Name	Register Number	Class	Calculator Model

智行萬願

MANJUSRI SECONDARY SCHOOL

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PRELIMINARY EXAMINATION 2016

Subject:	Science (Physics / Chemistry)
Paper:	5076 / 01
Level:	Secondary 4 Express / 5 Normal (Academic)
Date:	19 Aug 2016
Duration:	1 hour
Setter:	Mr Lionel Poh / Mrs Tan Siew Seng

Additional Materials: Optical Answer Sheet (OTAS)

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.
Write your Name, Register Number and Class in the spaces at the top of this page.
Do not use staples, paper clips, highlighters, glue or correction fluid.

There are **forty** questions in this section. Answer **all** questions.
For each question there are four possible answers **A**, **B**, **C** and **D**.
Choose the **one** you consider correct and record your choice in **soft pencil** on the separate Answer Sheet.

Read the instructions on the Answer Sheet very carefully.

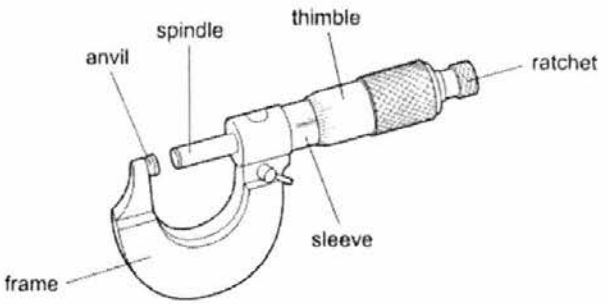
Each correct answer will score one mark. A mark will not be deducted for a wrong answer.
Any rough working should be done in this booklet.

A copy of the Periodic Table is printed on page 20.

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

For Examiner's Use	
Total	40

1 A student measures the thickness of a coin using a micrometer screw gauge.



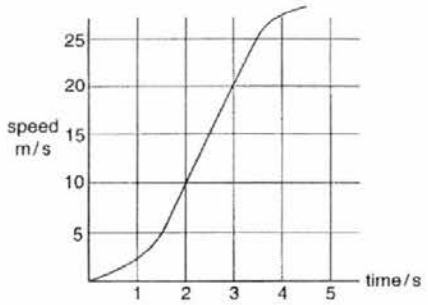
The following steps are carried out but are in the wrong order.

1 Turn the ratchet until a 'click' is heard.
2 Take the reading on the thimble.
3 Place the coin between the anvil and the spindle.
4 Take the reading on the sleeve.
5 Turn the thimble to close the anvil and the spindle.

What is the correct order?

A 1 → 5 → 3 → 2 → 4
B 3 → 1 → 5 → 4 → 2
C 3 → 5 → 1 → 4 → 2
D 5 → 3 → 1 → 2 → 4

2 The graph below shows the speed of a car as it accelerates from rest. During part of this time the acceleration is uniform.



What is the size of this uniform acceleration?

A 5 m/s^2

B 10 m/s^2

C 15 m/s^2

D 40 m/s^2

3 Which of the following expressions **cannot** be used to calculate force?

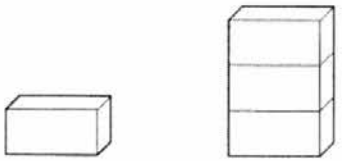
A force = work done × distance

B force = pressure × area

C force = moment ÷ perpendicular distance from force to pivot

D force = mass × acceleration

4 The diagram below shows a single brick and a pile of three bricks. All the bricks are identical.



Compared to the single brick, the pile of bricks has

A the same density but three times the volume and mass.

B the same mass but three times the density and volume.

C the same volume but three times the density and mass.

D three times the mass, volume and density.

5 The diagram below shows a man in a small boat.

Why does the boat become less stable when the man stands up?

A The centre of gravity of the man and boat is lower.

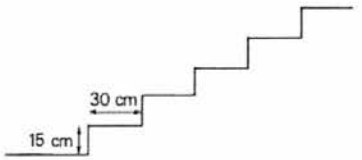
B The centre of gravity of the man and boat is higher.

C The total weight of the man and boat becomes lower.

D The total weight of the man and boat becomes higher.

6 The diagram below shows a set of five steps.

A student, of mass 50 kg, runs up the steps.



What is the student's gain in gravitational potential energy?

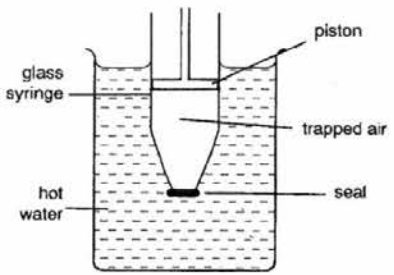
A $\frac{5 \times 15 \times 50}{100 \times 10}$ J

B $\frac{5 \times 15 \times 50 \times 10}{100}$ J

C $\frac{5 \times 30 \times 50 \times 10}{100}$ J

D $\frac{5 \times (15 + 30) \times 50}{100}$ J

7 The outlet of a glass syringe is sealed so that air is trapped below the piston.



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

A The glass is expanding.
B Convection is occurring inside the syringe.
C The molecules of trapped air are getting bigger.
D The trapped air molecules are hitting the piston more often with greater force.

8 The hot water for a house can be produced by absorbing solar energy, using copper panels through which the water circulates.

What is the best finish for the top surface of the copper panels?

A clear plastic
B dull black paint
C highly polished
D white paint

9 When a liquid evaporates rapidly, why does it cool?

A Fewer molecules are left in the liquid.
B Energy is lost by convection currents.
C Some of the more energetic molecules leave the liquid.
D Air molecules remove heat when they come into contact with the liquid surface.

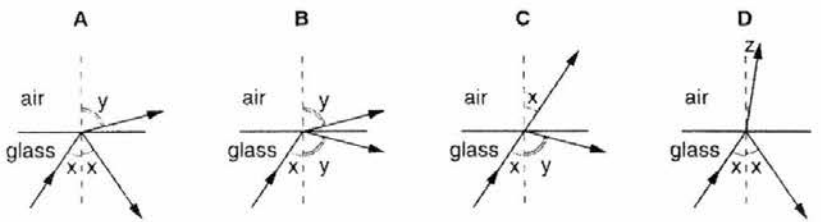
10 Which of the following correctly describes the respective nature of sound, light and radio waves?

	sound	light	radio
A	longitudinal	transverse	transverse
B	longitudinal	transverse	longitudinal
C	transverse	transverse	longitudinal
D	transverse	longitudinal	longitudinal

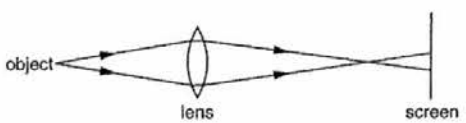
11 A ray of red light travelling in glass strikes the glass-air boundary.

Some light is reflected and some is refracted.

Which diagram shows the paths of the ray?



12 A lens forms a blurred image of an object on a screen.

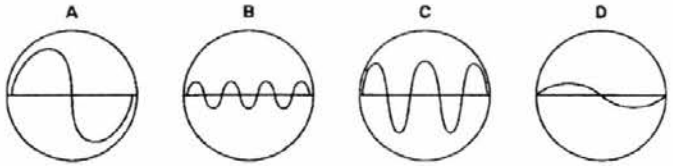


How can the image be made sharp and in focus on the screen?

A by using a brighter object at the same position
B by moving the object away from the lens and screen
C by moving the screen away from the lens and object
D by using a lens of longer focal length at the same position

13 The diagrams below represent sound waves displayed on an oscilloscope.

Assuming the controls of the oscilloscope remain the same for each sound, which diagram represents the quietest sound with the highest frequency?



14 A sonic "tape measure" is used to measure the length of a room.

It measures a time interval of 0.06 s between transmitting a sound pulse and receiving the echo. The speed of sound in air is 330 m/s.

How far is the reflecting wall from the tape measure?

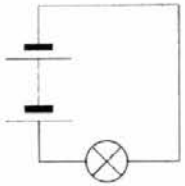
A 5.5 m
B 9.9 m
C 11 m
D 20 m

15 An electrostatically charged object will pick up small pieces of paper.

Which of the following **will not** pick up pieces of paper?

A a plastic comb pulled through dry hair
B a polythene rod runned with a woollen cloth
C an earthed metal rod rubbed with a duster
D a rubber balloon rubbed on a nylon shirt

16 The diagram below shows a battery with an electromotive force of 6 V in a circuit.

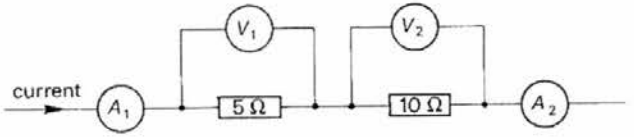


How much energy is needed to drive 30 C of charge round the circuit?

A 0.2 J
B 5 J
C 24 J
D 180 J

17 Current flows in two resistors connected in series as shown in the diagram below.

A_1 and A_2 are the readings on the ammeters. V_1 and V_2 are the readings on the voltmeters.



Which of the following correctly describes the ammeter and voltmeter readings?

	ammeter readings	voltmeter readings
A	A_1 is less than A_2	V_1 is less than V_2
B	A_1 is greater than A_2	V_1 is equal to V_2
C	A_1 is equal to A_2	V_1 is less than V_2
D	A_1 is equal to A_2	V_1 is equal to V_2

18 In an a.c. (household) electrical circuit, why should the switch for any device (such as an electric kettle) always be connected to the "live" lead?

A No current ever flows in the neutral lead of the device.
B The device will be shorted if the switch is in the earth lead.
C The device can never be switched off if the switch is in the neutral lead.
D The device can only be isolated (made safe) if the switch is in the live lead.

19 Which statement about magnetism is correct?

A Two like poles always attract one another.

B A magnet attracts small pieces of aluminium.

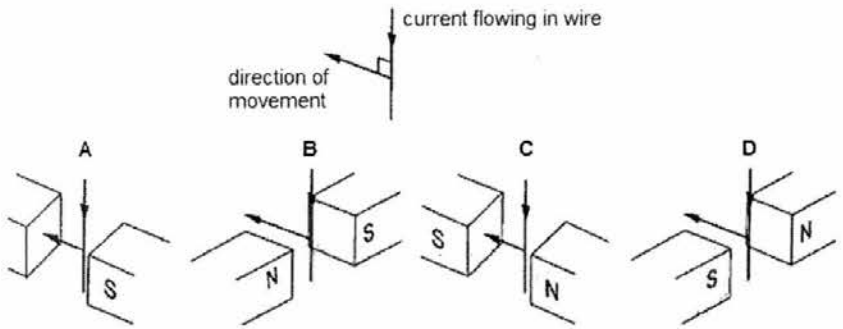
C Steel makes a better permanent magnet than iron does.

D There is no limit to the magnetic strength of a magnet made from a steel bar.

20 A current flows in a wire hanging between the poles of a magnet.

The wire starts to move in the direction shown below.

Which diagram shows the position and the polarity of the magnet?



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PRELIMINARY EXAMINATION 2016

Subject:	Science (Physics)
Paper:	5076 / 02
Level:	Secondary 4 Express / 5 Normal (Academic)
Date:	18 Aug 2016
Duration:	1 hour 15 minutes
Setter:	Mr Lionel Poh

READ THESE INSTRUCTIONS FIRST

Write your Name, Register Number and Class in the spaces provided at the top of this page.
You may use an HB pencil for any diagrams, graphs, tables or rough working.
Write in dark blue or black pen.
Do not use staples, paper clips, highlighters, glue or correction fluid.

The use of an approved scientific calculator is expected, where appropriate.
You may lose marks if you do not show your working or if you do not use appropriate units.

Section A
Answer **all** questions.
Write your answers in the spaces provided on the question paper.

Section B
Answer any **two** questions.
Write your answers in the spaces provided on the question paper.

The number of marks is given in brackets [ ] at the end of each question or part question.
The total number of marks for this paper is **65**.

For Examiner's Use	
Section A	45
Section B	20
Total	65

Section A

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

For Examiner's Use

1 A 2.0 kg box which is initially at rest, slides down a frictionless inclined plane, as shown in Fig. 1.1.

As the box slides down, its velocity increases constantly. When the box reaches the bottom of the inclined plane, its velocity is 3.0 m/s.

The box takes 1.5 s to slide from the top to the bottom of the inclined plane.

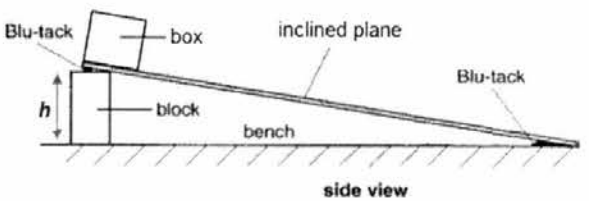

Fig. 1.1

(a) On the grid in Fig. 1.2, plot a graph to show how the velocity of the box changes with time as it slides from the top to the bottom of the inclined plane. [1]

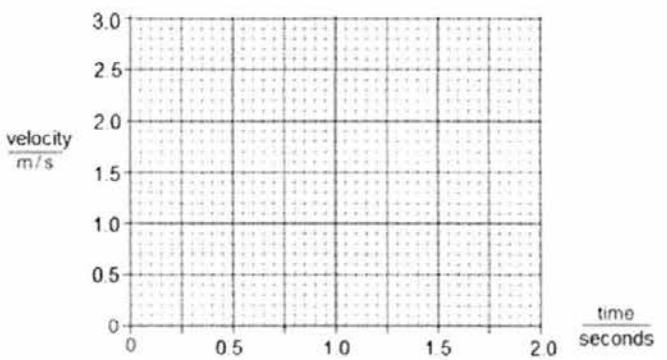

Fig. 1.2

For Examiner's Use

1 **(b)** Calculate the acceleration of the box as it slides down the inclined plane.

acceleration = ... m/s^2 [2]

(c) Calculate the length of the inclined plane.

length = ... m [2]

(d) Calculate the kinetic energy of the box at the bottom of the inclined plane

kinetic energy = ... J [2]

(e) Taking gravitational field strength to be 10 N/kg, calculate height ***h*** of the block.

height ***h*** = ... m [2]

For Examiner's Use

2 Fig. 2.1 shows a photo frame hung on a wall using two strings.
The tension in each string is 30 N and the photo frame is in equilibrium.

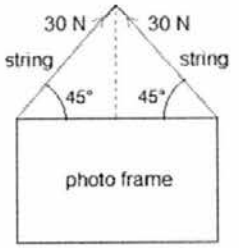

Fig. 2.1

Using a vector diagram, determine the weight of the photo frame.

weight = ... N [4]

For Examiner's Use

3 A solid substance is placed in a beaker and heated with a 10 W heater.
Fig. 3.1 shows how the temperature of the beaker and its contents changes with time.

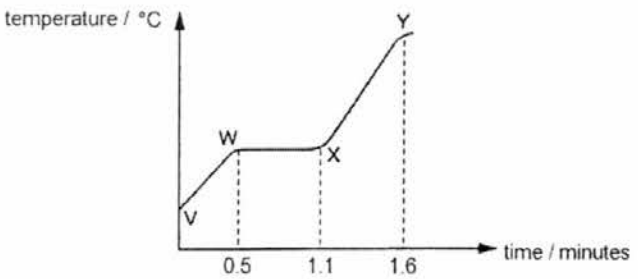

Fig. 3.1

(a) Compare the arrangement of **and** forces of attraction between the molecules of the substance in **VW** and **XY**.

.....
.....
.....
..... [2]

(b) Calculate the amount of energy needed to melt the solid substance.

energy = ... J [2]

(c) Explain why the temperature of the substance remains constant for the duration of **WX** even when energy is continuously supplied.

.....
.....
.....
..... [2]

For Examiner's Use

4 A piece of paper is pinned along its edge to a notice board that is directly above a desk lamp, as shown in Fig. 4.1.
When the lamp is switched on, it is observed that the piece of paper rises and remains almost stationary.

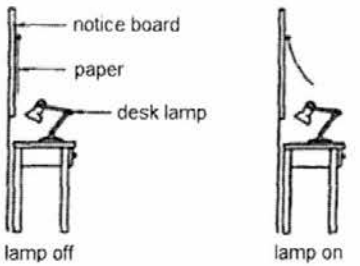

Fig. 4.1

(a) **(i)** Identify two electromagnetic waves produced by the desk lamp when it is switched on.

electromagnetic wave 1: .....

electromagnetic wave 2: ..... [2]

(ii) State one use for each of the electromagnetic waves identified in **(a)(i)**.

electromagnetic wave 1: .....

.....

electromagnetic wave 2: .....

..... [2]

(b) Explain why the piece of paper rises when the desk lamp is switched on.

.....
.....
.....
..... [2]

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For Examiner's Use

5 Fig. 5.1 shows part of a water wave formed by a dipper in a ripple tank.

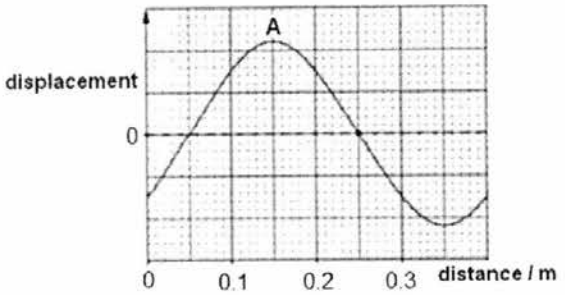


Fig. 5.1

(a) Calculate the wavelength of the water wave.

wavelength = ... cm [1]

(b) **(i)** State what is meant by the *frequency* of water wave.

.....

.....

..... [1]

(ii) 6 complete waves pass point **A** in 1.5 s.

Calculate the frequency of the water wave.

frequency = ... Hz [1]

5 (c) Hence, calculate the speed of the water wave.

For Examiner's Use

speed = ... m/s [2]

(d) The dipper is then set to vibrate at a greater frequency.
State and explain what happens to the water wave.

.....

.....

.....

..... [2]

6 Some electrical components are easily damaged if electric charge is placed on them. They are often stored by placing them in contact with a conductor.

For Examiner's Use

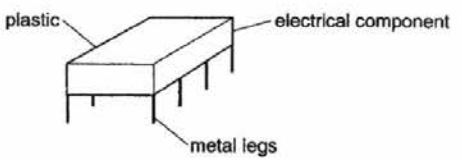


Fig. 6.1

(a) When the component shown in Fig. 6.1 is rubbed with a cloth, the metal legs become negatively charged.
Explain how this happens.

.....

.....

.....

..... [2]

(b) Fig. 6.2 shows the negatively charged metal legs placed near a piece of uncharged aluminium foil which rests on an insulator.

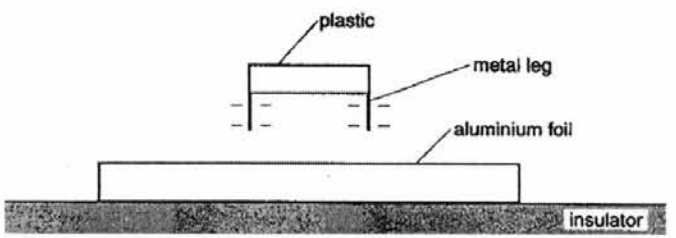


Fig. 6.2

(i) On Fig. 6.2, draw the induced charges that form on the aluminium foil. [1]

6 (b) (ii) Explain your answer in **(b)(i)**.

.....

.....

.....

..... [2]

(c) A wire is connected to the aluminium foil. 4.0 C of charges flows through the wire in 50 seconds.

Calculate the current flowing through the wire.

current = ... A [2]

For Examiner's Use

7 (a) Fig. 7.1 shows a light aluminium rod resting between the poles of a magnet. A current is passed through the rod from two brass strips connected to a power supply.

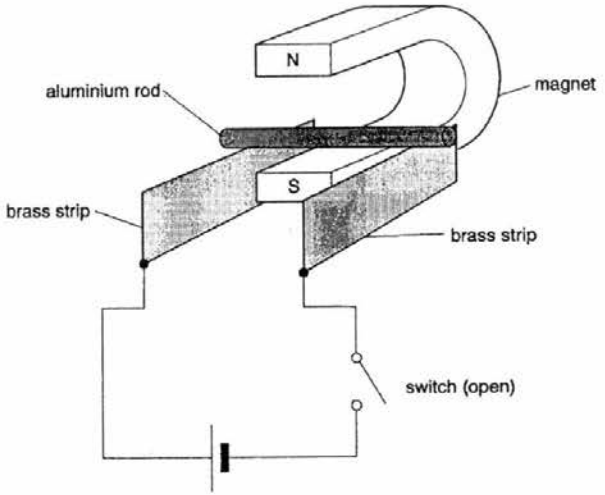


Fig. 7.1

(i) On Fig. 7.1, draw the direction of the conventional current in the rod when the switch is closed. [1]

(ii) Describe how the rod moves when the switch is closed.

.....

.....

..... [1]

(iii) Suggest a way to increase the speed of movement of the rod.

.....

.....

..... [1]

For Examiner's Use

7 **(b)** Fig.7.2 shows a magnet attached to a paper cone. The magnet is close to a coil of wire that is part of an electrical circuit.

For Examiner's Use

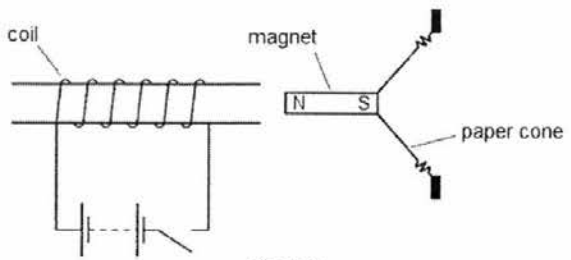


Fig. 7.2

(i) State and explain what happens to the magnet when the switch is closed.

.....

.....

.....

..... [2]

(ii) The connections to the battery are reversed.
State what happens to the magnet when the switch is closed.

.....

.....

..... [1]

For Examiner's Use

Section B

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

8 **(a)** Fig 8.1 shows a lever being used to tilt a 5 kg concrete block.
A 100 N block holds the concrete block in the position shown below.
G is the centre of mass of the block and gravitational field strength is 10 N/kg.

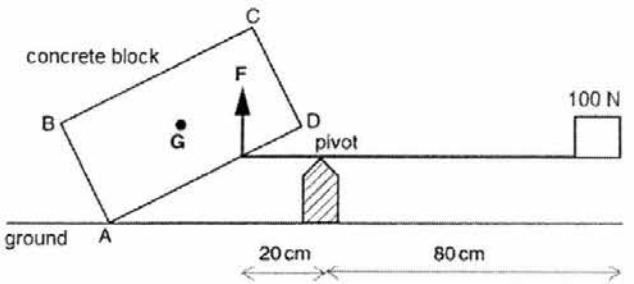


Fig. 8.1

(i) State the principle of moments

.....

.....

.....

..... [2]

(ii) By calculating the moments about the pivot, find the value of the force **F** exerted by the lever on the block.
Show your working clearly.

F = ... N [2]

For Examiner's Use

8 (a) (iii) In terms of moments, state the condition for the concrete block to fall over onto edge **AB**.

.....

.....

.....

.....

..... [3]

(b) The area of contact between the concrete block and the ground at point **A** is 5×10^{-6} m^2.

Calculate the pressure exerted by the concrete block on the ground.

pressure = ... Pa [3]

For Examiner's Use

9 (a) Fig. 9.1 shows a square glass block **JKLM** with a ray of light incident on side **JK** at an angle of incidence of 60°.

The refractive index of glass is 1.5.

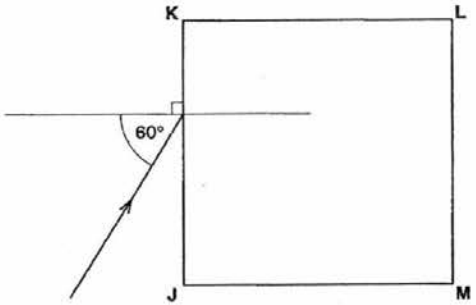


Fig. 9.1

(i) Calculate the angle of refraction of the ray as it approaches side **JK**.

angle of refraction = ... ° [2]

(ii) Calculate the critical angle for a ray of light in this glass.

critical angle = ... ° [2]

For Examiner's Use

9 (a) (iii) State and explain what happens to the ray of light when it is incident on side **KL**.

.....

.....

.....

.....

.....

..... [2]

(b) Fig. 9.2 shows an object O and its image I being formed by a convex lens. XY is the principal axis.

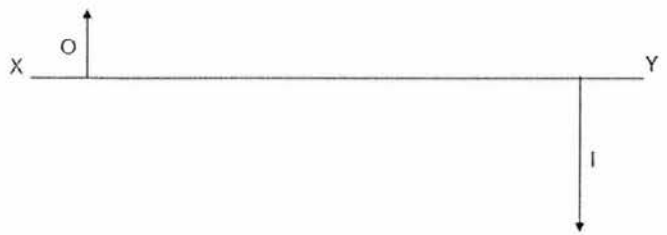


Fig. 9.2

(i) Draw a single ray on Fig. 9.2 to locate the position of the convex lens. Represent the lens with a vertical line and two arrow heads, one on each end of the line. [2]

(ii) Complete the ray diagram by drawing another ray on Fig. 9.2, from the object to the image. [1]

(iii) Locate the position of the principal focus of the lens. Label it **F**. [1]

For Examiner's Use

10 Fig. 10.1 shows a simple electrical circuit consisting of a fuse, and components **P** and **Q**.

Current is drawn from a d.c. power supply of 100 V.

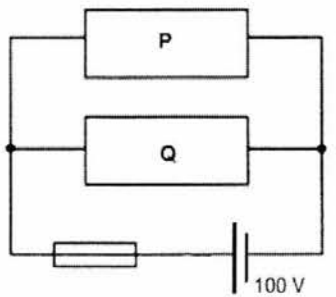
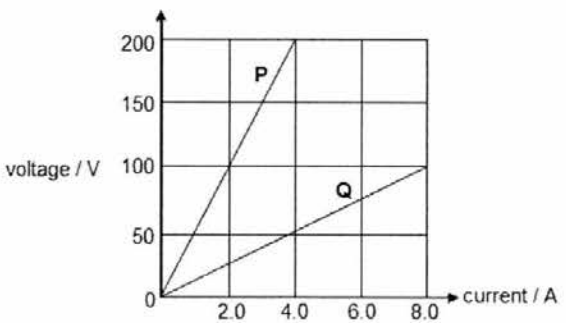


Fig. 10.1

Fig. 10.2 shows the voltage-current characteristics of components **P** and **Q**.



Fig, 10.2

(a) With reference to Fig. 10.2, state whether components **P** and **Q** obey Ohm's law. Explain your answer.

.....

.....

.....

..... [2]

For Examiner's Use

10 **(b)** With reference to Fig. 10.2, state the amount of current flowing through

(i) component **P**,

current = ... A [1]

(ii) component **Q**.

current = ... A [1]

(c) Calculate the resistance of

(i) component **P**,

resistance = ... Ω [1]

(ii) component **Q**.

resistance = ... Ω [1]

(d) Hence, calculate the effective resistance of the circuit in Fig. 10.1.

effective resistance = ... Ω [2]

For Examiner's Use

10 **(e)** Which fuse is more suitable for the circuit in Fig. 10.1, a fuse with a rating of 11 A or one with a rating of 13 A? Explain your choice.

..... [2]

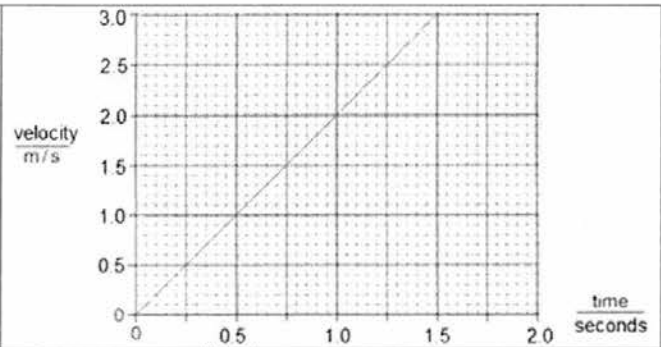
END OF PAPER

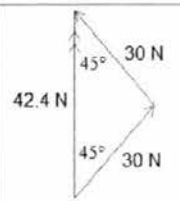
Manjusri Secondary School
Sec 4 EXP / 5NA Science (Physics)
Preliminary Examination
Answer Scheme

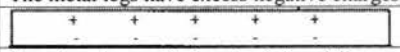
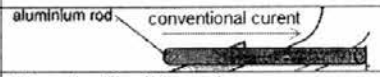
Section A: Multiple Choice Questions

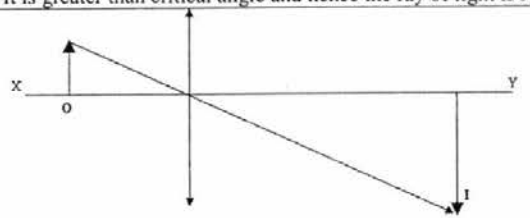
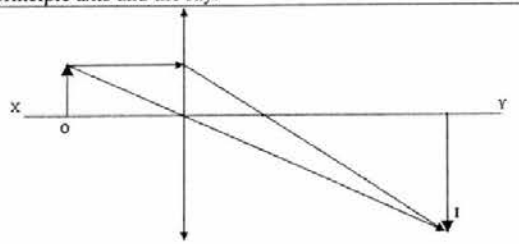
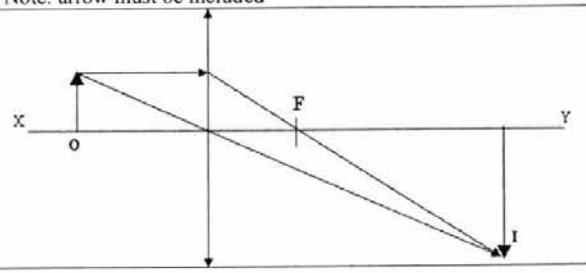
1	C	6	B	11	A	16	D
2	B	7	D	12	D	17	C
3	A	8	B	13	B	18	D
4	A	9	C	14	B	19	C
5	B	10	A	15	C	20	D

Paper 2: Structured Questions

1	(a)			[1]
	(b)		$a = \frac{v-u}{t}$ **OR** $a = \frac{3.0-0}{1.5}$	[1]
			$= 2.0\ \text{m/s}^2$	[1]
	(c)		length = area under the velocity-time graph	[1]
			$= \frac{1}{2} \times (3.0 \times 1.5) = 2.25$ m (accept ecf from incorrect graph)	[1]
	(d)		K.E $= \frac{1}{2}mv^2$ **OR** $\frac{1}{2} \times 2.0 \times 3.0^2$	[1]
			$= 9.0$ J	[1]
	(e)		G.P.E $= mgh$ **OR** $9.0 = 2.0 \times 10 \times h$	[1]
			$h = 0.45$ m	[1]

2			 1 mark: appropriate scale chosen 1 mark: correct directions of all forces (with resultant force represented by two arrow heads) and magnitude of forces indicated (excluding resultant force) 1 mark: correct measurements of the forces (according to scale) and angles 1 mark: weight between 38.2 N to 46.7 N	[4]
3	(a)		Particles in **VW** are arranged in an orderly manner	[1]
			while particles in **XY** are arranged in a random manner.	[1]
			Forces of attraction between the molecules of the substance in **VW** is stronger than that in **XY**.	[1]
	(b)		$E = Pt$ **OR** $E = 10 \times (0.6 \times 60)$	[1]
			$= 360$ J	[1]
	(c)		The energy supplied is used to weaken the forces of attraction	[1]
			and not to increase the K.E of the particles. Hence, temperature remains constant.	[1]
4	(a)	(i)	infra-red and visible light	[2]
		(ii)	infra-red: TV remote control	[1]
			visible light: telecommunications	[1]
	(b)		When the lamp is switched on, the surrounding air gets heated up and it expands.	[1]
			It becomes less dense and rises, pushing up the paper.	[1]
5	(a)		0.4 m	[1]
	(b)	(i)	Number of complete waves per unit time	[1]
		(ii)	$f = \frac{6}{1.5} = 4.0$ Hz	[1]
	(c)		$v = f\lambda$ **OR** $v = 4.0 \times 0.4$	[1]
			$= 0.16$ m/s	[1]
	(d)		The frequency of the wave increases	[1]
			as the frequency of the wave follows the frequency of the source (dipper).	[1]
6	(a)		The metal legs gain electrons from the cloth. **OR**	[1]

			Electrons from cloth are transferred to the metal legs.	
			The metal legs have excess negative charges.	[1]
	(b)	(i)		[1]
		(ii)	Negative charges in the aluminium foil are repelled to the bottom as like charges repel.	[1]
			The top of the aluminium foil has excess positive charges and the bottom has excess negative charges.	[1]
	(c)		$I = \frac{Q}{t}$ **OR** $I = \frac{4.0}{50}$	[1]
			= 0.08 A	[1]
7	(a)	(i)		[1]
		(ii)	The rod will roll inwards.	[1]
		(iii)	increase the amount of current / use a stronger magnet	[1]
	(b)	(i)	When switch is closed, the right side of the coil becomes S pole.	[1]
			N pole of the magnet will be attracted to the coil.	[1]
		(ii)	Magnet will be repelled.	[1]
8	(a)	(i)	For an object to be in equilibrium (balanced),	[1]
			sum of clockwise moments is equal to sum of anti-clockwise moments	[1]
		(ii)	$10 \times 10 \times 0.8 = \mathbf{F} \times 0.2$	[1]
			$\mathbf{F} = 400$ N	[1]
		(iii)	Anti-clockwise moment produced by **F**	[1]
			about point A (pivot)	[1]
			must be greater than clockwise moment produced by the weight of the concrete block about the same pivot.	[1]
			Note: students must • mention the sources of the moments • see that point A is the pivot	
	(b)		$P = \frac{W}{A}$	[1]
			$= \frac{5 \times 10}{0.000005}$	[1]
			$= 10^7$ Pa	[1]
9	(a)	(i)	$\eta = \frac{\sin i}{\sin r}$ **OR** $1.5 = \frac{\sin 60°}{\sin r}$	[1]
			$r = 35.3°$	[1]
		(ii)	$\eta = \frac{1}{\sin c}$ **OR** $1.5 = \frac{1}{\sin c}$	[1]
			$c = 41.8°$	[1]
		(iii)	Angle of incidence of the ray at side **KL** is 54.7°.	[1]

			It is greater than critical angle and hence the ray of light is reflected.	[1]
	(b)	(i)	 1 mark: ray with arrow joining the tip of the object to the tip of the image 1 mark: convex lens that passes through the point of intersection of the principle axis and the ray.	[2]
		(ii)	 Note: arrow must be included	[1]
		(iii)		[1]
10	(a)	(i)	Yes (award 1 mark only if students provide a reason close to the actual answer)	[1]
			Voltage across each component is directly proportional to the current flowing through it.	[1]
	(b)	(i)	2 A	[1]
		(ii)	8 A	[1]

	(c)	(i)	$R = \frac{V}{I} = \frac{100}{2} = 50\ \Omega$	[1]
		(ii)	$R = \frac{100}{8} = 12.5\ \Omega$	[1]
	(d)		$\frac{1}{R} = \frac{1}{50} + \frac{1}{12.5}$	[1]
			effective resistance = 10 Ω	[1]
	(e)		A fuse with a rating of 11 A (award 1 mark only if students provide a reason close to the actual answer)	[1]
			As the fuse rating should be slightly above the current flowing through it (10A).	[1]

Name	Register Number	Class	Calculator Model (if applicable)

智行菩願

MANJUSRI SECONDARY SCHOOL
文 殊 中 學

PRELIMINARY EXAMINATION 2016

Subject:	Science (Physics, Chemistry)
Paper:	5076/05 (Physics)
Level:	Secondary 4 Express / Secondary 5 Normal (Academic)
Date:	04 Aug 2016
Duration:	1 hour 30 minutes (With Chemistry Paper)
Setter:	Mr Joseph Tan

No additional materials are required.

Candidates answer on the Question Paper.

READ THESE INSTRUCTIONS FIRST

Write your Name, Register Number and Class in the spaces provided at the top of this page.
Write in dark blue or black pen.
You may use a soft pencil for any diagrams, graphs, tables or rough working.
Do not use staples, paper clips, highlighters, glue or correction fluid.

Answer both questions.

You are advised to spend 45 minutes on each question.

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

The total number of marks for this paper is **15**.

For Examiner's Use
15

This paper consists of **4** printed pages including this cover page.

For Examiner's Use

1 In this experiment, you are going to determine the resistance of a fixed resistor, R.

(a) The apparatus have been set up as shown in **Figure 1**.

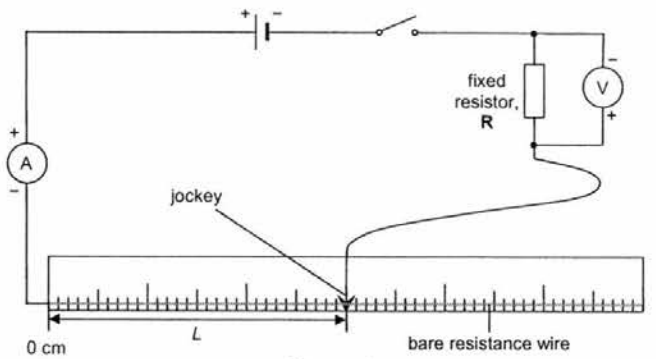


Figure 1

(b) Probe the resistance wire using the jockey at the 10.0 cm mark and record the ammeter reading, **I**, and voltmeter reading, **V**, in **Table 1** below. [1]

(c) Repeat the measurement of **I** and **V** for five more lengths of **L**, increasing **L** by 15.0 cm each time.

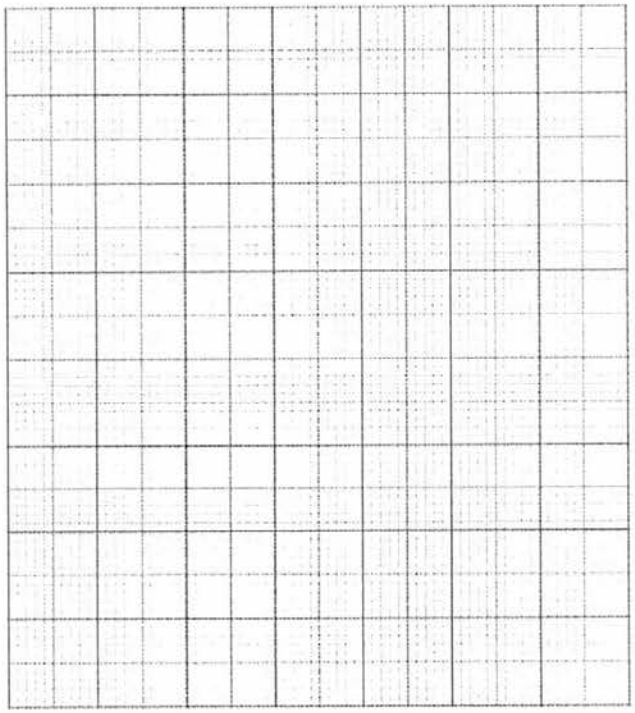
(d) Tabulate all readings of **I** and **V** in Table 1.

L / cm	I / A	V / V
10.0		

Table 1 [4]

(e) On the grid, plot a graph of **V** against **I**.
Draw the best-fit straight line, taking into account all your plotted points.

For Examiner's Use



[4]

(f) Determine the resistance of resistor, **R**, by finding the gradient of the graph. Show clearly on your graph how you did this.

R = _____ [2]

(g) **(i)** Identify **one** significant source of error in this experiment. [1]

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_____

_____

(ii) Suggest an improvement to the experiment that would reduce the error identified in part **(g)(i)**. [2]

Improvement: _____

_____

Explanation: _____

_____

(h) Suggest **one** precaution you have taken to ensure that the results are accurate. [1]

_____

_____

Manjusri Prelim Paper 5 (15m)

Qn No	Answer	Marks
1(b)	**I** = 0.20 A, **V** = 1.00 V (accept 0.90 – 1.40) [to be recorded in table]	[1]
(d)	<table><tr><th>L / cm</th><th>I / A</th><th>V / V</th></tr><tr><td>10.0</td><td>0.20</td><td>1.00</td></tr><tr><td>25.0</td><td>0.18</td><td>0.90</td></tr><tr><td>40.0</td><td>0.16</td><td>0.80</td></tr><tr><td>55.0</td><td>0.14</td><td>0.70</td></tr><tr><td>70.0</td><td>0.12</td><td>0.60</td></tr><tr><td>85.0</td><td>0.10</td><td>0.50</td></tr></table> [1] Values in L with 15.0 cm interval and 1 d.p. [2] Precision of 2 decimal place(s) for **I** and **V** respectively. [1] Descending values for **I** and **V**. [-1] Units in table for **L**, **I** and **V**.	[4]
(e)	[1] Label both axes with units {A} [1] Appropriate scale for both axes {S} [1] Plotting of points {P} [1] Best fit smooth line. {L}	[4]
(f)	[1] Decent sized triangle drawn based on 2 selected points on graph. [1] G = 5.00 Ω (accept 4.5 – 5.5) at least 1 d.p.	[2]
(g)(i)	Error in reading the accurate value of length of the wire due to kinks/curves in the wire. Unstable readings for ammeter and voltmeter.	[1]
(g)(ii)	Improvement: Straighten the wire by pulling the 2 ends of the wire just beyond the metre rule Take more readings and use the average. Explanation: Straightened wire will give a more accurate reading of the length of the wire under examination. Improve the accuracy of the readings.	[1] [1]
(h)	**Either** Lift the jockey off the resistance wire / switch off the circuit when not in use to prevent over heating of the resistance wire. **Or** Ensure that the jockey is vertical when probing the resistance wire and the hand is not resting on the resistance wire.	[1]

Marker report

Qn No	Finding(s) / Common mistake(s)	Remarks
1 (d)	Readings are generally well tabulated with the require degree of precision and omission of units, but most did not give answer to the correct precision of 2 decimal places.	Some students were suspected of fitting values to graph for straight line. A few reversed the order for the recordings.
(e)	**Axis**: Some are still confused about "V against I" by drawing I as the vertical axis and V as the horizontal axis. A handful did not label their origin correctly or label axis with units. **Scale**: Badly done with small graphs by most as they started from (0,0) as the origin. Some of them used odd scale. **Line**: Many straight lines drawn do not have balanced number of points on either sides.	
(f)	Only a few managed to calculate the value of G within the acceptable range. Most did not get the point awarded for showing the triangle used to calculate G on the graph due to small triangle. Many also did not have answers accurate to at least 1 d.p.	1 m awarded for drawing of triangle on the graph paper
(g)	Badly done. Most wrote repeating experiments a few times to improve accuracy, ensuring that wires are straight,	Students can also mention how the internal resistance of wires and jockey has a slight effect in raising the resistance to be found.
(h)	Badly done as many wrote on reducing parallax errors in reading ammeter and voltmeter. For those who mentioned about overheating of wire, students did not state how to prevent it from happening. None wrote about ensuring cells are of the same emf and turn off circuit to prevent draining of cells.	Most wrote repeating experiments a few times and finding average as precaution. This demonstrates how students do not understand what precaution means.