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MATEMATIK TAMBAHAN

Kertas 2

NOVEMBER 2021

2 jam 30 minit

## **PEPERIKSAAN PERCUBAAN SPM 2021**

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### **MATEMATIK TAMBAHAN**

#### **PERATURAN PEMARKAHAN**

**Kertas 2**

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No	Solution	Sub Mark	Total
1	<p>Let Haiqal = <math>x</math> and Syafiq = <math>y</math></p> $x + 0.2y = 3 / x + \frac{1}{5}y = 3$ $y^2 + 3 = 5x$ $x = 3 - 0.2y \quad \text{OR} \quad y = 15 - 5x$ $y^2 + 3 = 5(3 - 0.2y) \quad \text{OR} \quad (15 - 5x)^2 + 3 = 5x$ $y^2 + y - 12 = 0 \quad \text{OR} \quad 25x^2 - 155x + 228 = 0$ $(y + 4)(y - 3) = 0 \quad x = \frac{-(-155) \pm \sqrt{(-155)^2 - 4(25)(228)}}{2(25)}$ <p><math>y = 3, x = 2.4</math></p> <p>Haiqal = RM 2.4 juta dan Syafiq = RM 3 juta</p>	<p>P1</p> <p>P1</p> <p>K1</p> <p>K1</p> <p>K1</p> <p>N1</p> <p>N1</p>	7
2(a)	$S_{PQ} = 2(8) \quad \text{atau} \quad S_{SR} = \sqrt{4^2 + 4^2 - 2(4)(4)\cos 2 \times \frac{180}{3.142}}$	K1	6
	Perimeter = $4 + 16 + 4 + S_{SR}$	K1	
	Perimeter = 30.73 cm	N1	
(b)	$\text{Luas sektor } OPQ = \frac{1}{2}(8^2)(2) \quad \text{atau} \quad \text{Luas } \Delta OSR = \frac{1}{2}(4)(4) \sin 2 \times \frac{180}{3.142}$	K1	6
	$\text{Luas kawasan berlorek} = \frac{1}{2}(8^2)(2) - \frac{1}{2}(4)(4) \sin 2 \times \frac{180}{3.142}$	K1	
	Luas kawasan berlorek = 56.72 cm <sup>2</sup>	N1	
3(a)	(2,2)	P1	6
(b)	$\left(\frac{2}{3}\right)m_2 = -1$	K1	
	$y - 6 = -\frac{3}{2}(x - 8)$	K1	
	$2y = -3x + 36$	N1	
(c)	$\sqrt{(x-2)^2 + (y-2)^2} = \sqrt{(8-2)^2 + (6-2)^2} \quad \text{or}$ $\sqrt{(x-2)^2 + (y-2)^2} = \sqrt{(-4-2)^2 + (-2-2)^2}$	K1	

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	$x^2 + y^2 - 4x - 4y - 44 = 0$	N1	
4(a)	${}^6C_2$ or 15	1	6
(b) i)	$\frac{6!}{2!}$	1	
	360	1	
ii)	$\frac{3!}{2!}$ or $3!$ or ${}^4P_3$	1	
	$\frac{3!}{2!} \times {}^4P_3$ OR $\frac{3!}{2!} \times 3! \times 4$	1	
	72	1	
5(a)	<p>Dengan menggunakan segi tiga bersudut tegak,</p> $\text{Hipotenusus} = \sqrt{x^2 + y^2}$ $\sin \theta = \frac{y}{\sqrt{x^2 + y^2}} \text{ or } \cos \theta = \frac{x}{\sqrt{x^2 + y^2}}$ <p>OR</p> <p>Dengan menggunakan teorem Pythagoras,</p> $a^2 + b^2 = c^2$ $\frac{a^2}{c^2} + \frac{b^2}{c^2} = \frac{c^2}{c^2}$	1	8
	<p>Sebelah kiri = <math>\sin^2 \theta + \cos^2 \theta</math></p> $= \left( \frac{y}{\sqrt{x^2 + y^2}} \right)^2 + \left( \frac{x}{\sqrt{x^2 + y^2}} \right)^2$ <p>OR</p> $\left( \frac{a}{c} \right)^2 + \left( \frac{b}{c} \right)^2 = 1$	1	
	$= \frac{y^2}{x^2 + y^2} + \frac{x^2}{x^2 + y^2}$ $= \frac{x^2 + y^2}{x^2 + y^2}$ $= 1$ <p>OR</p> $\sin^2 \theta + \cos^2 \theta = 1$	1	

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	$P = 4, Q = 3, R = 1$ Any one of the answer correct get 1 mark	2	
(b)	<p>Shape of graph Amplitude Cycle</p>	1 1 1	
6(a)	$\frac{dy}{dx} = \frac{1}{2}k[11 - (-1)] = 3$	K1	7
	$k = \frac{1}{2}$	N1	
(b)	$\frac{1}{4}(11 - x) = 0$	K1	
	$x = 11$	N1	
(c)	<i>kecerunan tangen</i> = $\frac{3}{2}$ <i>atau</i> <i>kecerunan normal</i> = $-\frac{2}{3}$	P1	
	$y - (-2) = -\frac{2}{3}(x - 5)$	K1	
	$y = -\frac{2}{3}x + \frac{4}{3}$ <i>atau setara</i>	N1	
7(a) i)	$a = 2136$ $d = 140$	1	
	$15 \text{ Mei } 2020 = T_{15}$	1	
	$T_{15} = 2136 + 14(140)$ $= 4096$	1	
ii)	ii) $31 \text{ Mei } 2020 = 4096$ $1 \text{ Jun } 2020 = 2048$		
	$a = 4096$ dan $r = 0.5$ $4096 \times 0.5^{(n-1)} < 1$	1 1	

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	$0.5^{(n-1)} < \frac{1}{2^{12}}$ 13 Jun 2020 OR apply $a = 4096$ and $r = 0.5$ 4096, 2048, 1024, 512, 256, 128, 64, 32, 16, 8, 4, 2, 1, 0.5 13 Jun 2020	1 OR 1 1 1	10														
(b)	$a + a + 2d + a + 4d + a + 6d + a + 8d + a + 10d = 222$ $6a + 30d = 222$ or $a + 5d = 37$ $a + 10d = 50.75$ menyelesaikan persamaan serentak $d = 2.75$ $a = 23.25$ OR $\frac{6}{2}(a + 50.75) = 222$ $a = 23.25$ $\frac{6}{2}[2(23.25) + 5(2d)] = 222$ $d = 2.75$	1 1 1 1 OR 1 1 1 1															
8(a)	<table border="1"> <tbody> <tr> <td><math>x^2</math></td> <td>0.49</td> <td>1.44</td> <td>1.96</td> <td>2.89</td> <td>3.61</td> <td>4.84</td> </tr> <tr> <td><math>xy</math></td> <td>84.00</td> <td>69.00</td> <td>60.06</td> <td>45.05</td> <td>36.48</td> <td>14.96</td> </tr> </tbody> </table>	$x^2$	0.49	1.44	1.96	2.89	3.61	4.84	$xy$	84.00	69.00	60.06	45.05	36.48	14.96	N1 N1	
$x^2$	0.49	1.44	1.96	2.89	3.61	4.84											
$xy$	84.00	69.00	60.06	45.05	36.48	14.96											
(b)	<i>plot <math>xy</math> against <math>x^2</math> (correct axes and uniform scales)</i> <i>6 points plotted correctly</i> <i>Line of best fit</i>	K1 N1 N1	10														
(c) i)	$y = 21.98$	P1															
ii)	$xy = ax^2 + b$ use $m = a$ or $c = b$ $a = -15.87$ $b = 92$	P1 K1 N1 N1															

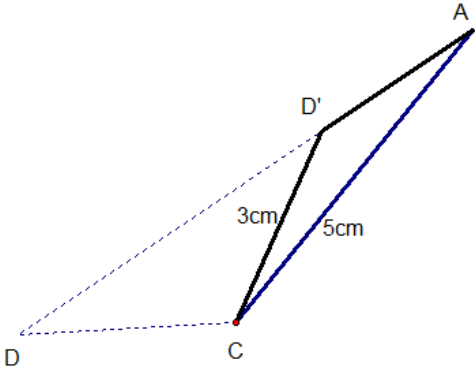
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9(a) i)	$-6\underline{x} + 3\underline{y}$	1	10
ii)	$\overline{AT} = \overline{AB} + \overline{BT}$ OR $\overline{AT} = \overline{AD} + \overline{DT}$ $= 3\underline{y} + \frac{1}{3}(6\underline{x} - 3\underline{y})$ $= 6\underline{x} + \frac{2}{3}(-6\underline{x} + 3\underline{y})$	1	
	$\overline{AT} = 2\underline{x} + 2\underline{y}$	1	
(b) i)	$\overline{AC} = \frac{1}{k}(2\underline{x} + 2\underline{y})$ $\overline{AC} = \frac{2}{k}\underline{x} + \frac{2}{k}\underline{y}$	1	
	$\overline{DC} = \overline{DA} + \overline{AC}$ $= \left(-6 + \frac{2}{k}\right)\underline{x} + \frac{2}{k}\underline{y}$	1	
ii)	Dengan perbandingan/ By comparison  $-6 + \frac{2}{k} = -2$ OR $2h = \frac{2}{k}$	1	
	$h = 2$	1	
	$k = \frac{1}{2}$	1	
(c)	$\frac{1}{2} \times 6 \underline{x}  \times 5 = 120$	1	
	$ \underline{x}  = 8 \text{ unit}$	1	
10(a)	Solve simultaneous eqn: $y = x^2 - 4x + 4$ and $y = -x + 2$ $(x - 2)(x - 1) = 0$ A(1,1)	K1 K1 N1	10
(b)	Integrate $\int (x^2 - 4x + 4) dx = \left[ \frac{x^3}{3} - 2x^2 + 4x \right]$ OR $\int (x-2)^2 dx = \left[ \frac{(x-2)^3}{3(1)} \right]$ Use limit in $A_1 = \left[ \frac{x^3}{3} - 2x^2 + 4x \right]_0^1$ OR $\left[ \frac{(x-2)^3}{3} \right]_0^1$ OR area trapezium $A_2 = \frac{1}{2}(1+2)(1)$	K1  K1	

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(c)	$A_1 - A_2$	K1	
	$\frac{5}{6}$	N1	
	$\pi \int (x-2)^4 dx = \pi \left[ \frac{(x-2)^5}{5(1)} \right]$	K1	
	Integrate $= \pi \left[ \frac{(x-2)^5}{5(1)} \right]_0^1$	K1	
	Use limit $\frac{31}{5} \pi$	N1	
11(a) i)	${}^8C_0 \times 0.4^0 \times 0.6^8$ atau ${}^8C_1 \times 0.4^1 \times 0.6^7$	1	10
	$1 - {}^8C_0 \times 0.4^0 \times 0.6^8 - {}^8C_1 \times 0.4^1 \times 0.6^7$	1	
	0.8936	1	
ii)	$138 = n(0.6)(0.4)$	1	
	$n = 575$	1	
(b)	$1.34 = \frac{56.2 - \mu}{\sigma}$	1	
	$-1.86 = \frac{43.4 - \mu}{\sigma}$	1	
	solve simultaneous eq , $3.2 \sigma = 12.8$	1	
	$\sigma = 4$	1	
	$\mu = 50.84$	1	
12(a)	$t = 4$	K1	10
	$v = 4^2 - 8(4) - 20$	K1	
	$v = -36 \text{ ms}^{-1}$	N1	
(b)	b) $(k - 10)(k + 2) = 0$	K1	
	$k = 10$	N1	

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(c)	$s = \frac{t^3}{3} - \frac{8t^2}{2} - 20t$	K1	10	
	$s = \frac{(10)^3}{3} - \frac{8(10)^2}{2} - 20(10)$	K1		
	$s = -266\frac{2}{3}$	N1		
(d)	$\left  \int_0^{10} t^2 - 8t - 20 dt \right  + \int_{10}^{15} t^2 - 8t - 20 dt$	K1		
	$458\frac{1}{3}m$	N1		
13(a)	$\frac{\sin \theta}{3} = \frac{\sin 31}{5}$	K1		
i)	$\angle DAC = 18^\circ$	N1		
ii)	$6^2 = 7^2 + 5^2 - 2(7)(5)\cos\theta$	K1		
	$\angle BAC = 57.12^\circ$	N1		
(b) i)		N1		
ii)	$\angle AD'C = 180^\circ - 31^\circ = 149^\circ$ $\angle ACD' = 180^\circ - 149^\circ - 18^\circ = 13^\circ$	K1 N1		
iii)	$luas AD'C = \frac{1}{2}(3)(5)\sin 13^\circ$ $\frac{1}{2}(3)(5)\sin 13^\circ = \frac{1}{2}(5)h$ $h = 0.6749 \text{ cm}$	K1 K1 N1		
14(a)	$x + y \geq 20$ $x \leq 2y$ $2x + y \leq 40$	N1 N1 N1		
(b)	Draw correctly at least one straight line Draw correctly all the straight lines Region shaded correctly	K1 N1 N1	10	



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(c) i)	40	P1	10
ii)	(12,8) 6(12) + 3 (8) = RM96 baki wang yang maksimum = RM24	P1 K1 N1	
15(a)	$\frac{125 \times I_{20/18}}{160} = 100$	K1	
	$I_{20/18} = 128$	N1	
(b) i)	$\frac{24}{16} \times 100$ x =150	K1 N1	
	ii)	$\frac{P_{18} \times 100}{16} = 130$ $P_{18} = RM 20.80$	
(c)	$\frac{(130 \times 2) + 4y + (125 \times 3)}{2 + 4 + 3} = 123$	K1	
	y =118	N1	
(d)	$\frac{145}{P_{16}} \times 100 = 123$	K1	
	RM 117.89	N1	

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14(b)

