



**MAJLIS PENGETUA SEKOLAH MALAYSIA
(CAWANGAN PULAU PINANG)**

**MODUL BERFOKUS KBAT SPM 2019
(PP)**

4531/3

FIZIK

Kertas 3

PERATURAN PEMARKAHAN

UNTUK KEGUNAAN PEMERIKSA SAHAJA

AMARAN

Peraturan pemarkahan ini adalah **SULIT** dan **Hak Cipta MPSM Pulau Pinang**. Kegunaannya khusus untuk pemeriksa yang berkenaan sahaja. Sebarang maklumat dalam peraturan pemarkahan ini tidak boleh dimaklumkan kepada sesiapa. Peraturan pemarkahan ini tidak boleh dikeluarkan dalam apa-apa bentuk media.

SECTION A

QUESTION 1

Question	Answer		Mark	Total Mark																								
1	(a)(i)	Manipulated variable = Angle of incidence.	1																									
	(ii)	Responding variable = Angle of refraction.	1																									
	(iii)	Constant variable = Refractive index of the glass block/density of the glass block	1																									
	(b) (i)	<table border="1"> <tr><td>$i/^\circ$</td><td>$r/^\circ$</td></tr> <tr><td>20</td><td>13</td></tr> <tr><td>30</td><td>19</td></tr> <tr><td>40</td><td>25</td></tr> <tr><td>50</td><td>30</td></tr> <tr><td>60</td><td>36</td></tr> </table> <p><u>Value of r</u> 5 values correct ---- (2) 4 or 3 values correct ----(1) 2 values and below -----(0)</p>	$i/^\circ$	$r/^\circ$	20	13	30	19	40	25	50	30	60	36	2													
$i/^\circ$	$r/^\circ$																											
20	13																											
30	19																											
40	25																											
50	30																											
60	36																											
	(ii)	<table border="1"> <tr><td>$\sin i$</td><td>$\sin r$</td></tr> <tr><td>0.34</td><td>0.22</td></tr> <tr><td>0.50</td><td>0.33</td></tr> <tr><td>0.64</td><td>0.42</td></tr> <tr><td>0.77</td><td>0.50</td></tr> <tr><td>0.87</td><td>0.59</td></tr> </table> <p>All values of $\sin i$ correct 1 mark All values of $\sin r$ correct 1 mark</p> <p><i>Accept 2 – 4 decimal places (ignore consistency d.p)</i> <i>Accept ecf (error carried forward) for $\sin r$</i></p>	$\sin i$	$\sin r$	0.34	0.22	0.50	0.33	0.64	0.42	0.77	0.50	0.87	0.59	2													
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	(iii)	<table border="1"> <tr><td>$i/^\circ$</td><td>$r/^\circ$</td><td>$\sin i$</td><td>$\sin r$</td></tr> <tr><td>20</td><td>13</td><td>0.34</td><td>0.22</td></tr> <tr><td>30</td><td>19</td><td>0.50</td><td>0.33</td></tr> <tr><td>40</td><td>25</td><td>0.64</td><td>0.42</td></tr> <tr><td>50</td><td>30</td><td>0.77</td><td>0.50</td></tr> <tr><td>60</td><td>36</td><td>0.87</td><td>0.59</td></tr> </table> <p>1 mark – 4 columns for i, r, $\sin i$ and $\sin r$ 1 mark – correct units for each i, r, and no unit for $\sin i$ and $\sin r$ 1 mark – all values of $\sin i$ and $\sin r$ are consistent to 2 - 4 d.p</p>	$i/^\circ$	$r/^\circ$	$\sin i$	$\sin r$	20	13	0.34	0.22	30	19	0.50	0.33	40	25	0.64	0.42	50	30	0.77	0.50	60	36	0.87	0.59	3	
$i/^\circ$	$r/^\circ$	$\sin i$	$\sin r$																									
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Question	Answer	Mark	Total Mark
(c)	<p>Draw the graph of θ against x.</p> <p>A - Label y-axis and x-axis correctly ✓</p> <p>B - States the unit at the axis correctly ✓</p> <p>C - Both axes with the even and uniform scale ✓</p> <p>D - 5 points correctly plotted: ✓ ✓ - at least 3 points correctly plotted ✓</p> <p>E - a smooth best straight line ✓</p> <p>F - minimum size of the graph is 5×4 squares of $2 \text{ cm} \times 2 \text{ cm}$. ✓ 7 ✓ - 5 marks 6-5 ✓ - 4 marks 3-4 ✓ - 3 marks 2 ✓ - 2 marks 1 ✓ - 1 mark</p>	5	
(d)	sin r is directly proportional to sin i .	1	
	Total		16

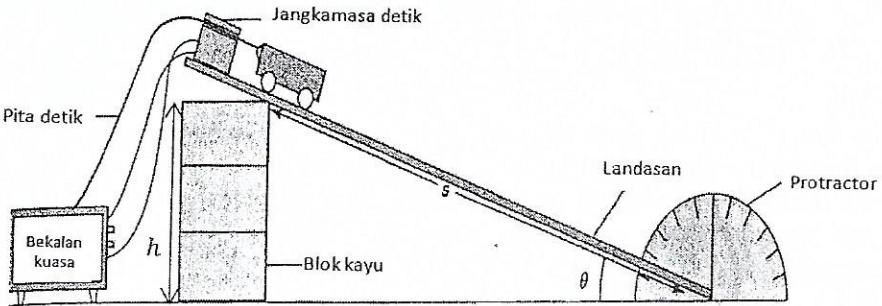
QUESTION 2

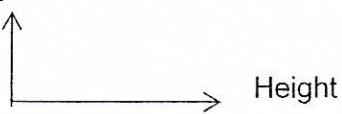
Soalan/ Question	Jawapan/Answer	Markah/ Marks
2 (a) (i)	<p>a is directly proportional to $\frac{1}{x}$</p> <p><i>a berkadar langsung dengan $\frac{1}{x}$</i></p> $a \propto \frac{1}{x}$	1
2 (a) (ii)	<p>Show on the graph/ tunjukkan pada graf</p> <p>Graph of a against $\frac{1}{x}$</p> <p>Graf a melawan $\frac{1}{x}$</p> <p>Diagram 2.1 Rajah 2.1</p> <p>Apabila/ When $a = 12 \text{ cm}$,</p> $\frac{1}{x} = 0.5$ $x = \frac{1}{0.5} = 2.0 \text{ cm}$	1

2 (a) (iii)	<p>Graph of a against $\frac{1}{x}$ <i>Graf a melawan $\frac{1}{x}$</i></p> <p>Minimum size triangle: 3×4 squares of $2\text{ cm} \times 2\text{ cm}$</p> <p>Diagram 2.1 <i>Rajah 2.1</i></p> <p>Show on the graph how you calculate m <i>Tunjukkan pada graf itu bagaimana anda menghitung m.</i></p> <p>Kecerunan // Gradient, $m = \frac{12-0}{0.5-0}$</p> <p>$m = 24\text{ cm}^2$ <i>(answer with correct unit/Jawapan dengan unit yang betul)</i></p>	1
2 (b)	$\lambda = \frac{m}{l} = \frac{24}{20.0}$ $\lambda = 1.2\text{ cm}$	1 1
2 (c)	$v = f\lambda = 1.2 \times 12$ $v = 14.4\text{ cm}$	1 1
2 (d)	<p>The eye should be vertically above the scale of perpendicular to the meter rule when taking the reading to avoid parallax error. <i>Mata harus berada tegak di atas skala pembaris meter/ bersudut tegak dengan skala pembaris apabila mengambil bacaan untuk mengelakkan ralat paralaks</i></p>	1
	JUMLAH	12

SECTION B

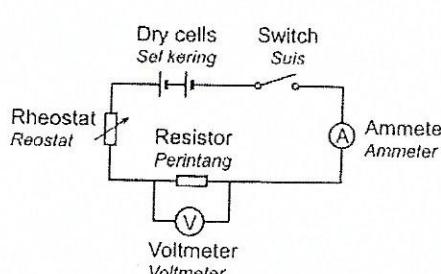
QUESTION 3

3	State a suitable inference		1	1
	(a) Velocity depends on the height (of the slide) <i>Halaju dipengaruhi oleh ketinggian (papan gelongsor)</i>			
	State a relevant hypothesis		1	1
	(b) The higher the height, the higher the velocity Jika <u>ketinggian bertambah</u> , maka <u>halaju bertambah</u>			
	State the aim of experiment		1	1
	(c)(i) To study the relationship between the height and the velocity <i>Untuk mengkaji hubungan antara ketinggian dan halaju</i>			
	State the manipulated variable and the responding variable Manipulated : height, Responding : velocity		1 1	2
	State ONE variable that kept constant Mass of trolley <i>Jisim troli</i>		1	1
	Complete list of apparatus and materials Ticker timer, trolley, ticker tape, runway, wooden block, power supply, metre rule, connecting wire <i>Jangka masa detik, troli, pita detik, pembaris meter, landasan, blok kayu, bekalan kuasa, wayar penyambung</i> (accept – if label in diagram or stated in procedure)		1	1
	Arrangement of apparatus :  Must label: ticker timer and runway		1	1

	<p>State the method of controlling the manipulated variable</p> <p>Fix the height of runway, $h = 20 \text{ cm}$ Switch on the power supply and the ticker timer. Release the trolley so that it slides down the runway</p> <p>Tetapkan ketinggian landasan, $h = 20 \text{ cm}$ <i>Hidupkan suis bekalan kuasa dan suis jangka masa detik. Lepaskan troli supaya menuruni landasan.</i></p> <p>State the method of measuring the responding variable</p> <p>Calculate the velocity with the formula <i>Kira halaju dengan menganalisa pitak detik dan menggunakan formula berikut:</i></p> $v = \frac{s}{t}$ <p>Repeat the experiment at least 4 times</p> <p>Repeat the experiment with 4 different values of height, such as 30 cm, 40 cm, 50 cm, and 60 cm² <i>Ulang eksperimen dengan ketinggian landasan, $h = 30. \text{ cm}, 40. \text{ cm}, 50. \text{ cm} \text{ dan } 60. \text{ cm}$</i></p>	1	3												
(v)	<p>Tabulation of data:</p> <table border="1"> <thead> <tr> <th>Height</th> <th>velocity</th> </tr> </thead> <tbody> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> </tbody> </table>	Height	velocity											1	1
Height	velocity														
(vi)	<p>Analyze the data.</p> <p>velocity</p> 	1	1												
(vii)	<p>Total marks</p> <p>Maximum</p>	13	13												
		12	12												

- Terima kes: MV: Ketinggian
 RV: Pecutan

QUESTION 4

4		State a suitable inference	1	1
	(a)	The brightness/current of the bulb depends on the voltage across it. <i>Kecerahan mentol/ arus bergantung kepada voltan merentasinya.</i>		
	(b)	State a relevant hypothesis The larger the potential difference, the larger the current. <i>Semakin besar beza keupayaan, semakin besar arus.</i>	1	1
	(c)(i)	State the aim of experiment To investigate the relationship between the potential difference and current. <i>Untuk menyiasat hubungan antara beza keupayaan dan arus elektrik.</i>	1	1
	(ii)	State the manipulated variable and the responding variable Manipulated variable: Potential difference, V <i>Pemboleh ubah dimanipulasikan: Beza keupayaan, V</i> Responding variable: Current, I <i>Pemboleh ubah bergerak balas: Arus elektrik,</i>	1	2
		State ONE variable that kept constant Fixed variable: Resistance of resistor <i>Pemboleh ubah dimalarkan: Rintangan perintang</i>	1	1
	(iii)	Complete list of apparatus and materials Dry cells, standard resistor, voltmeter, ammeter, rheostat and connecting wires. <i>Sel kering, perintang piawai, voltmeter, ammeter, reostat dan dawai penyambung.</i> (accept – if label in diagram or stated in procedure)	1	1
	(iv)	Arrangement of apparatus:  <p>Mesti label: resistor dan rheostat</p>	1	1

	State the method of controlling the manipulated variable														
	1. The apparatus is set up as shown. <i>Radas disusun seperti yang ditunjukkan.</i>	1	3												
	2. The switch is on and the rheostat is adjusted until the reading of voltmeter, $V = 0.5\text{ V}$. <i>Suis dihidupkan dan reostat dilaraskan sehingga bacaan pada voltmeter ialah 0.5 V</i>	1													
(v)	State the method of measuring the responding variable	1													
	3. The corresponding reading of ammeter, I , is recorded. <i>Bacaan ammeter yang sepadan, I, direkodkan.</i>														
	Repeat the experiment at least 4 times														
	4. The experiment is repeated by adjusting the rheostat so that the voltmeter reading $V = 1.0\text{ V}, 1.5\text{ V}, 2.0\text{ V}$ and 2.5 V . <i>Eksperimen diulangi dengan melaraskan reostat supaya bacaan voltmeter $V = 1.0\text{ V}, 1.5\text{ V}, 2.0\text{ V}$ and 2.5 V.</i>														
(vi)	Tabulation of data: <table border="1"> <thead> <tr> <th>$V(\text{V})$</th> <th>$I(\text{A})$</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>	$V(\text{V})$	$I(\text{A})$	0.5		1.0		1.5		2.0		2.5		1	1
$V(\text{V})$	$I(\text{A})$														
0.5															
1.0															
1.5															
2.0															
2.5															
(vii)	Analyze the data. 	1	1												
	Total marks	13	13												
	Maximum	12	12												

- Terima seperti biasa untuk kes: Pemboleh ubah dimanipulasi: Arus
Pemboleh ubah bergerakbalas: Beza keupayaan (Hukum Ohm)