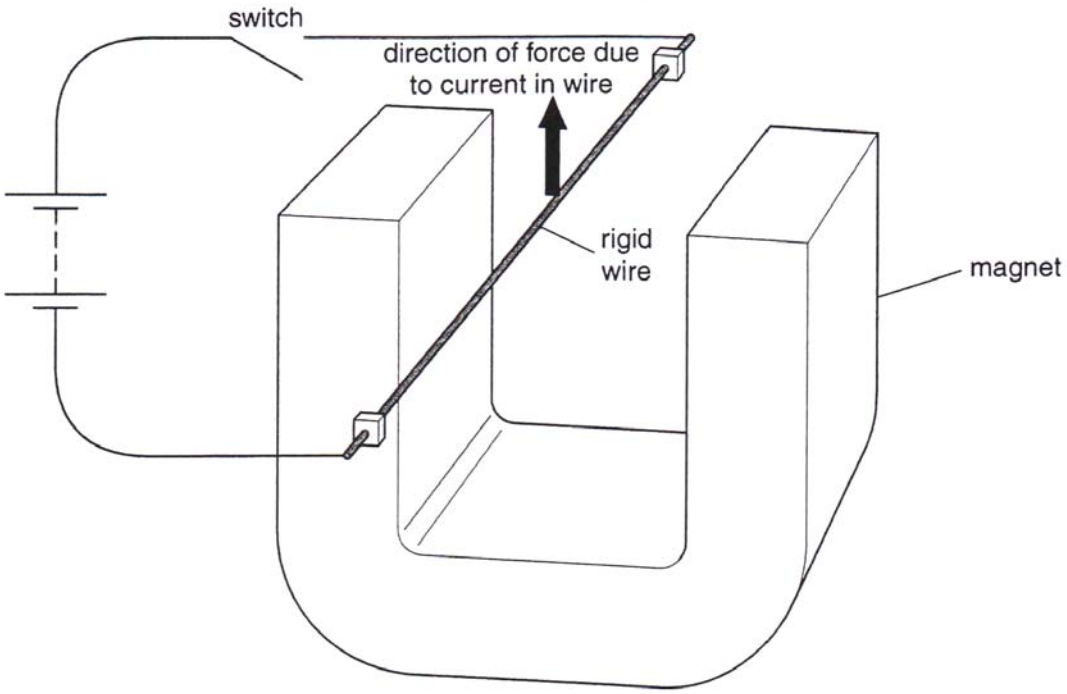


Fig. 11.1

(a) On Fig. 11.1, draw an arrow in the rigid wire to show the direction of conventional current. [1]

(b) On Fig. 11.1, label the north pole of the U-shaped magnet. [1]

(c) State **one** change that can be made to the set-up to cause a downward force on the wire.

.....

..... [1]

(d) Explain why the magnet is made of steel instead of iron if the above setup is to be used as part of a fan motor which can operate continuously.

.....

..... [1]

Downloaded from SingaKids.com

12 Fig. 12.1 shows a manual car park barrier.

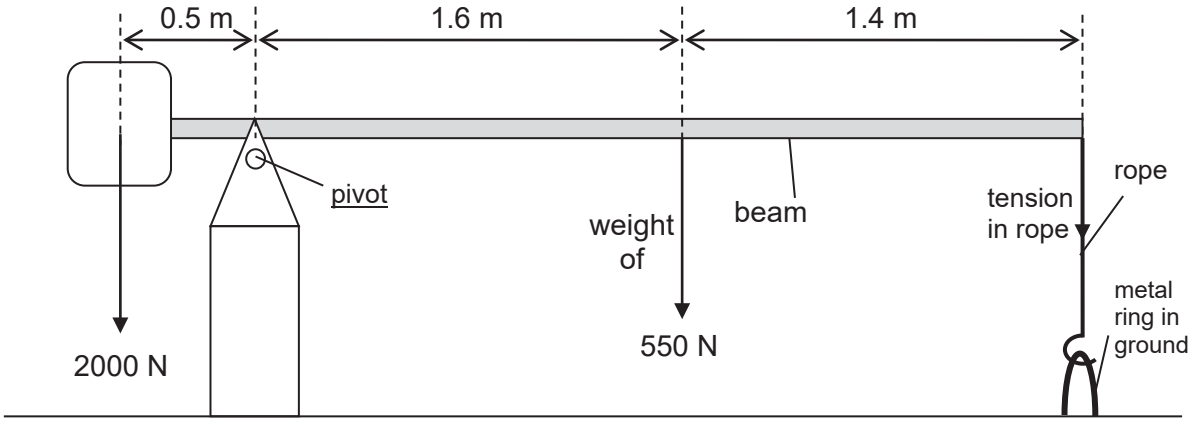


Fig. 12.1

The weight of the barrier beam is 550 N and acts at 1.6 m to the right of the pivot. Calculate the tension needed in the rope in order to keep the beam horizontal.

tension = ... N [3]

Downloaded from SingaKids.com

Section B

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

13 **(a)** Fig. 13.1 shows the structure of a 240 V electric hair dryer with a plastic case. It mainly consists of a fan and two heating coils of same power rating. The manufacturer claims that it is double insulated.

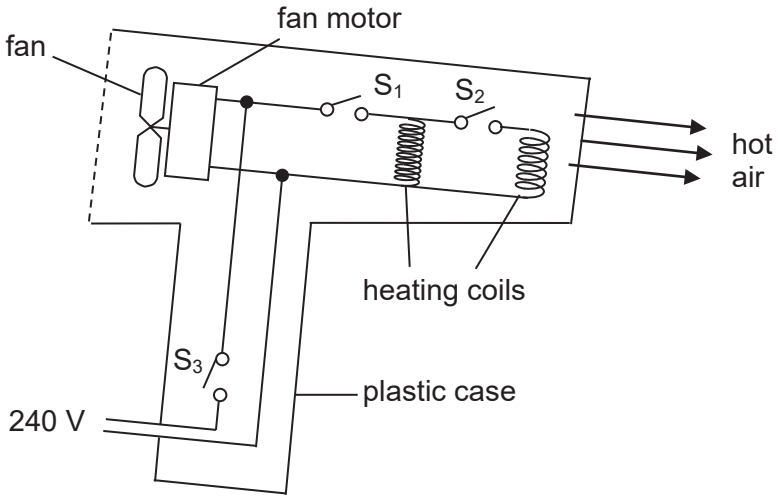


Fig. 13.1

The hair dryer has three settings that can be controlled by switches S_1, S_2 and S_3. Fig. 13.2 shows the total power consumed at each setting.

Setting	Function	Power / W
1	Cold (fan only)	140
2	Hot (half heating power)	640
3	Hot (full heating power)	1140

Fig. 13.2

(i) State the switch or switches that should be closed for the hair dryer to operate at the power of

140 W, ... [1]

640 W. ..... [1]

(ii) Suggest why the earth wire is not required for this hair dryer.

.....

.....

..... [1]

Downloaded from SingaKids.com

(iii) Calculate the current flowing in the hair dryer when it is operating at full heating power.

current = …… A [1]

(iv) Suggest a suitable fuse rating for the hair dryer.

fuse rating = ……... [1]

(b) Another hair dryer is designed with a different arrangement of the two heating coils as shown in Fig. 13.3.

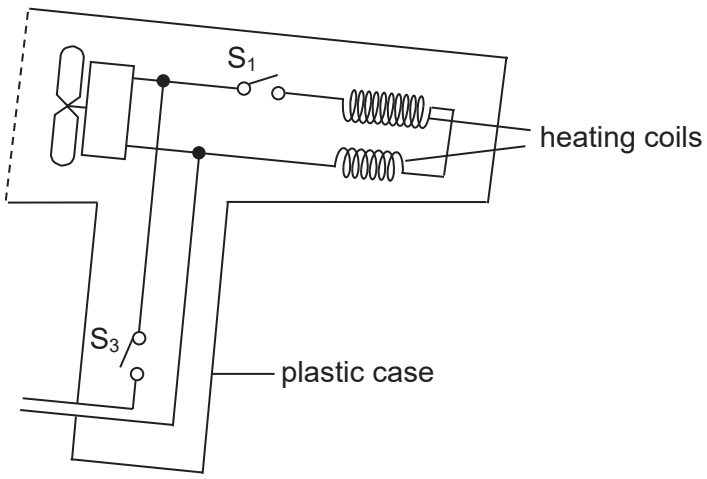


Fig. 13.3

State **one** way in which such an arrangement will not be as advantageous as that in Fig. 13.1.

...……...……...

..……..... [1]

Downloaded from SingaKids.com

(c) Fig. 13.4 shows a circuit with a lamp and resistor connected in parallel to each other.

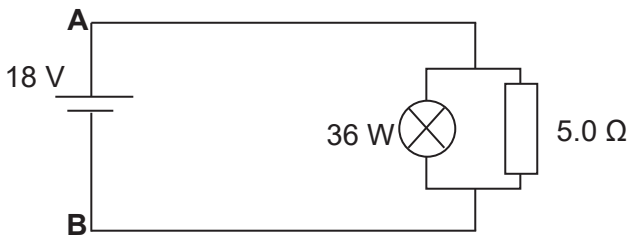


Fig. 13.4

(i) Calculate the amount of charge that passes through the resistor in 1 minute.

charge = ... [2]

(ii) The input energy to the lamp is 72 000 J. How long has the lamp been operating?

operation time = ... [2]

Downloaded from SingaKids.com

14 A pendulum consists of a pendulum bob attached to a thin thread, as shown in Fig. 14.1.

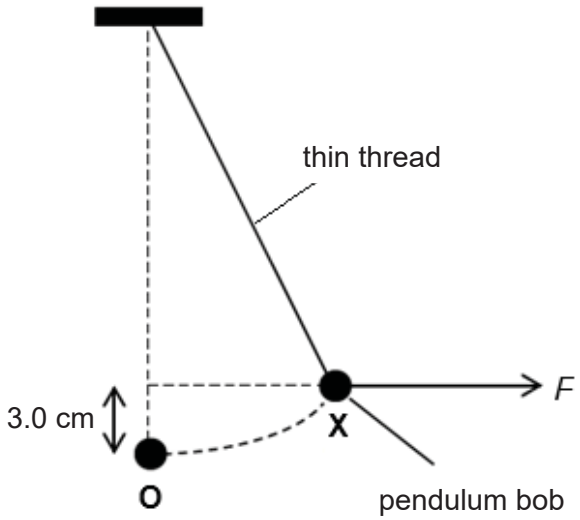


Fig. 14.1

When the thread is vertical, the metal sphere is at **O**. The metal sphere is moved from **O** to **X** and held in position **X** by a horizontal force *F*.

(a) Draw a free-body diagram to show the forces acting on the metal sphere when it is at **X**. [2]

(b) The pendulum bob is now released so that the pendulum is free to swing. Explain why the pendulum bob begins to move and why it continues to move past **O**.

.....

.....

.....

..... [2]

Downloaded from SingaKids.com

(c) The mass of the pendulum bob is 200 g. When the bob is moved from **O** to **X**, it is raised through a vertical height of 3.0 cm. The gravitational field strength is 10 N/kg.

(i) Calculate the work done to raise the sphere.

work done = ……... [2]

(ii) Calculate the maximum speed of the sphere after it has been released, assuming air resistance is negligible.

maximum speed = ……... [2]

(iii) A student determines the time taken for one complete swing of the pendulum. She uses two methods.
In the first method, she measures the time for one complete swing.
In the second method, she measures the time for 20 complete swings and divides the total time by 20.

Explain why the second method gives a more accurate result than the first method.

……

……

…… [2]

Downloaded from SingaKids.com

15 **(a)** Fig. 15.1 shows the boiler of a coal-fired power station. Hot gases rise and thermal energy from the hot gases heats the cold water inside the metal pipes, forming steam.

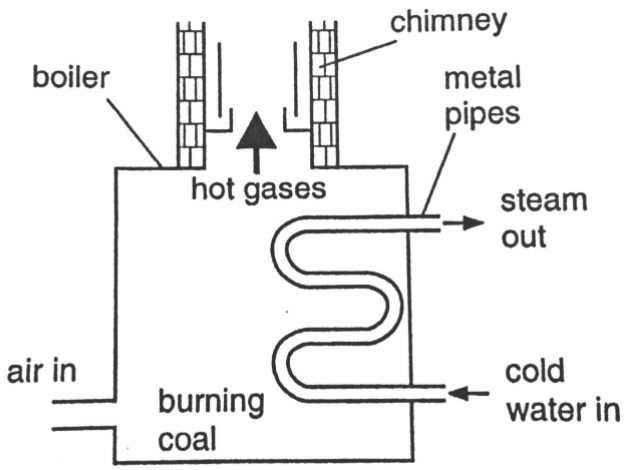


Fig. 15.1

(i) Explain, in terms of particle movement and density change, why the hot gases rise.

.....

.....

..... [2]

(ii) Using ideas about particles, explain how energy passes through the metal pipes by conduction.

.....

.....

..... [2]

(iii) Suggest what might happen if cold water is piped in from the top of the metal pipes instead of the bottom.
Give a reason for your answer.

.....

.....

..... [2]

Downloaded from SingaKids.com

(b) Fig. 15.2 shows an electrostatic precipitator that prevents dust and ash from emerging from the chimney.

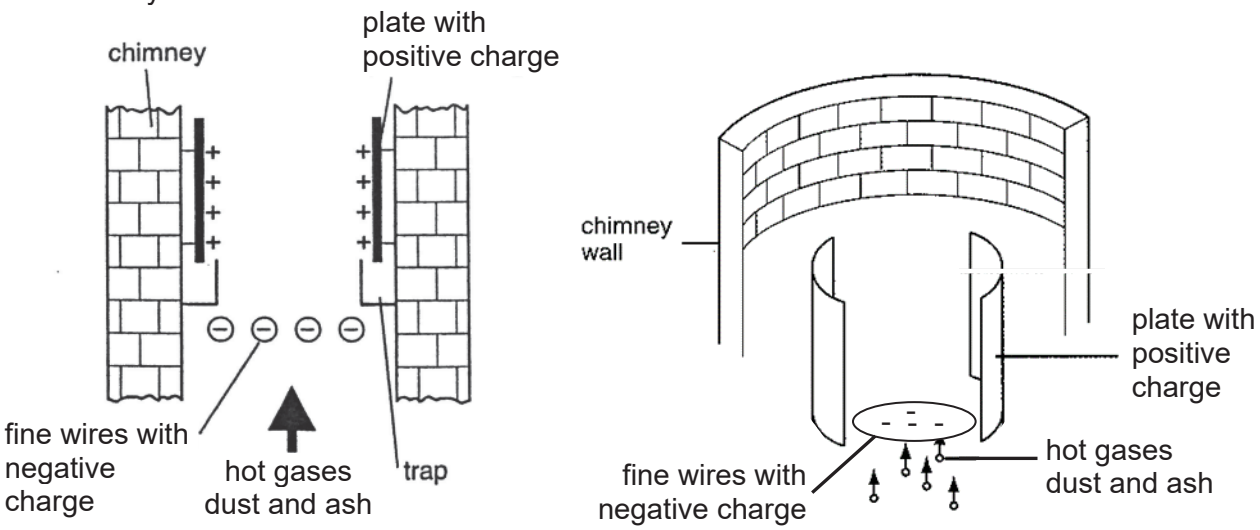


Fig. 15.2

(i) Describe what happens to the dust and ash particles in the hot gas after they pass through the fine wires with negative charges.

.....

.....

..... [1]

(ii) Provide an explanation for your answer in **(b)(i)**.

.....

.....

..... [2]

(iii) Suggest a reason why it is important for the power station to prevent dust and ash from emerging from their chimneys.

.....

.....

..... [1]

End of paper ☺

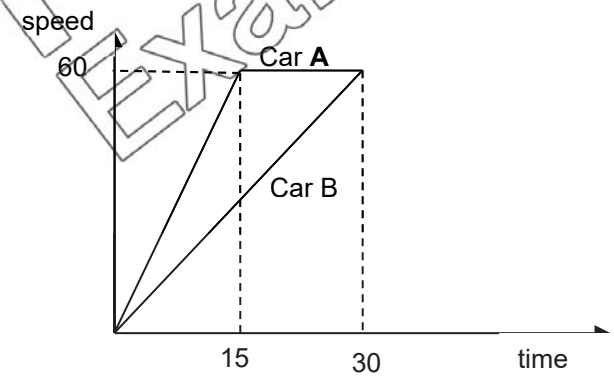
Downloaded from SingaKids.com

Downloaded from SingaKids.com

Answers to MCQ

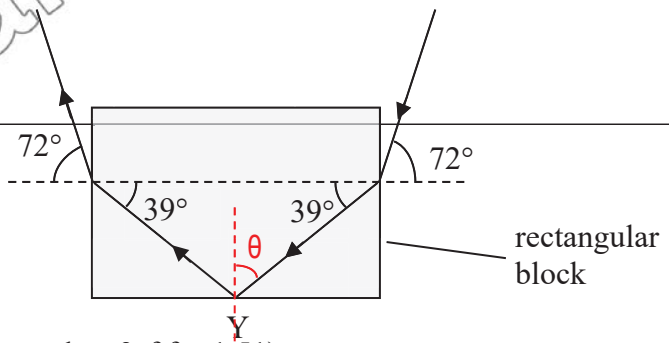
1	2	3	4	5	6	7	8	9	10
B	B	D	A	A	C	D	D	D	D
11	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
A	B	D	C	C	B	A	B	C	B

Answers for Section A and B

Qn	Answers	Marks awarded
	Section A	
1a	Air resistance/Air friction/brake friction	B1 (anyone)
1b	Not changing	B1
1c	decreasing	B1
2	Mass = (0.10 m^2 x 15 Pa) / 10 N/kg = 0.15 kg	M1 A1
3a	50 ˚C	B1
3bi	The energy will cause the wax particles to vibrate more/with increasing speed about its fixed positions The spacing between the wax particles will increase slightly.	B1 B1
3bii	~~The energy will cause the wax particles to break their forces of attraction/bonds between particles.~~ 1.Some particle are able to slide past each other. 2.The wax particles will change from fixed arrangement to random arrangement.	 B1 B1
3c	As the forces of attraction between liquid particles are weaker than the forces of attraction between solid particles, the more energetic/faster moving liquid particles will move further apart from each other compared to the solid particles. Hence it expands more between 8-9 min than between 0-1 min.	B1 B1
4a	 Penalise max 1m for graph extension beyond 30 min, missing any label	B1,B1 (1m for each graph)
4b	Distance between the cars = (½ x 15 x 60 + 15 x 60) – (½ x 30 x 60) = 1350 900 = 450 m	M1 A1

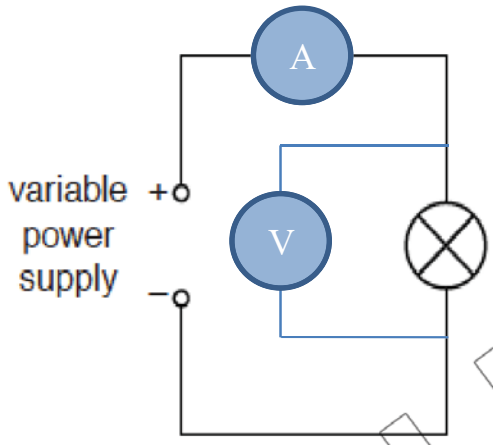
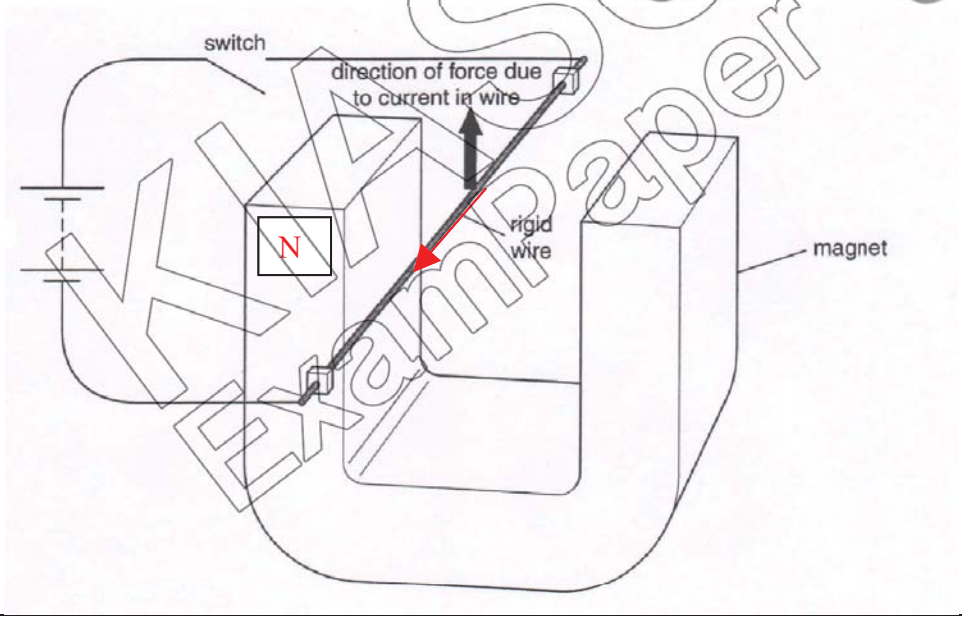
KiasuExamPaper

Downloaded from SingaKids.com

Qn	Answers	Marks awarded
4c	$Acceleration = \frac{60-0}{30}$ $= 2.0\ m/s^2$ Net force = 500 x 2.0 = 1000 N	M1 A1
5	Mass of coconut oil = 101.9 – 32.6 = 69.3 g Mass of the unknown liquid = 92.6 – 32.6 = 60 g Volume of unknown liquid = volume of coconut oil = Mass / Density = 69.3 / 0.924 = 75 cm^3 Density of unknown liquid = Mass / Volume = 60 / 75 = 0.80 g/cm^3	 M1 M1 A1
6	Mass = 10 kg Weight = 10 kg x 10 N/kg x 2 =200 N	B1 B1
7a	$\lambda = \frac{330}{5000}$ $= 0.066\ m$	M1 A1
7b	$v = \frac{2d}{t}$ where distance between bat and back of cave $d = (v \times t)/2$ = 330 x 6(1 mark if workings reflect the correct relationship between v,distance, t) = 1980 m	 M1 A1
8a	Refractive index $= \frac{\sin i}{\sin r}$ $= \frac{\sin 72^0}{\sin 39^0}$ $= 1.51$	 M1 A1
8b	$\sin c = \frac{1}{n}$ $\sin c = \frac{1}{1.51}$ $c = 41.4^0$ or $c = 41.5^0$ (use more than 3sf for 1.51)  	 B1
8c	The angle of incidence is greater than the critical angle. Thus, total internal reflection occurs.	B1

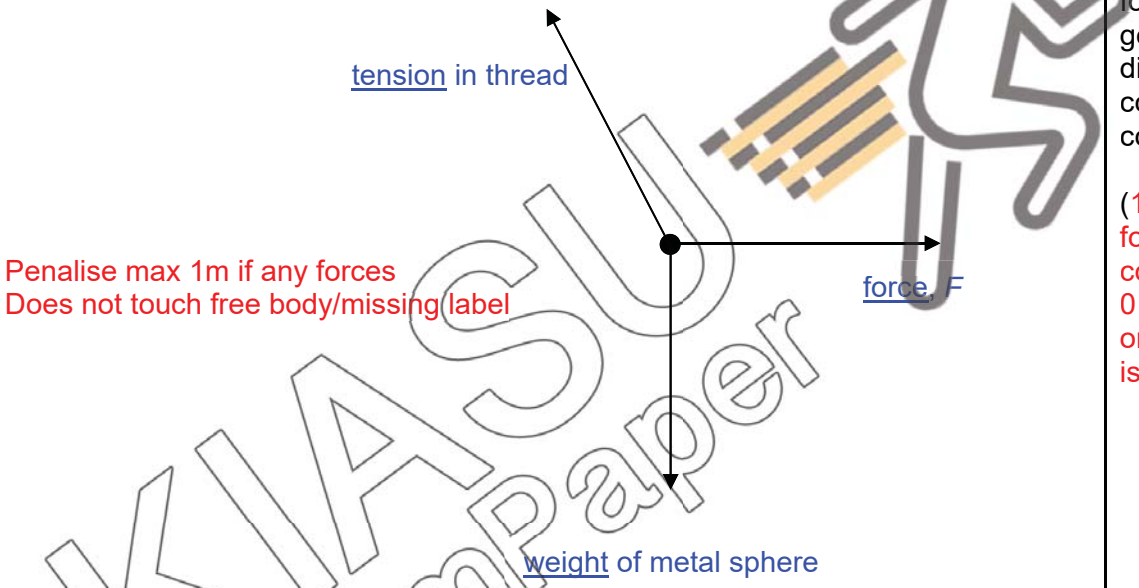
KiASU ExamPaper

Downloaded from SingaKids.com

Qn	Answers	Marks awarded
9a	gamma rays, visible light, infra-red	B1
9bi	microwave	B1
9bii	d = v x t 36000000 m = 300000000 m/s x t {1m for correct relationship between s,d,t, ignore prefixes} t = 0.120 s	M1 A1
10a	the work done by the source in driving a unit charge/1 coulomb around a complete circuit.	B1
10b		B1 any series connection with poer supply B1 any parallel connection with lamp
11ab		B1 B1
11c	Turn the magnet so that the poles exchange places with each other. or Turn the cells so that the terminals are switched over.	B1 either one
11d	Steel retains magnetism/is a permanent magnet while iron is not.	B1
12	Anticlockwise moments = clockwise moments (2000)(0.5) = T(3.0) + (550)(1.6) applies prin. of moment 1000 = 3.0 T + 880 correct distance T = 40 N	M1 M1 A1

KIASU Exam Paper

Downloaded from SingaKids.com

Qn	Answers	Marks awarded
	Section B	
13ai	S_3 S_3, S_1	B1 B1
13aii	the hair dryer has a plastic case which is an insulator so any current leakage from the wires will not be conducted outwards/double insulations	B1
13aiii	P = IV I = 1140/240 = 4.75 A	 B1
13aiv	5 A (no marks for no units)	B1
13b	if one heating coil is faulty, the whole dryer cannot work OR the power of the hot air cannot be changed	B1 either one
13c	Q = It = (V/R)t = (18/5)*60 = 216 C (no marks for no units)	M1 A1
	Using E = Pt, t = E / P =72 000 / 36 = 2000 s (no marks for no units)	M1 A1
14a	 Penalise max 1m if any forces Does not touch free body/missing label	B2 if all 3 forces general direction correct with correct label (1 mark if 2 forces are correct 0 mark if only 1 force is correct)
14b	At X, all three forces are balanced and the metal sphere does not move. When F is removed, a resultant force (due to weight of metal sphere and tension in thread) acts on the metal sphere, causing the metal sphere to move. At O, all GPE is converted to kinetic energy and the metal sphere continue to move pass O due to inertia /acquired/possession of KE. [Do not give marks, if candidate only gave descriptions of energy changes without linking KE to motion]	B1 B1
14ci	Work done = gain in GPE = mgh = $\frac{200}{1000}(10)\frac{3}{100}$ [convert mass and height correctly] = 0.06 J [include correct unit]	 M1 A1
14cii	GPE at X = KE at O 0.06 = ½ (0.2) v^2 v^2 = 0.6 v = $\sqrt{0.6}$ = **0.775 m/s** (3 sf) [also accept 0.78 m/s minus 1 mark for wrong or missing unit]	 M1 A1
14ciii	The main source of error is the reaction time of the student. By taking average of 20 complete swings, the error is divided between/spread over the 20 swings. [Do not award marks, if students just mention as obtaining more	B1 B1

KiASU ExamPaper

Downloaded from SingaKids.com

Qn	Answers	Marks awarded
	accurate timing without explaining why.]	
15ai	The particles in hot gases becomes further apart than surround cold air. The hot gases hence becomes less dense and rises.	B1 B1
15aii	The particles in the metal pipe gains kinetic energy from the energetic gas particles and vibrate more vigorously. They collide with the neighboring metal particles and passes kinetic energy to them.	B1 B1
15aiii	The cold water when heated becomes steam which is less dense. The steam rises up the metal pipes. If the cold water is piped in from the top, it will flow against the rising steam and heat transfer to outside the boiler will be inefficient/blocked/disrupted. ~~If cold water is piped in from the bottom, water is heated, become less dense and rises up the pipe creating a convection current which transfer heat away from the boiler.~~ ~~If cold water is piped in from the top, it will goes against the natural convection current leading to inefficient/blocked/disrupted heat transfer~~	B1 B1
15bi	The particles will be attracted to the positively charged plates	B1
15bii	The dust and ash particles will gain electrons from the fine wires and become negatively charged. As opposite charges attract, the particles will be attracted to the plates with positive charge.	B1 B1
15biii	To prevent air pollution, bad for the environment etc (any reasons pertaining to damage to environment)	B1
	~END~	

KiasuExamPaper

Downloaded from SingaKids.com