

3472/2

Additional

Mathematics

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PEPERIKSAAN PERCUBAAN SPM

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ADDITIONAL MATHEMATICS

Paper 2

(MODULE 1)

MARKING SCHEME

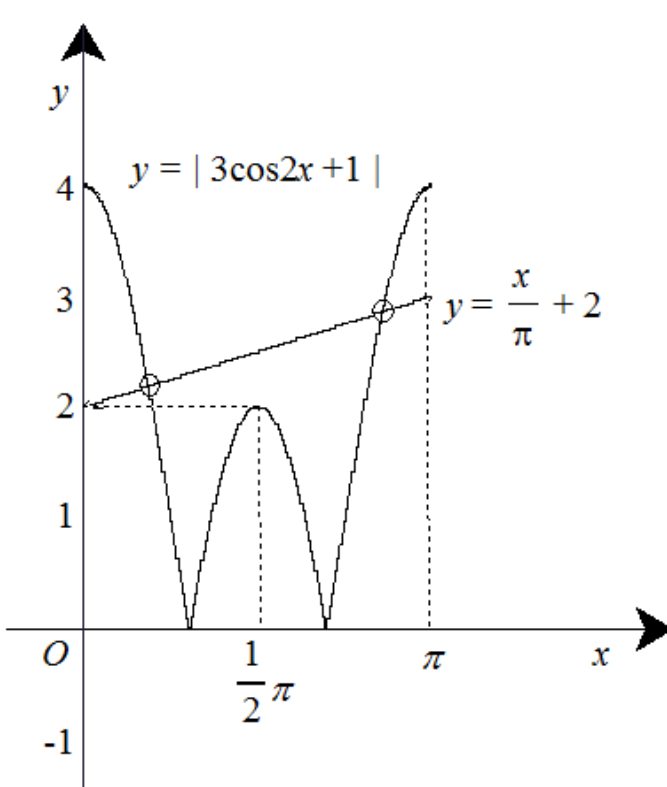
MARKING SCHEME
ADDITIONAL MATHEMATICS TRIAL EXAMINATION AUGUST 2018
MODULE 1 (PAPER 2)

NO.	SOLUTION	MARKS
1	$(90 - 2x + y)2 = 130$ $90 - 2x + y = 65$ $y = 2x - 25$ $(90 \times 45) - (90 - 2x)(y) = 3300$ $750 = 90y - 2xy$ $750 = 90(2x - 25) - 2x(2x - 25)$ $750 = 180x - 2250 - 4x^2 + 50x$ $4x^2 - 230x + 3000 = 0$ $x = \frac{-(-230) \pm \sqrt{(-230)^2 - 4(4)(3000)}}{2(4)}$ $x = 37.5 , \quad x = 20$ <p>When $x = 20$, $y = 2(15) - 25$ $= 15$</p> <p>$x = 37.5$, $y = 2(37.5) - 25$ (abaikan) $= 50$</p> <p>$AD = 50$ $AB = 15$</p>	<p>P1</p> <p>P1</p> <p>P1</p> <p>K1 Eliminate x or y</p> <p>K1 Solve quadratic equation</p> <p>N1</p> <p>N1 Both sides of the pond correct</p>
		7

N0.	SOLUTION	MARKS
<p>2</p> <p>(a)</p> $m = 19.5 + \left(\frac{\frac{20+p}{2} - 13}{5} \right) 10 = 23.5$ $\frac{20+p}{2} = 15$ $p = 10$ $N = 30$ <p>(b)</p> <p>Mode = 33.5</p>	<p>P1 Any 3 of these value 19.5 , 13 , 5 , 10</p> <p>K1 formula of m</p> <p>N1 both p & N</p> <p>K1 Plot / Correct axes & uniform scale</p> <p>K1 Correct histogram (5 bar)</p> <p>K1 Find mode</p> <p>N1</p>	<p>7</p>
		<p>7</p>

<p>3</p> <p>(a)</p> $a = 1, \quad d = 4, \quad n = 10$ $S_{10} = \frac{10}{2} [2(1) + 9(4)]$ $= 190$ <p>(b)</p> <p>Yellow tiles = $400 - 190$</p> $= 210$ <p>OR</p> $S_{10} = \frac{10}{2} [2(3) + 9(4)]$ $= 210$ <p>Difference = $210 - 190$</p> $= 20$		<p>P1 any 2 correct</p> <p>K1 use S_{10}</p> <p>N1</p> <p>N1</p> <p>N1</p>
		5
<p>4</p> <p>(a)</p>	<p>(i) $\overrightarrow{QT} = \overrightarrow{QP} + \overrightarrow{PT}$</p> $= \begin{pmatrix} -6 \\ -2 \end{pmatrix} + \begin{pmatrix} 5 \\ 4 \end{pmatrix}$ $= \begin{pmatrix} -1 \\ 2 \end{pmatrix}$ $\overrightarrow{QR} = -2\underset{\sim}{i} + 4\underset{\sim}{j}$ <p>(ii) $\overrightarrow{SR} = \overrightarrow{SP} + \overrightarrow{PQ} + \overrightarrow{QR}$</p> $= \begin{pmatrix} -1 \\ -5 \end{pmatrix} + \begin{pmatrix} 6 \\ 2 \end{pmatrix} + \begin{pmatrix} -2 \\ 4 \end{pmatrix}$ $= 3\underset{\sim}{i} + \underset{\sim}{j}$	<p>K1</p> <p>N1</p> <p>K1</p> <p>N1</p>

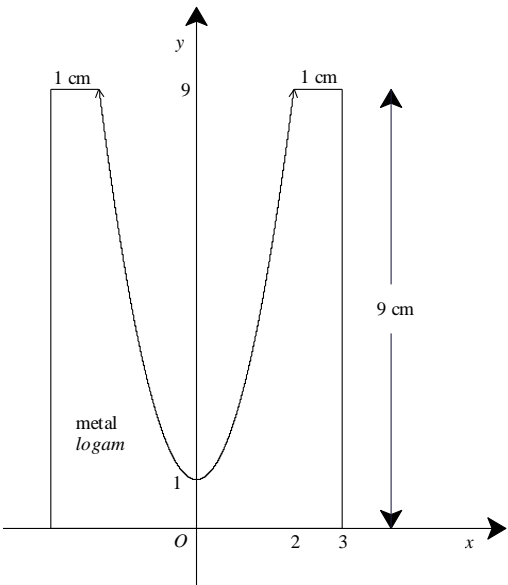
(b)	$\overline{SR} = k\overline{PQ}$ $\begin{pmatrix} 3 \\ 1 \end{pmatrix} = k \begin{pmatrix} 6 \\ 2 \end{pmatrix}$ $k = \frac{1}{2}$ $\overline{SR} \text{ is parallel to } \overline{PQ}$	K1 N1 N1
		7
5	<p>(a)</p> $2^x = 3^y = 18^q = k$ $2 = k^{\frac{1}{x}}, 3 = k^{\frac{1}{y}}, 18 = k^{\frac{1}{q}}$ $2 \times 3 \times 3 = 18$ $k^{\frac{1}{x}} k^{\frac{1}{y}} k^{\frac{1}{q}} = k^{\frac{1}{q}}$ $\frac{1}{x} + \frac{2}{y} = \frac{1}{q}$ $q = \frac{xy}{2x + y}$ <p>(b)</p> $x = \log_3 5, 3^x = 5$ $9^k = 9^{1 + \frac{1}{2}x}$ $= 3^{2(1 + \frac{1}{2}x)}$ $= 3^{2+x}$ $= 45$	K1 K1 N1 K1 K1 N1
		6

N0.	SOLUTION	MARKS
6	<p>(a) $y = 3 \cos 2x$</p> <p>(b) </p> <p>(c) $f(x)+1 -2 = \frac{x}{\pi}$ $y = \frac{x}{\pi} + 2$ Number of solutions = 2</p>	<p>P1 graph cosine curve P1 amplitude 3 P1 2 cycle 0 to 2π</p> <p>P1 shifted graph $y = f(x)+1$</p> <p>P1 $y = f(x)+1$</p> <p>K1 line $y = \frac{x}{\pi} + 2$</p> <p>N1 equation $y = \frac{x}{\pi} + 2$</p> <p>N1</p>
		8

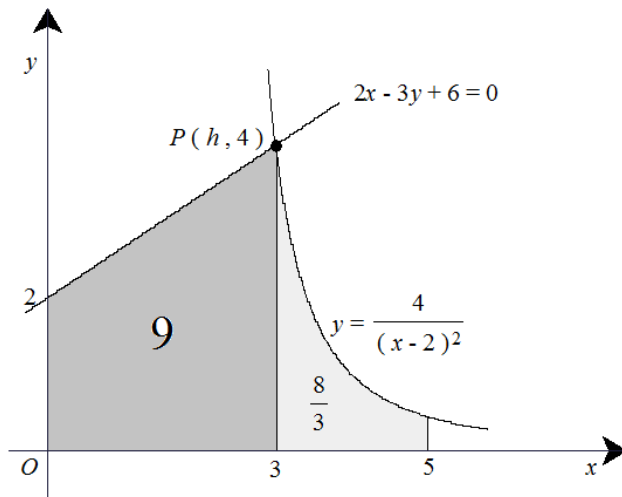
NO.	SOLUTION	MARKS
<p>7</p> <p>(a)</p> <p>(i)</p> <p>(ii)</p> <p>(b)</p> <p>(i)</p> <p>(ii)</p>	<p>$p = 0.4 \quad q = 0.6$</p> <p>$P(X > 8)$</p> <p>$= P(X = 9) + P(X = 10)$</p> <p>$= {}^{10}C_9 (0.4)^9 (0.6)^1 + {}^{10}C_{10} (0.4)^{10} (0.6)^0$</p> <p>$= 0.001573 + 0.0001049$</p> <p>$= 0.001678$</p> <p>$\sqrt{n(0.4)(0.6)} = 12$</p> <p>$n = 600$</p> <p>$Z = \frac{72 - 55}{5}$</p> <p>$= 3.4$</p> <p>$P(X > k) = 0.185$</p> <p>$P\left(z > \frac{k - 55}{5}\right) = 0.185$</p> <p>$\frac{k - 55}{5} = 0.896$</p> <p>$k = 59.48$</p>	<p>P1</p> <p>K1 use ${}^nC_r p^r q^{n-r}$</p> <p>N1</p> <p>K1</p> <p>N1</p> <p>K1</p> <p>N1</p> <p>K1 use score-z</p> <p>$Z = \frac{X - \mu}{\sigma}$</p> <p>K1</p> <p>N1</p>
		10

N0.	SOLUTION	MARKS
<p>8</p> <p>(a)</p> $\angle SWT = \frac{7}{10} / 0.7 / 40 \cdot 10^\circ / 40 \cdot 11^\circ$ $\frac{25^\circ}{180^\circ} \times \pi = 0.4364 \text{ rad} / 0.4363 \text{ rad}$ $\theta = 0.7 + 0.4363 = 1.1363 \text{ rad}$ <p style="text-align: center;">(65 · 10°)</p> $\theta = 1.136 \text{ rad (3d.p.)}$ <p>(b)</p> $\text{Arc } QV = 8 \times 1.136 = 9.088$ $\text{Perimeter} = 8 + 8 + 9.088$ $= 25.088$ <p>(c)</p> $A_{QPV} = \frac{1}{2}(8^2)(1.136) = 36.352$ $A_{SWT} = \frac{1}{2}(10^2)(0.7) = 35$ $\text{Area} = 71.352 - 63.88$ $= 7.472$	<p>K1 use $s = r\theta$</p> <p>K1</p> <p>N1</p> <p>K1</p> <p>K1</p> <p>N1</p> <p>K1</p> <p>K1</p> <p>use formula $A = \frac{1}{2}r^2\theta$</p> <p>to find A_{QPV} , A_{SWT}</p> <p>K1</p> <p>N1</p>	<p>MARKS</p>
		10

N0.	SOLUTION	MARKS
<p>9</p> <p>(a)</p> <p>(i)</p> $m_{QR} = 1$ $m_{RS} = -1$ $R = (0, 6)$ $S = (h, 0)$ $\frac{6}{-h} = -1$ $h = 6$ <p>(ii)</p> $(x, y) = \left(\frac{18-2}{4}, \frac{4}{4} \right)$ $= (4, 1)$ <p>(iii)</p> $A = \frac{1}{2} \begin{vmatrix} 4 & -2 & -4 & 4 \\ 1 & 4 & -2 & 1 \end{vmatrix}$ $= \frac{1}{2} (16+4-4) - (-2-16-8) $ $= \frac{1}{2} 16+26 $ $= 21$ <p>(b)</p> $\left(\frac{y-4}{x+2} \right) \left(\frac{y}{x-6} \right) = -1$ $y^2 - 4y = -x^2 + 4x + 12$ $x^2 + y^2 - 4x - 4y - 12 = 0$	<p>K1 for using $m_1 m_2 = -1$</p> <p>K1</p> <p>N1</p> <p>K1</p> <p>N1</p> <p>K1 use formula of Area</p> <p>N1</p> <p>K1 for using $m_1 m_2 = -1$ to form equation</p> <p>K1</p> <p>N1</p>	
		10

NO.	SOLUTION	MARKS
<p>10 (a)</p>	<div style="text-align: center;">  </div> <p> $y = 2x^2 + 1$ $y = 9$ $x = 2 \text{ or } r = 3$ </p> <p>Volume of cylinder $= \pi(3^2)(9)$ $= 81\pi$ </p> <p>Volume $= \pi \int_1^9 \frac{y-1}{2} dy$ $= \frac{\pi}{2} \left[\frac{y^2}{2} - y \right]_1^9$ $= \frac{\pi}{2} \left[\left(\frac{81}{2} - 9 \right) - \left(\frac{1}{2} - 1 \right) \right]$ $= \frac{\pi}{2} (32)$ $= 16\pi$ </p> <p>Volume of metal $= 81\pi - 16\pi$ $= 65\pi$ </p>	<p>K1 Substitute</p> <p><i>y = 9 to find</i> <i>x = 2 or r = 3</i></p> <p>K1</p> <p>K1 integrate and use the limit correctly</p> <p>K1 N1</p>

(b)



(i)

$$\begin{array}{l} 2x - 3y + 6 = 0 \\ (h, 4) \\ 2h = 6 \\ h = 3 \end{array} \quad \text{OR} \quad \begin{array}{l} y = \frac{4}{(x-2)^2} \\ (h, 4) \\ (h-2)^2 = 1 \\ h = 3 \end{array}$$

N1

(ii)

Area of trapezium

$$\begin{aligned} &= \frac{1}{2}(2+4)(3) \\ &= 9 \end{aligned}$$

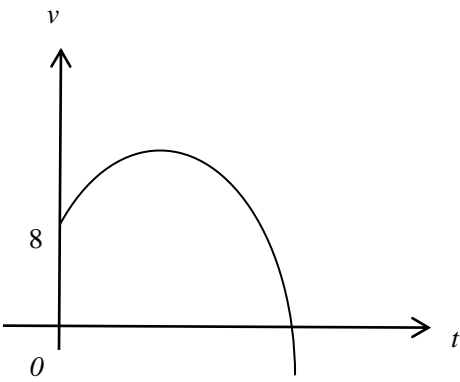
K1

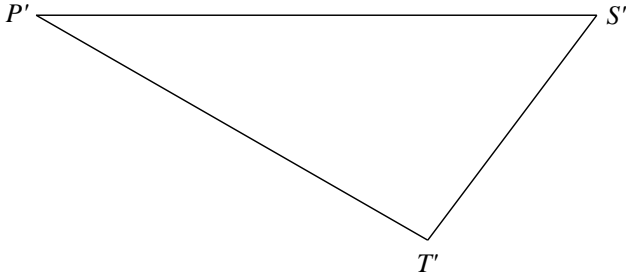
Area

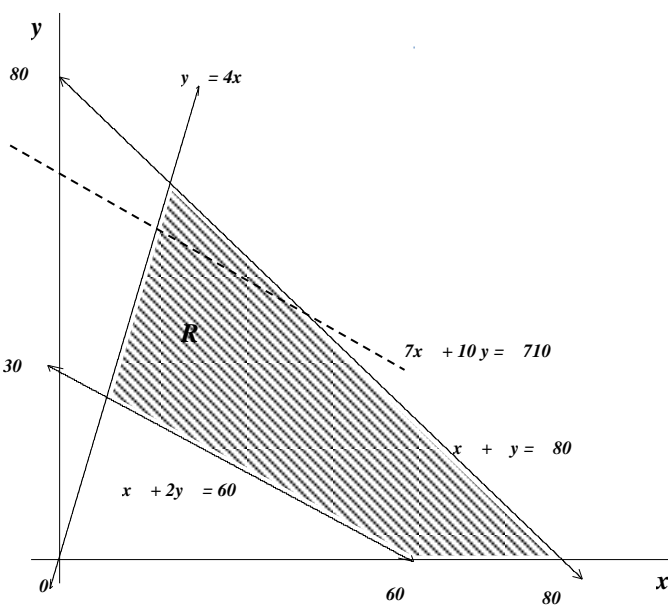
$$\begin{aligned} &= \int_3^5 4(x-2)^{-2} dx \\ &= -4 \left[\frac{1}{x-2} \right]_3^5 \\ &= -4 \left[\frac{1}{3} - \frac{1}{1} \right] \\ &= -4 \left[-\frac{2}{3} \right] \\ &= \frac{8}{3} \end{aligned}$$

K1 integrate and use the limit correctly

	<p>Area of the shaded region</p> $= 9 + \frac{8}{3}$ $= \frac{35}{3} \quad / \quad 11\frac{2}{3} \quad / \quad 11.67$	<p>K1</p> <p>N1</p>
		10

N0.	SOLUTION	MARKS
12	<p>(a) $8ms^{-1}$</p> <p>(b) $-t^2 + 2t + 8 > 0$</p> $(t+2)(t-4) < 0$ $0 < t < 4$ <p>(c) </p> <p>(d) $S = -\frac{t^3}{3} + t^2 + 8t$</p> $t = 4, S = -\frac{(4)^3}{3} + (4)^2 + 8(4)$ $t = 5, S = -\frac{(5)^3}{3} + (5)^2 + 8(5)$ <p>Distance=</p> $26\frac{2}{3} + (26\frac{2}{3} - 23\frac{1}{3})$ $= 30$	<p>N1</p> <p>K1</p> <p>K1</p> <p>N1</p> <p>K1</p> <p>N1</p> <p>K1</p> <p>K1</p> <p>K1</p> <p>N1</p>
		10

NO.	SOLUTION	MARKS
<p>13 (a)</p>	<p>(i)</p> $PR^2 = 8^2 + 3 \cdot 71^2 - 2(8)(3 \cdot 71)\cos 112^\circ$ $PR = 10$ $SR = 5$ <p>(ii)</p> $\frac{PT}{\sin 120^\circ} = \frac{5}{\sin 30^\circ}$ $PT = 8 \cdot 66$ <p><i>Perimeter</i></p> $= 8 + 3 \cdot 71 + 5 + 5 + 8 \cdot 66$ $= 30 \cdot 37$ <p>(b) (i)</p>  <p>(ii)</p> $Area = \frac{1}{2}(8 \cdot 66)(10)\sin 30^\circ$ $= 21 \cdot 65$ <p>OR</p> $Area = \frac{1}{2}(8 \cdot 66)(5)$ $= 21 \cdot 65$	<p>K1 use cosine rule N1</p> <p>K1 use sine rule N1</p> <p>K1 N1</p> <p>N1</p> <p>K1 use $A = \frac{1}{2}ab \sin c$ K1 $P'S' = 10$ N1</p>
		10

NO.	SOLUTION	MARKS
14		
(a)	$x + y \leq 80$	N1
	$y \leq 4x$	N1
	$x + 2y \geq 60$	N1
(b)		
	<ul style="list-style-type: none"> • At least one straight line is drawn correctly from inequalities involving x and y. 	N1
	<ul style="list-style-type: none"> • All the three straight lines are drawn correctly 	N1
	<ul style="list-style-type: none"> • Region is correctly shaded 	N1
(c)	$35x + 50y = 3550$	
	<i>or</i>	K1
	$7x + 10y = 710$	K1
	Draw a straight line in the graph.	K1
	$X = 30$	K1
	Maximum number of cake A = 30	N1
		10

N0.	SOLUTION	MARKS
15		
(a)	$x = 135$	N1
(b)	$\frac{1.50 \times 100}{Q} = 115$	K1
	$= 1.30$	N1
(c)	$\frac{120 \times I}{100} = 140$	K1
	$I = 116.67$	N1
(d)		
(i)	$\frac{120 \times 2 + 115 \times 3 + 135 \times 1 + 110 \times y}{2 + 3 + 1 + y} = 116$	K1
	$y = 4$	N1
(ii)	$\frac{p}{20} \times 100 = 116$	K1
	$p = 23.2$	
	$\frac{500}{23.2} = 21.55$	K1
	$\text{max} = 21$	N1
		10

END OF MARKING SCHEME