3472/2

Additional

Mathematics

August 2018

PEPERIKSAAN PERCUBAAN SPM

TAHUN 2018

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ADDITIONAL MATHEMATICS

Paper 2

(MODULE 1)

.

MARKING SCHEME

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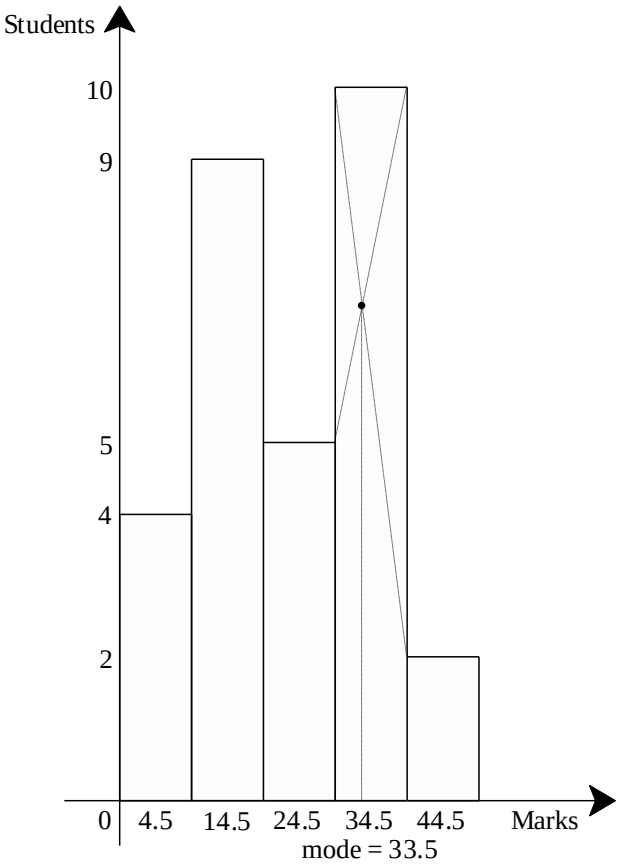
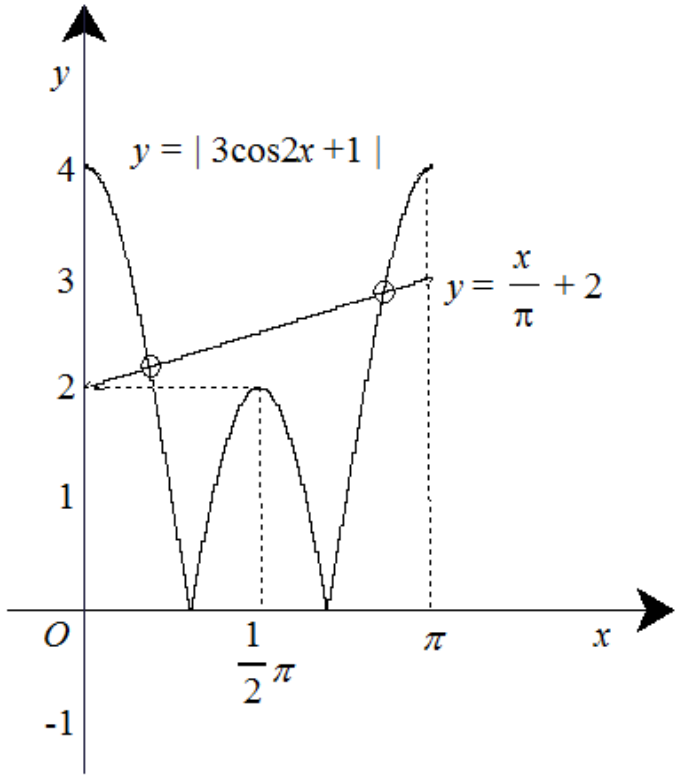
ADDITIONAL MATHEMATICS TRIAL EXAMINATION AUGUST 2018
MODULE 1 (PAPER 2)

N0.	SOLUTION	MARKS
1	$(90-2x+y)2=130$	**P1**
	$90-2x+y=65$	
	$y=2x-25$	**P1**
	$(90\times 45)-(90-2x)(y)=3300$	**P1**
	$750=90y-2xy$	
	$750=90(2x-25)-2x(2x-25)$	**K1** Eliminate x or y
	$750=180x-2250-4x^2+50x$	
	$4x^2-230x+3000=0$	
	$x=\dfrac{-(-230)\pm\sqrt{(-230)^2-4(4)(3000)}}{2(4)}$	**K1** Solve quadratic equation
	$x=37.5$, $x=20$	**N1**
	When $x=20$, $y=2(15)-25$ $=15$ $x=37.5$, $y=2(37.5)-25$ (abaikan) $=50$	
	$AD=50$ $AB=15$	**N1** Both sides of the pond correct
		7

N0.	SOLUTION	MARKS
2 **(*a*)**	$m = 19\cdot5 + \left(\dfrac{\frac{20+p}{2} - 13}{5}\right)10 = 23\cdot5$	**P1** *Any 3 of these value* $19\cdot5$, 13 , 5 , 10
		K1 formula of m
	$\dfrac{20+p}{2} = 15$	
	$p = 10$	**N1** both p & N
	$N = 30$	
(*b*)		**K1** Plot / Correct axes & uniform scale
		K1 Correct histogram (5 bar)
		K1 Find mode
	Mode = $33\cdot5$	**N1**
		7

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

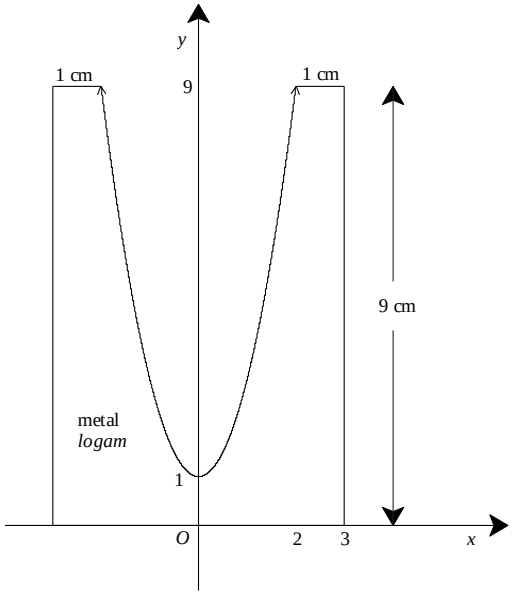
(*b*)	$\overrightarrow{SR} = k\overrightarrow{PQ}$ $\begin{pmatrix}3\\1\end{pmatrix} = k\begin{pmatrix}6\\2\end{pmatrix}$ $k = \frac{1}{2}$ $\overrightarrow{SR}$ *is parallel to* $\overrightarrow{PQ}$	**K1** **N1** **N1**
		7
5 **(*a*)**	$2^x = 3^y = 18^q = k$ $2 = k^{\frac{1}{x}}, 3 = k^{\frac{1}{y}},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

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

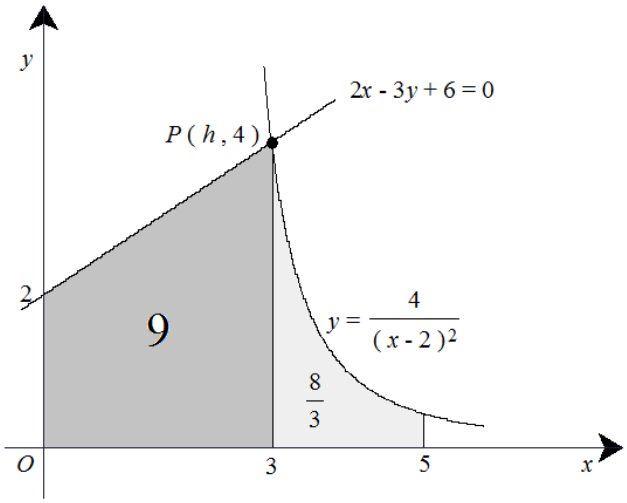
N0.	SOLUTION	MARKS
7		
(*a*)		
(i)	$p = 0\cdot 4 \qquad q = 0\cdot 6$	**P1**
	$P(X > 8)$	
	$= P(X = 9) + P(X = 10)$	
	$= {}^{10}C_{9}(0\cdot 4)^{9}(0\cdot 6)^{1} + {}^{10}C_{10}(0\cdot 4)^{10}(0\cdot 6)^{0}$	**K1** use ${}^{n}C_{r}\,p^{r}q^{n-r}$
	$= 0\cdot 001573 + 0\cdot 0001049$	
	$= 0\cdot 001678$	**N1**
(ii)		
	$\sqrt{n(0.4)(0.6)} = 12$	**K1**
	$n = 600$	**N1**
(*b*)		
(i)	$Z = \dfrac{72-55}{5}$	**K1**
	$= 3\cdot 4$	**N1**
(ii)		
	$P(X > k) = 0.185$	**K1** use score-z $Z = \dfrac{X-\mu}{\sigma}$
	$P\left(z > \dfrac{k-55}{5}\right) = 0\cdot 185$	
	$\dfrac{k-55}{5} = 0\cdot 896$	**K1**
	$k = 59\cdot 48$	**N1**
		10

N0.	SOLUTION	MARKS
8		
(*a*)	$\angle SWT = \frac{7}{10} / 0\cdot7 / 40\cdot10° / 40\cdot11°$	**K1** use $s = r\theta$
	$\frac{25°}{180°} \times \pi = 0\cdot4364rad / 0\cdot4363rad$	
	$\theta = 0\cdot7 + 0\cdot4363 = 1\cdot1363rad$	**K1**
	$(65\cdot10°)$	
	$\theta = 1\cdot136rad \ (3d.p.)$	**N1**
(*b*)		
	$Arc\,QV = 8 \times 1\cdot136 = 9\cdot088$	**K1**
	$Perimeter = 8 + 8 + 9\cdot088$	**K1**
	$= 25\cdot088$	**N1**
(*c*)		
	$A_{QPV} = \frac{1}{2}(8^2)(1\cdot136) = 36\cdot352$	**K1**
	$A_{SWT} = \frac{1}{2}(10^2)(0\cdot7) = 35$	**K1** use formula $A = \frac{1}{2}r^2\theta$ to find A_{QPV} , A_{SWT}
	$Area = 71\cdot352 - 63\cdot88$	**K1**
	$= 7\cdot472$	**N1**
		10

N0.	SOLUTION	MARKS
9 **(*a*)**	(i)	
	$m_{QR}=1$ $m_{RS}=-1$	**K1** for using $m_1m_2=-1$
	$R=(0,6)$ $S=(h,0)$	
	$\frac{6}{-h}=-1$ $h=6$	**K1** **N1**
	(ii)	
	$(x,y)=\left(\frac{18-2}{4},\frac{4}{4}\right)$ $=(4,1)$	**K1** **N1**
	(iii)	
	$A=\frac{1}{2}\begin{vmatrix}4 & -2 & -4 & 4\\ 1 & 4 & -2 & 1\end{vmatrix}$ $=\frac{1}{2}\lvert(16+4-4)-(-2-16-8)\rvert$ $=\frac{1}{2}\lvert16+26\rvert$ $=21$	**K1** **u**se formula of *Area* **N1**
(*b*)	$\left(\frac{y-4}{x+2}\right)\left(\frac{y}{x-6}\right)=-1$ $y^2-4y=-x^2+4x+12$ $x^2+y^2-4x-4y-12=0$	**K1** for using $m_1m_2=-1$ to form equation **K1** **N1**
		10

N0.	SOLUTION	MARKS
10 **(*a*)**		
	$y = 2x^2 + 1$ $y = 9$ $x = 2 \quad or \quad r = 3$	**K1** Substitute $y = 9$ *to find* $x = 2 \quad or \quad r = 3$
	Volume of cylinder $= \pi\left(3^2\right)(9)$ $= 81\pi$	**K1**
	Volume $= \pi \int_1^9 \frac{y-1}{2}\, dy$ $= \frac{\pi}{2}\left[\frac{y^2}{2} - y\right]_1^9$ $= \frac{\pi}{2}\left[\left(\frac{81}{2} - 9\right) - \left(\frac{1}{2} - 1\right)\right]$ $= \frac{\pi}{2}(32)$ $= 16\pi$	**K1** integrate and use the limit correctly
	Volume of metal $= 81\pi - 16\pi$ $= 65\pi$	**K1** **N1**

(b)



(i)

$2x-3y+6=0$

$(h,4)$

$2h=6$

$h=3$

OR

$y=\dfrac{4}{(x-2)^2}$

$(h,4)$

$(h-2)^2=1$

$h=3$

N1

(ii)

Area of trapezium

$=\dfrac{1}{2}(2+4)(3)$

$=9$

K1

Area

$=\int_3^5 4(x-2)^{-2}\,dx$

$=-4\left[\dfrac{1}{x-2}\right]_3^5$

$=-4\left[\dfrac{1}{3}-\dfrac{1}{1}\right]$

$=-4\left[-\dfrac{2}{3}\right]$

$=\dfrac{8}{3}$

K1 integrate and use the limit correctly

	Area of the shaded region $= 9 + \frac{8}{3}$ $= \frac{35}{3}$ / $11\frac{2}{3}$ / $11 \cdot 67$	 **K1** **N1**
		10

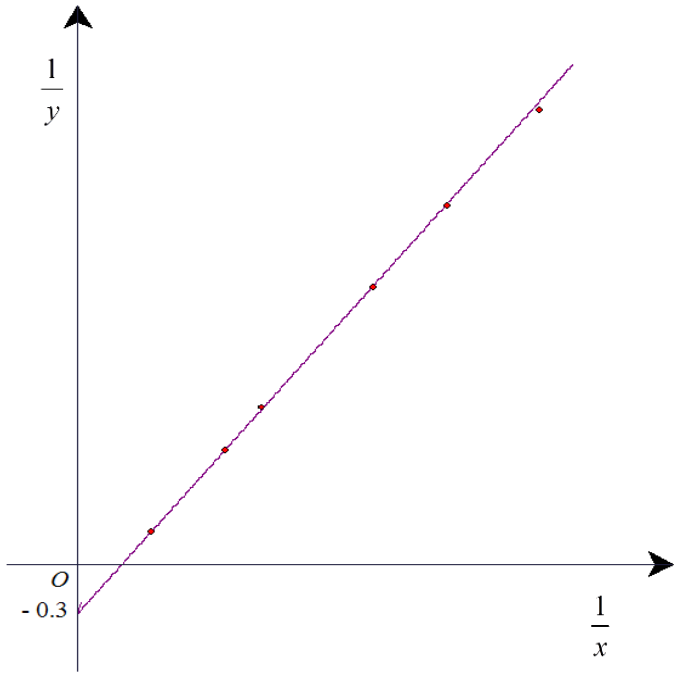
N0.	SOLUTION	MARKS
11		
(*a*)		

$\frac{1}{x}$	1·25	1·00	0·80	0·50	0·40	0·20
$\frac{1}{y}$	2·78	2·22	1·69	0·96	0·70	0·20

N1 6 correct values

N1 6 correct values

(*b*)



K1 plot / correct axes & uniform scale

N1 6 points plotted correctly

N1 line of best-fit

(*c*)

(i) $\frac{1}{y} = k\left(\frac{1}{x}\right) + h$ **P1**

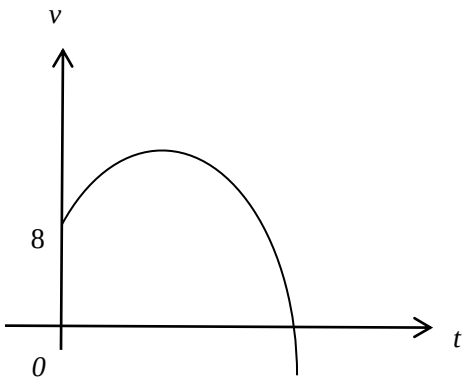
(ii) $h = -0 \cdot 3$ **N1** for y-intercept

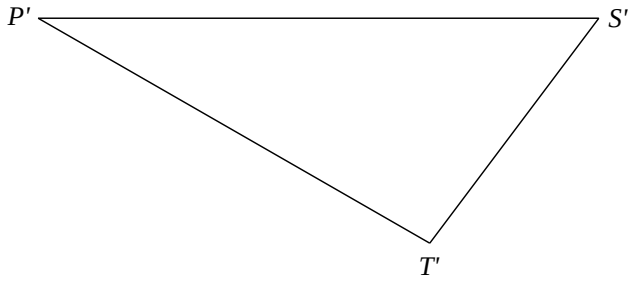
$k = 2 \cdot 48$ **N1** finding gradient

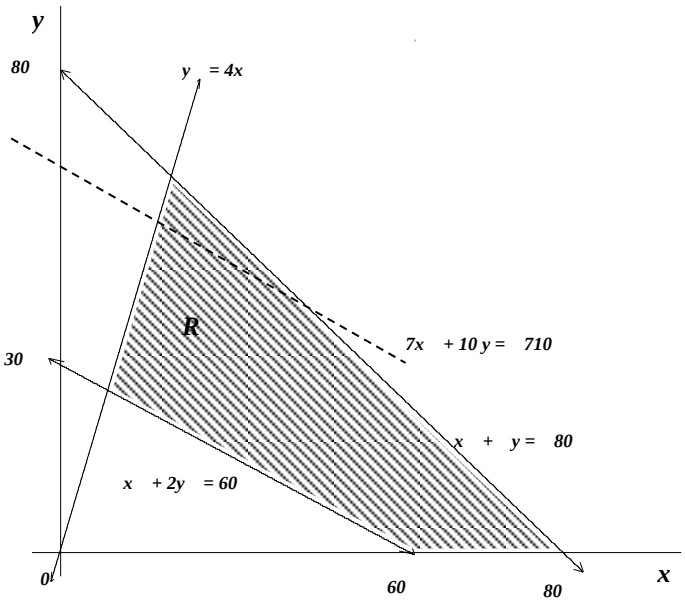
(iii) $\frac{1}{y} = 1 \cdot 25 \leftrightarrow 1.30$ **K1**

$y = 0 \cdot 8 \leftrightarrow 0.77$ **N1**

		10

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

N0.	SOLUTION	MARKS
13		
(*a*)	(i)	
	$PR^2 = 8^2 + 3\cdot 71^2 - 2(8)(3\cdot 71)\cos 112°$	**K1** use cosine rule
	$PR = 10$	
	$SR = 5$	**N1**
	(ii)	
	$\frac{PT}{\sin 120°} = \frac{5}{\sin 30°}$	**K1** use sine rule
	$PT = 8\cdot 66$	**N1**
	Perimeter	
	$= 8 + 3\cdot 71 + 5 + 5 + 8.66$	**K1**
	$= 30\cdot 37$	**N1**
(*b*)	(i)	
		**N1**
	(ii)	
	$Area = \frac{1}{2}(8\cdot 66)(10)\sin 30°$	**K1** use $A = \frac{1}{2}ab\sin c$
	$= 21\cdot 65$	**K1** *P'S'* = 10
	OR	**N1**
	$Area = \frac{1}{2}(8\cdot 66)(5)$	
	$= 21\cdot 65$	
		10

N0.	SOLUTION	MARKS
14		
(*a*)	$x + y \leq 80$	**N1**
	$y \leq 4x$	**N1**
	$x + 2y \geq 60$	**N1**
(*b*)		
	• At least one straight line is drawn correctly from inequalities involving x and y.	**N1**
	• All the three straight lines are drawn correctly	**N1**
	• Region is correctly shaded	**N1**
(*c*)		
	$35x + 50y = 3550$ *or* $7x + 10y = 710$	**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*)		
	$\frac{1 \cdot 50 \times 100}{Q} = 115$	**K1**
	$= 1 \cdot 30$	**N1**
(*c*)		
	$\frac{120 \times I}{100} = 140$	**K1**
	$I = 116 \cdot 67$	**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**
	$p = 23 \cdot 2$	
	$\frac{500}{23 \cdot 2} = 21 \cdot 55$	**K1**
	$\max = 21$	**N1**
		10

END OF MARKING SCHEME