

## ANSWER SCHEME SPMRSM 2014

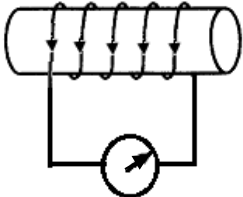
### Kertas 1

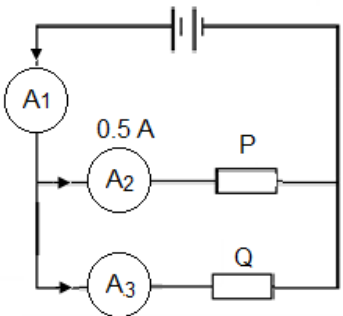
<b>1</b>	<b>D</b>	<b>11</b>	<b>A</b>	<b>21</b>	<b>D</b>	<b>31</b>	<b>C</b>	<b>41</b>	<b>A</b>
<b>2</b>	<b>C</b>	<b>12</b>	<b>B</b>	<b>22</b>	<b>A</b>	<b>32</b>	<b>A</b>	<b>42</b>	<b>B</b>
<b>3</b>	<b>C</b>	<b>13</b>	<b>A</b>	<b>23</b>	<b>C</b>	<b>33</b>	<b>B</b>	<b>43</b>	<b>D</b>
<b>4</b>	<b>C</b>	<b>14</b>	<b>A</b>	<b>24</b>	<b>D</b>	<b>34</b>	<b>A</b>	<b>44</b>	<b>B</b>
<b>5</b>	<b>B</b>	<b>15</b>	<b>C</b>	<b>25</b>	<b>D</b>	<b>35</b>	<b>B</b>	<b>45</b>	<b>D</b>
<b>6</b>	<b>A</b>	<b>16</b>	<b>B</b>	<b>26</b>	<b>B</b>	<b>36</b>	<b>A</b>	<b>46</b>	<b>C</b>
<b>7</b>	<b>B</b>	<b>17</b>	<b>C</b>	<b>27</b>	<b>C</b>	<b>37</b>	<b>B</b>	<b>47</b>	<b>C</b>
<b>8</b>	<b>B</b>	<b>18</b>	<b>D</b>	<b>28</b>	<b>B</b>	<b>38</b>	<b>D</b>	<b>48</b>	<b>B</b>
<b>9</b>	<b>D</b>	<b>19</b>	<b>B</b>	<b>29</b>	<b>A</b>	<b>39</b>	<b>D</b>	<b>49</b>	<b>B</b>
<b>10</b>	<b>C</b>	<b>20</b>	<b>A</b>	<b>30</b>	<b>A</b>	<b>40</b>	<b>C</b>	<b>50</b>	<b>D</b>

### PAPER 2 (SECTION A)

NO	MARK	ANSWER	NOTES
1(a)	1	<i>Name the force correctly</i> <ul style="list-style-type: none"> <li>• Gravitational force</li> </ul>	
(b)	1	<i>Name the physical quantity correctly</i> <ul style="list-style-type: none"> <li>• Gravitational acceleration / acceleration due to gravity.</li> </ul>	
(c)(i)	1	<i>Tick the correct answer</i> <ul style="list-style-type: none"> <li>• Unchanged</li> </ul>	
(ii)	1	<i>State the reason correctly</i> <ul style="list-style-type: none"> <li>• Mass does not influence the gravitational acceleration.</li> </ul>	
TOT	4		

2(a)	1	<i>Name the type of lens correctly</i> <ul style="list-style-type: none"> <li>• Convex lens</li> </ul>	
(b)	1	<i>State the function correctly</i> <ul style="list-style-type: none"> <li>• To magnify the image</li> </ul>	
	2	<i>State the object distance correctly</i> <ul style="list-style-type: none"> <li>• Object distance is less than focal length of the lens</li> </ul>	
(c)	1 2	<i>Show the calculation correctly</i> <ul style="list-style-type: none"> <li>• <math>\frac{1}{f} = \frac{1}{u} + \frac{1}{v}</math></li> <li>• <math>\frac{1}{v} = \frac{1}{f} - \frac{1}{u}</math></li> <li>• <math>\frac{1}{v} = \frac{1}{10} - \frac{1}{15}</math></li> <li>• <math>v = 30 \text{ cm}</math></li> </ul>	

TOT	5		
3(a)	1	<i>State the physical quantity correctly</i> <ul style="list-style-type: none"> <li>• <b>Induced</b> current</li> </ul>	
(b)	1	<i>State the reason correctly</i> <ul style="list-style-type: none"> <li>• There is cutting / changing of magnetic flux.</li> </ul>	
(c)	1	<i>Name the physics concept correctly</i> <ul style="list-style-type: none"> <li>• Electromagnetic induction.</li> </ul>	
(d)(i)	1	<i>Mark the direction of current flow correctly</i> <i>Draw the deflection of the pointer correctly</i>	
(ii)	2		
(e)	1	<i>State the answer correctly.</i> <ul style="list-style-type: none"> <li>• Deflect in opposite direction // to the left.</li> </ul>	
TOT	6		

4(a)	1	<i>Name the type of connection P correctly</i> <ul style="list-style-type: none"> <li>• Parallel .</li> </ul>	
(b)	1 2	<i>State the reading of the ammeter correctly</i>  <ul style="list-style-type: none"> <li>• <math>A_1 = 1.0 \text{ A}</math></li> <li>• <math>A_3 = 0.5 \text{ A}</math></li> </ul>	
(c)	1 2	<i>Show the calculation correctly</i> $V = IR$ $= 0.5 \times 3$ $= 1.5 \text{ V}$	
(d)	1 2	<i>Draw the circuit correctly</i>	

TOT	7		

5(a)	1	<p><b>Name the instrument correctly.</b></p> <ul style="list-style-type: none"> <li>Aneroid barometer.</li> </ul>	
(b)	1	<p><b>Compare the altitudes correctly</b></p> <ul style="list-style-type: none"> <li>M is lower altitudes than N</li> </ul>	
(c)(i)	1	<p><b>Compare the volume of vacuum chamber correctly</b></p> <ul style="list-style-type: none"> <li>The volume of vacuum chamber in Diagram 5.3 is greater than in Diagram 5.2.</li> </ul>	
(ii)	1	<p><b>Compare the atmospheric pressure exerted at M and N correctly</b></p> <ul style="list-style-type: none"> <li>The atmospheric pressure at M is greater than at N.</li> </ul>	
(iii)	1	<p><b>State the relationship between the altitude and the volume of the chamber correctly</b></p> <ul style="list-style-type: none"> <li>The higher the altitude the larger the volume of the chamber.</li> </ul>	
(iv)	1	<p><b>State the relationship between the atmospheric pressure and the volume of the chamber correctly</b></p> <ul style="list-style-type: none"> <li>The greater the atmospheric pressure exerted the smaller the volume of the chamber.</li> </ul>	
(d)	1 2	<p><b>Explain the reason correctly</b></p> <ul style="list-style-type: none"> <li>Rate of collision by air molecules acting on vacuum chamber is higher.</li> <li>Higher force causes volume of vacuum chamber to decrease.</li> </ul>	
TOT	8		

6(a)	1	<p><b>State the meaning correctly.</b></p> <ul style="list-style-type: none"> <li>A diode is a electronic device which allows current to flow in one direction <b>only</b>.</li> </ul>	
(b)(i)	1	<p><b>Compare the movement of charge carrier correctly</b></p> <ul style="list-style-type: none"> <li>Electron in diagram 6.1 move towards p-type semiconductor, electron in diagram 6.2 move away from p-type semiconductor.//</li> </ul>	

		<ul style="list-style-type: none"> <li>Electron in diagram 6.1 move to the left, electron in diagram 6.2 move to the right.</li> </ul>	
(ii)	1	<p><i>Compare the connection of n-type to the terminals of the cell correctly</i></p> <ul style="list-style-type: none"> <li>In Diagram 6.1, n-type is connected to the negative terminal of the cell.</li> <li>In Diagram 6.2, n-type is connected to the positive terminal of the cell.</li> </ul>	
(iii)	1	<p><i>Compare the depletion layer correctly</i></p> <ul style="list-style-type: none"> <li>Depletion layer in Diagram 6.1 is thinner than in Diagram 6.2// vice-versa</li> </ul>	
(iv)	1	<p><i>State the relationship between connection of terminal and the depletion layer correctly</i></p> <ul style="list-style-type: none"> <li>When the n-type semiconductor is connected to the negative terminal of dry cell, the depletion layer becomes thinner.//</li> <li>When the n-type semiconductor is connected to the positive terminal of dry cell, the depletion layer becomes thicker.</li> </ul>	
(c)	1	<p><i>State the connection name correctly.</i></p> <ul style="list-style-type: none"> <li>Forward bias.</li> </ul>	
(d)(i)	1	<p><i>Name the device correctly</i></p> <ul style="list-style-type: none"> <li>Transistor</li> </ul>	
(ii)	1	<p><i>State the function of the device correctly.</i></p> <ul style="list-style-type: none"> <li>Current amplifier // <b>Automatic</b> switch</li> </ul>	
TOTAL	8		

7(a)(i)	1	<p><i>State the meaning correctly.</i></p> <ul style="list-style-type: none"> <li>A form of energy.</li> <li>A form of energy that flows from hot to cold body.</li> </ul>	
(ii)	1 2	<p><i>Explain the reason by making the relationship between mass and heat transferred correctly.</i></p> <ul style="list-style-type: none"> <li>Large mass of hot water has large heat capacity // transfer large amount of heat.</li> <li>Reduce time to cook the noodle</li> </ul>	
(b)	1 2	<p><i>Show the calculation correctly.</i></p> <p>Heat absorbed by cold water = heat released by hot water  <math>m_1 c (\theta - \theta_1) = m_2 c (\theta_2 - \theta)</math></p> <ul style="list-style-type: none"> <li><math>2 (\theta - 30) = 9 (95 - \theta)</math></li> </ul> <p><i>State the correct answer and unit.</i></p> <ul style="list-style-type: none"> <li><math>\theta = 83.18^\circ \text{C}</math></li> </ul>	

(c)(i)	1 2 3	<p>Show the calculation</p> <p><b>Slow cooker P</b></p> <p><math>Pt = mc\theta</math></p> <ul style="list-style-type: none"> <li><math>(180)(10 \times 60) = (2) c (60)</math></li> <li><math>C = 900 \text{ J kg}^{-1} \text{ } ^\circ\text{C}^{-1}</math></li> </ul> <p><b>Slow cooker Q</b></p> <ul style="list-style-type: none"> <li><math>(70)(15 \times 60) = (2) c (60)</math></li> <li><math>C = 525 \text{ J kg}^{-1} \text{ } ^\circ\text{C}^{-1}</math></li> </ul>	
(ii)	1 2	<p>State the answer correctly</p> <ul style="list-style-type: none"> <li>Slow cooker P/ceramic</li> </ul> <p>State the reason correctly</p> <ul style="list-style-type: none"> <li>High specific heat capacity</li> </ul>	
TOT	10		

8(a)	1	<p>State the meaning correctly</p> <ul style="list-style-type: none"> <li>Radioactivity is the spontaneous disintegration of unstable nucleus to become more stable by emission of energetic particles or photons / radiation.</li> </ul>	
(b)(i)	1 2	<p>Write the equation correctly</p> <ul style="list-style-type: none"> <li><math>{}_{92}^{238}\text{U} \rightarrow {}_{90}^{234}\text{Th} + {}_2^4\text{He}</math></li> </ul>	
(ii)	1 2 1	<p>State the answer correctly</p> <ul style="list-style-type: none"> <li>Proton and neutron decreases</li> </ul> <p>State the reason correctly</p> <ul style="list-style-type: none"> <li>To become more stable//</li> <li>Release helium which has 2 neutron and 2 proton</li> </ul>	awu
(c)(i)	1	<p>Show on the graph how to determine half life for P,Q and R</p>	
(i)	1	<p>State the answer and unit for radioactive P correctly</p> <ul style="list-style-type: none"> <li>1 year</li> </ul>	
(ii)		<p>State the answer and unit for radioactive Q correctly</p> <ul style="list-style-type: none"> <li>2 years</li> </ul>	
(iii)	1 2	<p>State the answer and unit for radioactive R correctly</p> <ul style="list-style-type: none"> <li>1.25 years</li> </ul>	
(d)(i)		<p>State the most suitable source correctly</p>	

	1 2	<ul style="list-style-type: none"> <li>Radioactive Q</li> </ul>	
(ii)	1 2	<i>State the reasons correctly</i> <ul style="list-style-type: none"> <li>It has long half life</li> <li>It has medium penetrating power.</li> </ul>	
TOT	11		

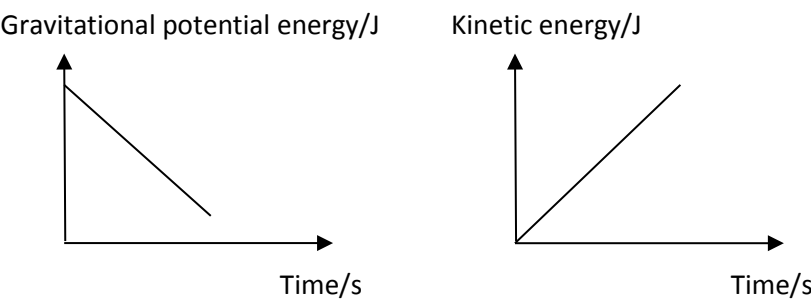
## PAPER 2 (SECTION B)

NO.		ANSWER	MARK																
9	(a)	<b><i>State the meaning correctly</i></b> ✓ Image that can be formed on the screen.	1																
	(b)	<b><i>Compare the focal length correctly,</i></b> ✓ The focal length in diagram 9.1 is longer than in diagram 9.2.// vice versa	1																
		<b><i>Compare the curvature correctly,</i></b> ✓ The mirror in diagram 9.2 has a greater curvature than in diagram 9.1.// ✓ The mirror in diagram 9.2 curve more than in diagram 9.1.//	2																
		<b><i>Compare the height of image correctly,</i></b> ✓ The height of image in diagram 9.1 is <u>higher</u> / greater than in diagram 9.2.	3																
		<b><i>Relate the height of image and focal length correctly.</i></b> ✓ The longer the focal length, the higher the image.	1																
		<b><i>Relate the height of image and curvature correctly.</i></b> ✓ The greater the curvature, the smaller the image.	2																
	(c)	<b><i>Explain the answer correctly</i></b> ✓ Transmitter from the ship transmit ultrasonic signal to the sea. ✓ Ultrasonic signal reflected from the sunken object. ✓ Receiver on the ship capture signal. ✓ Data displayed on CRO is used to calculate the distance of sunken object ✓ By using formula $s = \frac{vt}{2}$	1 2 3 4 Max 4																
	(d)	<b><i>State the modification and the justification correctly.</i></b> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2">Modification</th> <th colspan="2">Explanation</th> </tr> </thead> <tbody> <tr> <td>✓ Use concave shape</td> <td>1</td> <td>✓ Parallel light rays will be converge to focal point</td> <td>2</td> </tr> <tr> <td>✓ Shiny surface/ silver surface/ aluminium</td> <td>3</td> <td>✓ Reflector of light // heat</td> <td>4</td> </tr> <tr> <td>✓ Wider diameter/surface area</td> <td>5</td> <td>✓ To collect more light or heat</td> <td>6</td> </tr> </tbody> </table>	Modification		Explanation		✓ Use concave shape	1	✓ Parallel light rays will be converge to focal point	2	✓ Shiny surface/ silver surface/ aluminium	3	✓ Reflector of light // heat	4	✓ Wider diameter/surface area	5	✓ To collect more light or heat	6	
Modification		Explanation																	
✓ Use concave shape	1	✓ Parallel light rays will be converge to focal point	2																
✓ Shiny surface/ silver surface/ aluminium	3	✓ Reflector of light // heat	4																
✓ Wider diameter/surface area	5	✓ To collect more light or heat	6																

	✓ Use sun tracker	7	✓ To detect the position of the sun for maximum exposure	8
	✓ High position	9	✓ To maximize the amount of sunlight collected.	10
	✓ Low rate of rusting		✓ Long lasting.	

NO.	ANSWER		MARK												
10	(a)	<b>State the meaning correctly</b> ✓ number of complete oscillation /waves in one second.	1												
	(b)	<b>Compare the frequency correctly,</b> ✓ frequency of sound waves in diagram 10.1 is higher than in diagram 10.2.	1												
		<b>Compare the distance between the two loud speakers correctly</b> ✓ the distance between the two loud speakers in diagram 10.1 and diagram 10.2 are the same.	2												
		<b>Compare the distance between the two consecutive loud sounds correctly</b> ✓ the distance between the two consecutive loud sounds in diagram 10.1 is shorter than in diagram 10.2. ✓	3												
		<b>Relate the wavelength of the sound waves and distance between the two consecutive loud sounds correctly</b> ✓ When the wavelength increases, the distance between two consecutive loud sound increases.// vice versa ✓ the shorter the wavelength of the sound waves the shorter the distance between the two consecutive loud sounds	4												
		<b>Name the phenomenon correctly.</b> ✓ Interference of sound waves	5												
	(c)	<b>Explain the concept correctly</b> ✓ When the wave pass through the gap, diffraction occurs//spreading of water wave. ✓ Amplitude of the waves reduces. ✓ Energy is reduced after passing through the gap ✓ Barrier act as reflector// reflect high wave // stops high waves from hitting the houses. ✓ Barrier is high to prevent overflow of water.	1 2 3 4 5												
	(d)	<b>State the modification and the justification correctly.</b>													
		<table border="1"> <thead> <tr> <th colspan="2">Modification</th> <th colspan="2">Explanation</th> </tr> </thead> <tbody> <tr> <td>✓ Use vibrator with constant frequency</td> <td>1</td> <td>✓ To create the continuous waves</td> <td>2</td> </tr> <tr> <td>Put barrier with gap</td> <td>3</td> <td>✓ Diffraction will creates waves</td> <td>4</td> </tr> </tbody> </table>	Modification		Explanation		✓ Use vibrator with constant frequency	1	✓ To create the continuous waves	2	Put barrier with gap	3	✓ Diffraction will creates waves	4	
Modification		Explanation													
✓ Use vibrator with constant frequency	1	✓ To create the continuous waves	2												
Put barrier with gap	3	✓ Diffraction will creates waves	4												

			with smaller amplitudes	
	✓ Have high speed water source	5	✓ Create high amplitude waves for surfing	6
	✓ Different depth	7	✓ Waves of different speed	8
	✓ floats	9	✓ to save from drowning	10
			✓	
	soft barrier around the pool		✓ to absorb fast moving wave//reflected waves	
	Have 2 gaps in barrier		✓ to create the interference of waves.	
<b>TOTAL</b>				<b>20</b>

11	(a)	<b>State the meaning correctly</b> ✓ Force is an agent that can change the shape, state of motion and direction of an object.	1																				
	(b)(i)	<b>Explain the reason correctly</b> ✓ In Diagram 11.1, weight of the load is equal to the tension of the rope//forces are in equilibrium. ✓ In Diagram 11.2, weight of the load is greater than the tension of the rope.	1 2																				
	(ii)	<b>State the energy changes correctly</b> ✓ <b>Gravitational</b> potential energy → Kinetic energy.  Gravitational potential energy/J      Kinetic energy/J  Time/s    Time/s	1 2 3																				
	(c)(i)	<b>Calculate the tension of the rope.</b> ✓ $W = 150 \text{ N}$ ✓ $T = \frac{150}{\cos 15}$ ✓ $= 155.29 \text{ N}$	1 2 3																				
	(ii)	<b>State the answer correctly</b> ✓ No	4																				
	(d)	<b>State the suitable characteristics and the justification correctly.</b> <table border="1" data-bbox="331 1886 1465 2116"> <thead> <tr> <th colspan="2">characteristics</th> <th colspan="2">Explanation</th> </tr> </thead> <tbody> <tr> <td>✓ Seat cover: Fabric</td> <td>1</td> <td>✓ Cooler / able to absorb sweat</td> <td>2</td> </tr> <tr> <td>✓ Seat base: fibre</td> <td>3</td> <td>✓ Strong /does not break easily</td> <td>4</td> </tr> <tr> <td>✓ Seat belt : wide</td> <td>5</td> <td>✓ Exert less pressure on baby</td> <td>6</td> </tr> <tr> <td>✓ Car seat fastened facing the rear</td> <td>7</td> <td>✓ Children are not exposed to danger from broken glass or</td> <td>8</td> </tr> </tbody> </table>	characteristics		Explanation		✓ Seat cover: Fabric	1	✓ Cooler / able to absorb sweat	2	✓ Seat base: fibre	3	✓ Strong /does not break easily	4	✓ Seat belt : wide	5	✓ Exert less pressure on baby	6	✓ Car seat fastened facing the rear	7	✓ Children are not exposed to danger from broken glass or	8	
characteristics		Explanation																					
✓ Seat cover: Fabric	1	✓ Cooler / able to absorb sweat	2																				
✓ Seat base: fibre	3	✓ Strong /does not break easily	4																				
✓ Seat belt : wide	5	✓ Exert less pressure on baby	6																				
✓ Car seat fastened facing the rear	7	✓ Children are not exposed to danger from broken glass or	8																				



			9	flying pieces of debris	
		<b>State the suitable car correctly</b> ✓ M		<b>State the reason correctly</b> ✓ Because it use fabric, wide seat belt, have fibre base and faces rear.	10
<b>TOTAL C11 = 20 marks</b>					

12	(a)(i)	<b>State the answer correctly</b> ✓ Transformer P is a step down transformer. ✓ Number of turns of secondary coil is less than the number of turns of the primary coil.			1 2																
	(ii)	<b>Explain how a transformer works.</b>  ✓ AC flows in the primary coil ✓ Soft iron core is magnetized with changing magnetic flux. ✓ Soft iron core links the changing of magnetic flux from primary coil to secondary coil ✓ There is cutting of magnetic flux ✓ Induced e.m.f. / induced current is produced in the secondary coil.			1 2 3 4																
	(b)(i)	<b>Show the calculation correctly.</b>  ✓ $\frac{V_p}{V_s} = \frac{N_p}{N_s}$ ✓ $V_s = \frac{V_p}{N_p} \times N_s$ ✓ $= \frac{2000}{500} \times 240$  $= 60 \text{ V}$			1 2																
		<b>Show the calculation correctly.</b>  ✓ $V_p I_p = V_s I_s$  ✓ $I_s = \frac{240}{60} \times 2$  $= 8 \text{ A}$			1 2																
	(c)	<b>State the suitable characteristics and the justification correctly.</b>																			
		<table border="1" style="width: 100%;"> <thead> <tr> <th colspan="2">Characteristics</th> <th colspan="2">Explanation</th> </tr> </thead> <tbody> <tr> <td>✓ Material of the blade : fibre glass</td> <td>1</td> <td>✓ Lighter/easy to rotate.</td> <td>2</td> </tr> <tr> <td>✓ Shape of blade : aerodynamic</td> <td>3</td> <td>✓ Low air resistance</td> <td>4</td> </tr> <tr> <td>✓ Type of generator: AC</td> <td>5</td> <td>✓ Able to change voltage /</td> <td>6</td> </tr> </tbody> </table>				Characteristics		Explanation		✓ Material of the blade : fibre glass	1	✓ Lighter/easy to rotate.	2	✓ Shape of blade : aerodynamic	3	✓ Low air resistance	4	✓ Type of generator: AC	5	✓ Able to change voltage /	6
Characteristics		Explanation																			
✓ Material of the blade : fibre glass	1	✓ Lighter/easy to rotate.	2																		
✓ Shape of blade : aerodynamic	3	✓ Low air resistance	4																		
✓ Type of generator: AC	5	✓ Able to change voltage /	6																		

				potential difference	
		✓ Height of wind turbine : high position	7	✓ Increase the rotation of blade , not block by buildings	8
		<b>State the suitable wave correctly</b> ✓ R	9	<b>State the reason correctly</b> ✓ Fibre glass, aerodynamic, AC generator and high position.	10
					<b>TOTAL C12 = 20 marks</b>

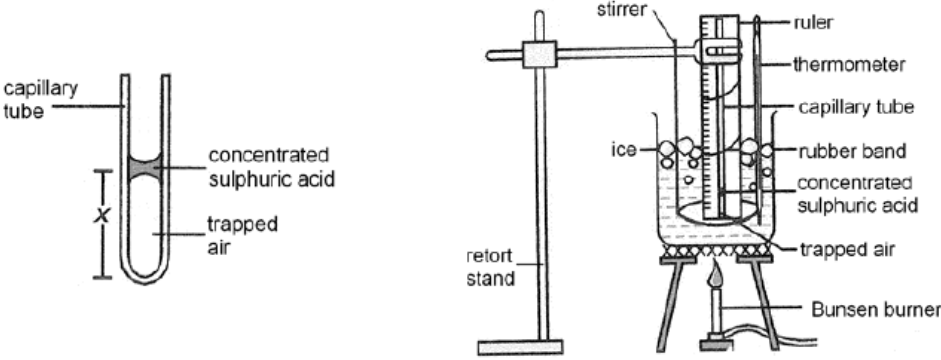
**PAPER 3 (SECTION A)**

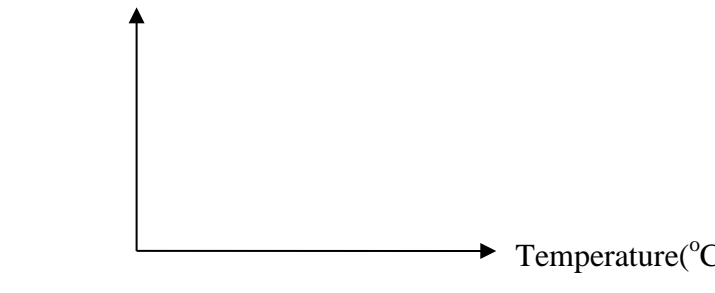
NO.		ANSWER	MARK																		
1	(a)(i)	<b>State the manipulated variable correctly.</b> ✓ Length of wire , <i>l</i>	1																		
	(ii)	<b>State the responding variable correctly.</b> ✓ Angle of deflection, $\Delta\theta$	1																		
	(iii)	<b>State the fixed variable correctly.</b> ✓ Diameter of wire// mass of load//length of cut A from the centre of straw.	1																		
	(b)(i)	<b>Record the reading of <math>\theta</math> correctly</b>  <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Diagram</th> <th>angle</th> </tr> </thead> <tbody> <tr> <td>diagram 1.3</td> <td>98°</td> </tr> <tr> <td>diagram 1.4</td> <td>106°</td> </tr> <tr> <td>diagram 1.5</td> <td>114°</td> </tr> <tr> <td>diagram 1.6</td> <td>122°</td> </tr> <tr> <td>diagram 1.7</td> <td>130°</td> </tr> </tbody> </table> <div style="border: 1px solid black; padding: 5px; margin-left: auto; margin-right: auto; width: fit-content;">           5 ✓ → 2 marks            3-4 ✓ → 1 mark            0-2 ✓ → 0 mark         </div>	Diagram	angle	diagram 1.3	98°	diagram 1.4	106°	diagram 1.5	114°	diagram 1.6	122°	diagram 1.7	130°	1  2						
Diagram	angle																				
diagram 1.3	98°																				
diagram 1.4	106°																				
diagram 1.5	114°																				
diagram 1.6	122°																				
diagram 1.7	130°																				
	(ii)	<b>Calculate the reading of <math>\Delta\theta</math> correctly</b>  <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Diagram</th> <th><math>\Delta\theta</math></th> </tr> </thead> <tbody> <tr> <td>diagram 1.3</td> <td>8°</td> </tr> <tr> <td>diagram 1.4</td> <td>16°</td> </tr> <tr> <td>diagram 1.5</td> <td>24°</td> </tr> <tr> <td>diagram 1.6</td> <td>32°</td> </tr> <tr> <td>diagram 1.7</td> <td>40°</td> </tr> </tbody> </table> <div style="border: 1px solid black; padding: 5px; margin-left: auto; margin-right: auto; width: fit-content;">           5 ✓ → 2 marks            3-4 ✓ → 1 mark            0-2 ✓ → 0 mark         </div>	Diagram	$\Delta\theta$	diagram 1.3	8°	diagram 1.4	16°	diagram 1.5	24°	diagram 1.6	32°	diagram 1.7	40°							
Diagram	$\Delta\theta$																				
diagram 1.3	8°																				
diagram 1.4	16°																				
diagram 1.5	24°																				
diagram 1.6	32°																				
diagram 1.7	40°																				
	(c)	<b>Tabulate <i>l</i>, <math>\theta</math>, and <math>\Delta\theta</math> correctly</b>  <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th><i>L</i>(cm)</th> <th><math>\theta</math>(°)</th> <th><math>\Delta\theta</math>(°)</th> </tr> </thead> <tbody> <tr> <td>10.0</td> <td>98</td> <td>8</td> </tr> <tr> <td>20.0</td> <td>106</td> <td>16</td> </tr> <tr> <td>30.0</td> <td>114</td> <td>24</td> </tr> <tr> <td>40.0</td> <td>122</td> <td>32</td> </tr> <tr> <td>50.0</td> <td>130</td> <td>40</td> </tr> </tbody> </table> <div style="border: 1px solid black; padding: 5px; margin-left: auto; margin-right: auto; width: fit-content;">           7 ✓ → 5 marks            6 ✓ → 4 marks            4-5 ✓ → 3 marks            2-3 ✓ → 2 marks            1 ✓ → 1 mark         </div> <p style="margin-left: auto; margin-right: auto;">Write all the variables correctly. State the correct unit All values of are consistent without d.p.</p>	<i>L</i> (cm)	$\theta$ (°)	$\Delta\theta$ (°)	10.0	98	8	20.0	106	16	30.0	114	24	40.0	122	32	50.0	130	40	1 2 3
<i>L</i> (cm)	$\theta$ (°)	$\Delta\theta$ (°)																			
10.0	98	8																			
20.0	106	16																			
30.0	114	24																			
40.0	122	32																			
50.0	130	40																			

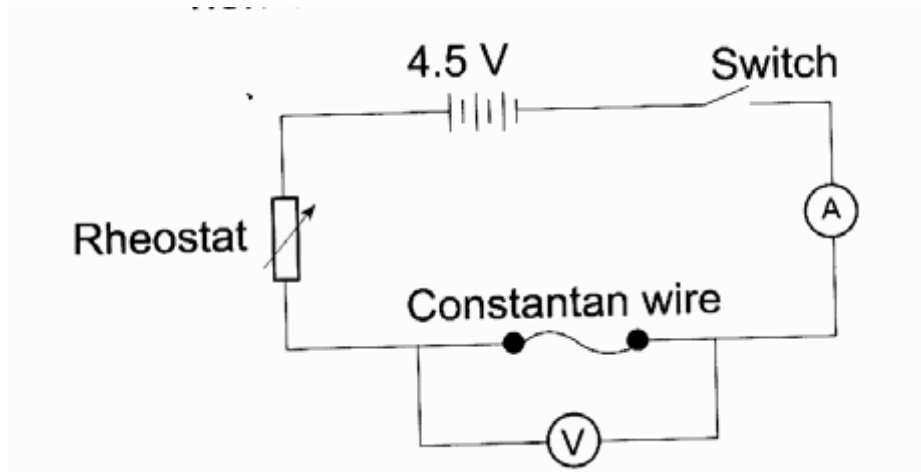
	(d)	<b>Draw the graph of <math>\Delta\theta</math> against <math>l</math> correctly</b> ✓ Label y-axis $\Delta\theta$ and x-axis $l$ ✓ Label correct unit for y-axis and x-axis ✓ Both axes with an even and uniform scale ✓ 5 coordinates correctly plotted ✓ 3-4 coordinates correctly plotted. ✓ A smooth best straight line ✓ Minimum size of the graph is 10 cm x 10 cm	1 2 3 4 5
	(e)	<b>State the relationship correctly</b> ✓ $\Delta\theta$ is directly proportional to $l$	1
			<b>TOTAL 16</b>


2	(a)(i)	<b>State the relationship correctly</b> ✓ $h$ is directly proportional to $H$	1
	(ii)	<b>State the value of <math>h</math> when <math>H=10.0</math> cm</b> ✓ Show on the graph ✓ $h = 7.5$ cm	1 2
	(iii)	<b>State the value of <math>H</math> when <math>h=50.0</math> cm</b> ✓ Show on the graph ✓ $H = 65.0$ cm	
	(b)	<b>Calculate the gradient correctly</b> ✓ Draw the triangle $> 8$ cm x 8 cm ✓ Correct substitution e.g. $m = \frac{(50 - 0)}{(65 - 0)}$ ✓ State the answer with unit $m = 0.769$ range ( 0.769-0.775)	1 2 3
	(c)	<b>Calculate the refractive index correctly</b> <ul style="list-style-type: none"> <li>• <math>n = H/h</math></li> <li>• <math>= 1/m</math></li> <li>• <math>= 1/0.769</math></li> <li>• <math>N = 1.300</math></li> </ul>	1 2
		<b>State the precaution correctly</b> ✓ eyes must be <b>perpendicular</b> to the scale of stopwatch to avoid <b>parallax</b> error. ✓ Repeat the experiment 4 times and calculate the <b>average</b> for more <b>accurate</b> results.	1

**PAPER 3 (SECTION B)**

3	Rubric	mark								
(a)	<p><b>State the suitable inference correctly</b></p> <ul style="list-style-type: none"> <li>Volume of trapped air depends on its temperature</li> </ul>	1								
(b)	<p><b>State the hypothesis correctly</b></p> <ul style="list-style-type: none"> <li>The higher the temperature the bigger the volume of trapped air</li> </ul>	1								
(c)(i)	<p><b>State the aim of experiment correctly</b></p> <ul style="list-style-type: none"> <li>To investigate the relationship between volume and temperature of trapped air</li> </ul>	1								
(ii)	<p><b>State the variables correctly</b></p> <p>Manipulative : Temperature of trapped air                      Responsive : volume of trapped air (length of air trapped)</p>	2								
	<p><b>State the fixed variables correctly</b></p> <ul style="list-style-type: none"> <li>Pressure of trapped air // mass of air</li> </ul>	3								
(iii)	<p><b>List the apparatus correctly</b>                      , tripod, beaker, thermometer, Bourdon gauge, Bunsen burner, rubber tube</p>	4								
(iv)	<p><b>Arrangement of the apparatus</b></p> 	5								
(v)	<p><b>State the procedure including the way to control the manipulated variables correctly</b>                      Water is heated and stirred until the temperature is 20°C.</p>	6								
	<p><b>State the procedure including the way to measure the responding variables correctly</b>                      The pressure of trapped air is measure by using the Bourdon gauge.                      Record the reading of pressure in a table.</p>	7								
	<p><b>State the repetition of the procedure to obtain a set of data</b></p> <p>The above procedure is repeated for a temperatures <math>\theta = 40^\circ\text{C}</math> ,60 °C,80 °C and 100 °C</p>	8								
(vi)	<p><b>Draw a table at least consist of 2 column with complete labelled</b></p> <table border="1" data-bbox="300 1973 1125 2121"> <thead> <tr> <th>Temperature/°C</th> <th>Volume of air trapped/ cm<sup>3</sup></th> </tr> </thead> <tbody> <tr> <td>20</td> <td></td> </tr> <tr> <td>40</td> <td></td> </tr> <tr> <td>60</td> <td></td> </tr> </tbody> </table>	Temperature/°C	Volume of air trapped/ cm <sup>3</sup>	20		40		60		9
Temperature/°C	Volume of air trapped/ cm <sup>3</sup>									
20										
40										
60										

		80			
		100			
	(vii)	<b>Draw the axes of y and x with label</b>			10
		<p>volume( cm<sup>3</sup>)</p>  <p>Temperature(°C)</p>			
		<b>TOTAL</b>			12

4.	(a)	<b>State the inference correctly</b> <ul style="list-style-type: none"> <li>The speed of the slide depends on the length of wire</li> </ul>	1
	(b)	<b>State the hypothesis correctly</b> <ul style="list-style-type: none"> <li>The greater the <u>current</u>, the greater the <u>displacement</u> of the rod</li> <li>The greater the current the greater the force.</li> </ul>	1
	(c)(i)	<b>State the aim of the experiment</b> <ul style="list-style-type: none"> <li>To determine the relationship between <u>current</u> and <u>displacement</u> of the rod.</li> </ul>	1
	(ii)	<b>State the variable correctly</b> <ul style="list-style-type: none"> <li>MV- current</li> <li>RV – displacement of the rod.(force is shown by displacement of rod)</li> <li>CV – strength of the magnet//number of magnet</li> </ul>	2 3
	(iii)	<b>State the apparatus correctly</b> <ul style="list-style-type: none"> <li>Dc power supply, magnet bar, C-shaped soft iron core, rheostat, switch connecting wires and meter rule.</li> </ul>	4
	(iv)	<b>Show the arrangement of apparatus correctly</b> 	5

	(v)	<p><b>State the procedure of controlling the MV</b></p> <ul style="list-style-type: none"> <li>Set the apparatus as shown in the diagram The switch is switched on. The rheostat is adjusted to obtain the current 0.5 A.</li> </ul> <p><b>State the procedure of taking the reading of RV</b></p> <ul style="list-style-type: none"> <li>Measure the <u>displacement of the rod</u> by using a ruler. Record the reading in a table.</li> </ul> <p><b>State the repeating the procedure of taking the reading of MV</b></p> <ul style="list-style-type: none"> <li>Repeat the experiment with values of current, <math>I = 1.0 \text{ A}</math>, <math>1.5 \text{ A}</math>, <math>2.0 \text{ A}</math> and <math>2.5 \text{ A}</math></li> </ul>	6 7 8												
	(vi)	<p><b>Tabulate the data</b></p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Current, I (A)</th> <th>Displacement, s (cm)</th> </tr> </thead> <tbody> <tr> <td>0.5</td> <td></td> </tr> <tr> <td>1.0</td> <td></td> </tr> <tr> <td>1.5</td> <td></td> </tr> <tr> <td>2.0</td> <td></td> </tr> <tr> <td>2.5</td> <td></td> </tr> </tbody> </table>	Current, I (A)	Displacement, s (cm)	0.5		1.0		1.5		2.0		2.5		9
Current, I (A)	Displacement, s (cm)														
0.5															
1.0															
1.5															
2.0															
2.5															
	(v)	<p><b>Draw the graph</b></p> <p style="text-align: center;">Displacement, s (cm)</p>  <p style="text-align: center;">Current, I (A)</p>	10												
TOTAL			12												