

**SKEMA PEMARKAHAN  
MATEMATIK TAMBAHAN – KERTAS 2  
PERCUBAAN SPM 2019**

Nombor	Penyelesaian dan Pemarkahan	Sub Markah	Markah Penuh
<b>BAHAGIAN A [ 40 MARKAH]</b>			
1	<p>(a) <math>14 - \text{mata Atiya} = 7</math> <span style="float: right;">K1</span></p> <p style="padding-left: 100px;"><math>\text{Mata Chua} = 8</math> dan <math>\text{mata Atiya} = 7</math> <span style="float: right;">N1</span></p> <p>(b) <math>\left( \frac{5^2 + 7^2 + 7^2 + 8^2 + 12^2 + 14^2 + 17^2}{7} \right) - 10^2</math> <span style="float: right;">K1</span></p> <p style="padding-left: 100px;"><math>4.071</math> <span style="float: right;">N1</span></p> <p>(c) <math>\text{Min} = 20</math> <span style="float: right;">N1</span></p> <p style="padding-left: 100px;"><math>\text{Varians} = 66.29</math> <span style="float: right;">N1</span></p>	<b>2</b>	
2	<p><math>(90 - 2x + y)^2 = 130</math> atau setara <span style="float: right;">P1</span></p> <p><math>y = 2x - 25</math> <span style="float: right;">P1</span></p> <p><math>(90 \times 45) - (90 - 2x)y = 3300</math> atau <math>750 = 90y - 25</math> <span style="float: right;">P1</span></p> <p><math>750 = 90(2x - 25) - 2x(2x - 25)</math> <span style="float: right;">K1</span></p> <p><math>4x^2 - 230x + 3000 = 0</math></p> <p><math>x = \frac{-(-230) \pm \sqrt{(-230)^2 - 4(4)(3000)}}{2(4)}</math> <span style="float: right;">K1</span></p> <p><math>x = 20</math> dan <math>x = 37.5</math> <span style="float: right;">N1</span></p> <p><math>y = 15</math> dan <math>y = 50</math> (abaikan)</p> <p><math>AD = 50</math> dan <math>AB = 15</math> kedua-dua betul <span style="float: right;">N1</span></p>	<b>7</b>	<b>7</b>

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3	<p>(a) <math>A_1 = \pi h^2</math> atau <math>A_1 = \pi h^2</math> setara P1  <math>\frac{a[4^4 - 1]}{4 - 1} = 1700\pi</math> K1  <math>a = 20\pi</math> N1</p> <p>(b) <math>20\pi(4)^{n-1} = 320\pi</math> atau setara K1  <math>n = 3</math> N1</p> <p>(c) <math>\frac{20\pi}{4 - 1}</math> K1  <math>6\frac{2}{3}\pi</math> N1</p>	<p>3</p> <p>2</p> <p>2</p>	<p>7</p>
4.	<p>(a) <math>\vec{AO} + \vec{OE} = m(\vec{AO} + \vec{OD})</math> K1  <math>\vec{OE} = (1 - m)\underline{a} + m\underline{d}</math> N1</p> <p>(b) (i) <math>\vec{OE} = 2n\underline{a} + 3n\underline{d}</math> K1  Selesaikan persamaan serentak K1  <math>2n = 1 - m</math>  <math>m = 3n</math>  <math>m = \frac{3}{5}, n = \frac{1}{5}</math> N1, N1</p> <p>(ii) <math>\vec{AE} = \frac{3}{5}\vec{AD}</math>  DE : EA = 2 : 3 NI</p>	<p>2</p> <p>5</p>	<p>7</p>

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5	<p>(a) <math>\sqrt{(h-5)^2 + (2h-6)^2} = \sqrt{32}</math> K1</p> <p><math>(5h-29)(h-1) = 0</math></p> <p><math>h = \frac{29}{5}</math> (abaikan), <math>h = 1</math> N1</p> <p><math>\frac{2-0}{1-3} = \frac{k-0}{-2-3}</math> atau <math>\frac{2-0}{1-3} = \frac{k-2}{-2-1}</math> K1</p> <p><math>k = 5</math> N1</p> <p>(b) Gunakan <math>m_1 \times m_2 = -1</math></p> <p><math>m_{AP} \times m_{BP}</math> atau <math>m_{AP} \times m_{BD}</math> atau <math>m_{AP} \times m_{PD}</math> K1</p> <p><math>1 \times -1 = -1</math> dan AP adalah jarak terpendek N1</p> <p>ATAU Kaedah alternatif</p> <p><math>(\sqrt{32})^2 + (\sqrt{8})^2</math> dan <math>(\sqrt{40})^2</math> atau K1</p> <p><math>(\sqrt{32})^2 + (\sqrt{18})^2</math> dan <math>(\sqrt{50})^2</math></p> <p><math>(\sqrt{32})^2 + (\sqrt{8})^2 = (\sqrt{40})^2</math> atau N1</p> <p><math>(\sqrt{32})^2 + (\sqrt{18})^2 = (\sqrt{50})^2</math></p>	4	6

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6	<p>(a) <math>y = x - 1</math> pada <math>(x, 0)</math></p> <p><math>x = 1</math> P1</p> <p>Luas kawasan berlorek</p> <p><math>\int_0^3 11 - x^2 dx = \left[ 11x - \frac{x^3}{3} \right]_0^3</math> atau <math>\frac{1}{2}(2)(2)</math> K1</p> <p><math>\left[ 11x - \frac{x^3}{3} \right]_0^3 - \frac{1}{2}(2)(2)</math> K1</p> <p>22 unit<sup>2</sup> N1</p> <p>(b) <b>Isipadu janaan</b></p> <p><math>\pi \int_2^{11} (11 - y) dy = \pi \left[ 11y - \frac{y^2}{2} \right]_2^{11}</math> K1</p> <p><math>\pi \left[ 11(11) - \frac{11^2}{2} \right] - \left[ 11(2) - \frac{2^2}{2} \right]</math> K1</p> <p>40.5 <math>\pi</math></p>	4	7

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<b>BAHAGIAN B</b>			
7	<p>(a) <math>\sin \frac{\angle POQ}{2} = \frac{12}{15}</math> <span style="float: right;">K1</span></p> <p><math>\angle POQ = 1.855 \text{ rad}</math> <span style="float: right;">N1</span></p> <p>(b) <math>S_{PBQ} = 15(1.855)</math> <span style="float: right;">K1</span></p> <p><math>S_{PCQ} = 12(3.142)</math> <span style="float: right;">K1</span></p> <p><math>15(1.855) + 12(3.142) + 20 + 11 + 11</math> <span style="float: right;">K1</span></p> <p>107.5 <span style="float: right;">N1</span></p> <p>(c) <math>\frac{1}{2}(12)^2(3.142)</math> <span style="float: right;">K1</span></p> <p><math>\frac{1}{2}(15)^2(1.855)</math> atau <math>\frac{1}{2}(15)^2 \sin 106.26</math></p> <p>atau <math>\frac{1}{2}(24)(9)</math> <span style="float: right;">K1</span></p> <p><math>\frac{1}{2}(12)^2(3.142) - [\frac{1}{2}(15)^2(1.855) - \frac{1}{2}(15)^2 \sin 106.26] +</math></p> <p><math>\frac{1}{2}(11)^2(1.818)</math> <span style="float: right;">K1</span></p> <p>235.5 <span style="float: right;">N1</span></p>	<p>2</p> <p>4</p> <p>4</p>	<b>10</b>

Nomor	Penyelesaian dan Pemarkahan	Sub Markah	Markah Penuh
8	<p>(a)</p> <p>(i) <math>P(X = 6) = {}^6C_6(p)^6(1-p)^0</math> atau <math>P(X = 6) = {}^6C_6(p)^6(q)^0</math>  <math>{}^6C_6(p)^6(1-p)^0 = 0.046656</math> K1  <math>p = 0.6</math> N1</p> <p>ii) <math>P(x &gt; 4) = P(X = 5) + P(X = 6)</math> P1  <math>= {}^6C_5(0.6)^5(0.4)^1 + {}^6C_6(0.6)^6(0.4)^0</math> K1  <math>= 0.2333</math> N1</p> <p>(b)</p> <p>(i) <math>P(X &gt; V) = 0.409</math>  <math>P\left(z &gt; \frac{V - 900}{17}\right) = 0.409</math>  <math>z = 0.23</math> N1  <math>\frac{v - 900}{17} = 0.23</math> K1  <math>V = 903.91</math> N1</p> <p>(ii) <math>P(866 &lt; X &lt; 951)</math>  <math>= P\left(\frac{866 - 900}{17} &lt; z &lt; \frac{951 - 900}{17}\right)</math> K1  <math>= P(-2 &lt; z &lt; 3)</math>  <math>= 0.9759</math> N1</p>	5	10

Nomor	Penyelesaian dan Pemarkahan	Sub Markah	Markah Penuh														
9	<p>(a)</p> <table border="1" data-bbox="354 212 1300 352"> <tr> <td><math>\log_{10}(x+1)</math></td> <td>0.30</td> <td>0.48</td> <td>0.60</td> <td>0.70</td> <td>0.78</td> <td>0.85</td> </tr> <tr> <td><math>\log_{10} y</math></td> <td>0.70</td> <td>0.81</td> <td>0.89</td> <td>0.95</td> <td>1.00</td> <td>1.04</td> </tr> </table> <p>(b) <b>RUJUK GRAF</b></p> $\log_{10} y = q \log_{10}(x+1) + \log_{10} p \quad \text{P1}$ <p>(c)</p> <p>(i) <math>\log_{10} p = 0.515 \quad \text{K1}</math></p> $p = 3.27 \quad \text{N1}$ <p>(ii) <math>q = \frac{1.04 - 0.7}{0.85 - 0.3} \quad \text{atau setara} \quad \text{K1}</math></p> $q = 0.6 \quad \text{N1}$	$\log_{10}(x+1)$	0.30	0.48	0.60	0.70	0.78	0.85	$\log_{10} y$	0.70	0.81	0.89	0.95	1.00	1.04	<p>N1</p> <p>N1</p> <p><b>2</b></p> <p><b>4</b></p> <p><b>4</b></p> <p><b>4</b></p>	<p><b>10</b></p>
$\log_{10}(x+1)$	0.30	0.48	0.60	0.70	0.78	0.85											
$\log_{10} y$	0.70	0.81	0.89	0.95	1.00	1.04											
10.	<p>(a) (i)</p> $2 \cot x \sin^2 x = 2 \left( \frac{\cos x}{\sin x} \right) (\sin^2 x)$ $= 2 \sin x \cos x \quad \text{K1}$ $= \sin 2x \quad \text{N1}$ <p>(ii)</p> $\sin 2x = 0.5 \quad \text{K1}$ $2x = 30^\circ, 150^\circ, 390^\circ, 510^\circ$ $x = 15^\circ, 75^\circ, 195^\circ, 255^\circ \quad \text{N1}$ <p>(b)</p> $y = \cos x \quad \text{atau} \quad y = \cos 2x \quad \text{P1}$ $y =  \cos 2x  \quad \text{P1}$ $y = 2 +  \cos 2x  \quad \text{P1}$	<p><b>4</b></p> <p><b>3</b></p>															

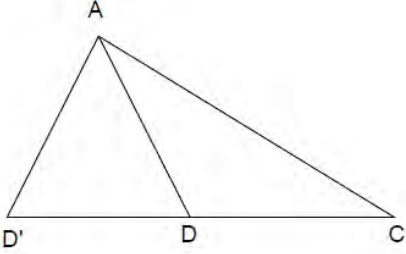




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	<p>(b) (i) <math>4.2\pi = 8\pi(3) \times \frac{dr}{dt}</math> atau setara K1</p> <p><math>\frac{dr}{dt} = 0.175</math> N1</p> <p>(ii) <math>4\pi(3^2) \times 0.175</math> K1</p> <p><math>6.3\pi</math> N1</p>	<b>4</b>	<b>10</b>
<b>BAHAGIAN C</b>			
12	<p>(a) (i) <math>\frac{2}{P_{2013}} \times 100 = 189</math> K1</p> <p><math>P_{2013} = RM1.06</math> ( mesti 2 titik perpuluhan) N1</p> <p>(ii) <math>\frac{184 \times 84}{100}</math> K1K1</p> <p><math>= 154.56</math> N1</p> <p>(b) (i) <math>\frac{(84 \times 5) + (154 \times 40) + (189 \times 10) + (45h)}{100} = 154</math> K1K1</p> <p><math>h = 154</math> N1</p> <p>(iii) <math>\frac{27.10}{P_{2013}} \times 100 = 154</math> K1</p> <p><math>P_{2013} = RM17.60</math> ( mesti 2 titik perpuluhan) N1</p>	<b>5</b>	<b>10</b>

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13	(a) $a = \frac{dv}{dt} = -3$ <b>N1</b>	1	
	(b) <u>Use <math>v=0</math></u> $12 - 3t = 0$ <b>K1</b>		
	$t = 4s$ <b>N1</b>	2	
	(c) Use $s = \int (12 - 3t) dt$ <b>K1</b> and substitute $t = 0, s = 0$ $s = 12t - \frac{3t^2}{2}$	4	
	<u>Use <math>s = -30</math></u> <b>K1</b> $-30 = 12t - \frac{3t^2}{2}$ $3t^2 - 24t - 60 = 0$ $(t + 2)(t - 10) = 0$ $t = -2, t = 10$ $t \geq 0, t = 10$ <b>N1</b>  <i>velocity, <math>v = 12 - 3t</math></i> $= 12 - 3(10)$ $= -18ms^{-1}$ <b>N1</b>		
(d) At Q, $t = 4$ $S_{OQ} = 12(4) - \frac{3(4)^2}{2} = 24m$ <b>K1</b>  Total distance = $24 + 24 + 30$ <b>K1</b> $= 78 m$ <b>N1</b>	3	10	

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14	<p>(a) I : <math>x + y \leq 80</math>      <b>atau</b>      setara      N1  II : <math>y \leq 4x</math>      <b>atau</b>      setara      N1  III : <math>y - x \geq 10</math>      <b>atau</b>      setara      N1</p> <p>(b) Rujuk Graf</p> <ul style="list-style-type: none"> <li>• Skala &amp; paksi seragam dan satu garisan dilukis betul      K1</li> <li>• Semua garis dilukis betul ( terima garis putus – putus)      K1</li> <li>• Rantau R dilorek betul      N1</li> </ul> <p>(c) (i)    <math>30 \leq y \leq 60</math>      N1</p> <p>(ii)    Titik maksimum = ( 16, 64 )    N1</p> <p style="padding-left: 40px;">Kutipan yuran maksimum</p> <p style="padding-left: 40px;"><math>= 60(16) + 70(64)</math>      K1</p> <p style="padding-left: 40px;"><math>= \text{RM } 5440</math>      N1</p> <p>Note:  SS - 1 if in (a), the symbol = is not used at all or more than three inequalities given or <math>x</math> and <math>y</math> are not used at all</p> <p><u>OR</u>  in (b), does not use the scale given or axis in the reverse direction or does not use the graph paper.</p>	<p style="text-align: center;"><b>3</b></p> <p style="text-align: center;"><b>3</b></p> <p style="text-align: center;"><b>4</b></p>	<p style="text-align: center;"><b>10</b></p>

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15	<p>(a) <math>AC^2 = 6.5^2 + 3.5^2 - 2(6.5)(3.5)\cos 70^\circ</math> K1  6.24 cm N1</p> <p>(b) <math>\frac{\sin \angle BAC}{3.5} = \frac{\sin 70}{6.24}</math> K1  Use <math>\angle ACD = \angle BAC = 31.81^\circ</math> K1  <math>\angle ADC = 180^\circ - 62.74^\circ</math> K1  117.26° N1</p> <p>(c) (i)</p> <div style="text-align: center;">  </div> <p><math>\angle AD'C</math> must acute angle N1</p> <p>(ii)</p> $\angle D'AD = 180^\circ - 2(62.74^\circ)$ K1 $\Delta ADD' = \frac{1}{2}(3.7)(3.7)(\sin 54.52^\circ)$ K1 5.57 cm <sup>2</sup> N1	<p style="text-align: center;">2</p> <p style="text-align: center;">4</p> <p style="text-align: center;">4</p>	<p style="text-align: center;">10</p>
<b>JUMLAH MARKAH</b>			<b>100</b>

SOALAN 14 (b)

