3472/2
Additional
Mathematics

August 2017

PROGRAM PEMANTAPAN PRESTASI TINGKATAN 5

SPM 2017

ADDITIONAL MATHEMATICS

Paper 2

(MODULE 1)

.

MARKING SCHEME

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ADDITIONAL MATHEMATICS TRIAL EXAMINATION AUGUST 2017
MODULE 1 (PAPER 2)

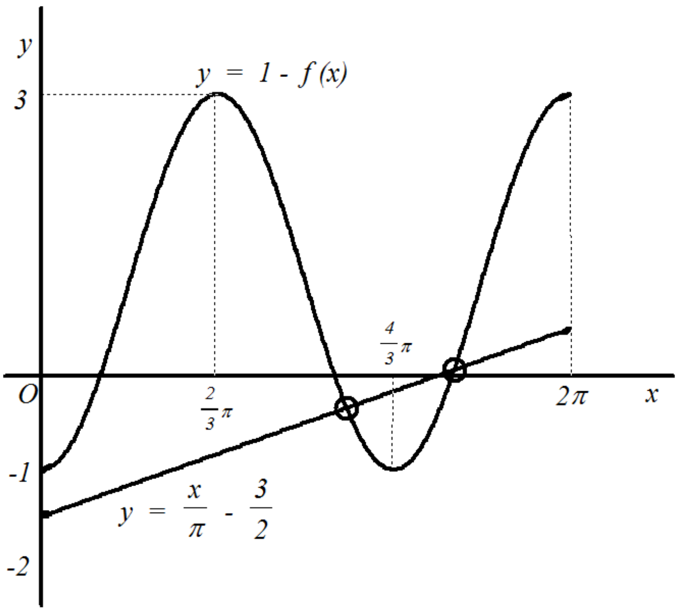
N0.	SOLUTION	MARKS
1	Perimeter = 52 cm $20 + 4x + 4(4y + x) = 52$ or $5x(4y+x) = \pi x^2\left(\frac{15y}{\pi}\right)$ ($x = 0$ diabaikan)	**P1**
	$x = 4-2y$ or $y = \frac{4-x}{2}$	**P1**
	$20y+5x-15xy=0$ $20y+5(4-2y)-15(4-2y)y=0$	**K1** **Eliminate x/y**
	$3y^2-5y+2=0$ $(y-1)(3y-2)=0$	**K1** **Solve quadratic equation**
	$y=1, \quad -\frac{2}{3}$	**N1**
	When $y=1$, $x=4-2(1)$ $= 2$	**N1**
	Base area of the mold = $5(4y+x)$ $= 5[4(1)+2]$	**K1**
	$= 30$ cm^2	**N1**
		8

N0.	SOLUTION	MARKS
2 **(a)** **(i)**	$56 = \dfrac{\sum x}{10}$	**K1**
	$\sum x = 560$	**N1**
(ii)	$6^2 = \dfrac{\sum x^2}{10} - 56^2$	**K1**
	$\sum x^2 = 31720$	**N1**
(b)	$\bar{X}_{baru} = \dfrac{560 + 2(46)}{12}$	
	$\bar{X}_{baru} = 54 \cdot 3$	**N1**
	$\sigma = \sqrt{\dfrac{31720 + 2(46^2)}{12} - 54 \cdot 33^2}$	**K1** **min & sisihan piawai**
	$\sigma = 6 \cdot 652$	**N1**
		7
3		
(a)	$a = 2176, \quad n = 15, \quad d = 12$	
	$T_{15} = 120 + 14(120)$	**K1**
	$= 1800$	
	Total = 1800 + 2176	**K1**
	= 3976	**N1**

(b)	$a = 4096, \quad r = \frac{1}{2}$ $ar^{n-1} = 1$ $(4096)\left(\frac{1}{2}\right)^{n-1} = 1$ $\left(\frac{1}{2}\right)^{n-1} = \frac{1}{4096}$ $\left(\frac{1}{2}\right)^{n-1} = \left(\frac{1}{2}\right)^{12}$ $n-1=12$ $n=13$ $\therefore$ All fish all going to die when $n=14$. On 28 June 2017.	**P1** **K1** **N1**
		6
4	(a) $\overrightarrow{RS} = \overrightarrow{RP} + \overrightarrow{PS}$ $= 2\underset{\sim}{p} + \left(-\frac{10}{3}\underset{\sim}{p} + \frac{2}{3}\underset{\sim}{q}\right)$ $= -\frac{4}{3}\underset{\sim}{p} + \frac{2}{3}\underset{\sim}{q}$ $\overrightarrow{ST} = \overrightarrow{SQ} + \overrightarrow{QT}$ $= \frac{1}{3}\left(-5\underset{\sim}{p} + \underset{\sim}{q}\right) + \mu\underset{\sim}{q} - \underset{\sim}{q}$ $= -\frac{5}{3}\underset{\sim}{p} - \frac{2}{3}\underset{\sim}{q} + \mu\underset{\sim}{q}$	**K1 find (a) triangle law OR b(ii) quadrilateral law (for RS or ST)** **N1** **N1**

	(b) $\overrightarrow{RS}=\lambda\overrightarrow{ST}$ $-\frac{4}{3}\underset{\sim}{p}+\frac{2}{3}\underset{\sim}{q}=\lambda\left(-\frac{5}{3}\underset{\sim}{p}-\frac{2}{3}\underset{\sim}{q}+\mu\underset{\sim}{q}\right)$ $-\frac{4}{3}=\lambda\left(-\frac{5}{3}\right)$ $\lambda=\frac{4}{5}$ $\frac{2}{3}=\frac{4}{5}\left(\mu-\frac{2}{3}\right)$ $\mu=\frac{3}{2}$	**K1** **K1** **N1** **K1** **N1**
		8
5 **(a)**	$5^{n+2}+10\left(5^{n-1}\right)-17\left(5^{n}\right)$ $=25\left(5^{n}\right)+10\left(5^{n}\right)\left(\frac{1}{5}\right)-17\left(5^{n}\right)$ $=\left(25+2-17\right)\left(5^{n}\right)$ $=10\left(5^{n}\right)$	**K1** **N1**
(b)	$\frac{\log_3 q}{\log_3 3}\times\frac{4\log_3 3}{\log_3 p}\times\frac{3q\log_3 p}{\log_3 q}=9$ $12q=9$ $q=\frac{3}{4}$	**K1** for change base, **K1** for power **N1**
		5

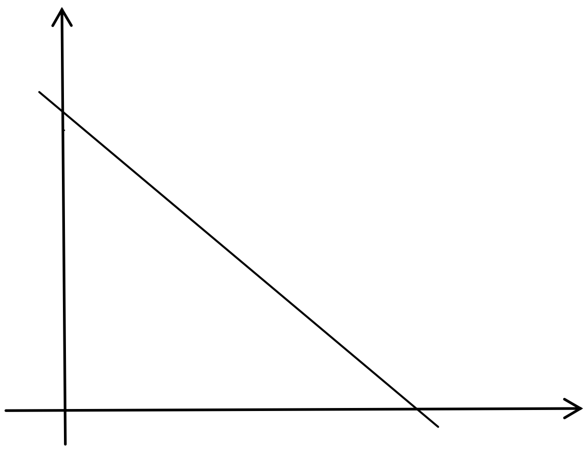
N0.	SOLUTION	MARKS
6	(a) $p = 0\cdot85 \qquad q = 0\cdot15$ $P(X > 8)$ $= P(X = 9) + P(X = 10)$ $= {}^{10}C_{9}(0\cdot85)^{9}(0\cdot15) + {}^{10}C_{9}(0\cdot85)^{10}(0\cdot15)^{0}$ $= 0\cdot5443$ (b) $P(7\cdot96 \le X \le 8.03)$ $= \left(\dfrac{7\cdot96-8}{0\cdot1} \le z \le \dfrac{8\cdot03-8}{0\cdot1}\right)$ $= P(-0\cdot4 \le z \le 0\cdot3)$ $= 1 - P(z \ge 0\cdot4) - P(z \ge 0\cdot3)$ $= 0\cdot2733$	**P1** **K1** **use** ${}^{n}C_{r}p^{r}q^{n-r}$ **N1** **K1** **Use score-*z*** **Z =** $\dfrac{X - \mu}{\sigma}$ **K1** **N1**
		6

N0.	SOLUTION	MARKS
7	(a) $\sin x \cot^2 x + \sin x$ $= \sin x \left(\cot^2 x + 1\right)$ $= \sin x \ \text{cosec}^2 x$ $= \text{cosec}\, x$	K1 N1
	(b) (i) $y = 2\cos\frac{3}{2}x$	P1 graph cosine curve P1 amplitude 2 P1 cycle $\frac{3}{2}$ cycle 0 to 2π
	(ii)  	P1 $-f(x)$ P1 shifted graph $1 - 2\cos\frac{3}{2}x$ K1 $y = \frac{x}{\pi} - \frac{3}{2}$
	(iii) $\frac{5}{2} - f(x) - \frac{x}{\pi} = 0$ $y = \frac{x}{\pi} - \frac{3}{2}$ Number of solutions = 2	N1 equation $y = \frac{x}{\pi} - \frac{3}{2}$ N1
		10

N0.	SOLUTION	MARKS
8 **(a)**	$\sin \angle AOD = \frac{5}{10}$ $\angle AOD = 0.5236 rad$	**K1** **N1** θ **in rad**
(b)	$S_{AD} = 10 \times 0.5236$ $= 5.236$	**K1** **Use** $s = r\theta$
	$DC = \frac{1}{5} \times 10$ $= 2$	**K1**
	$Perimeter = 5.236 + 2 + 5 + 8$ $= 20.24$	**K1** **N1**
(c)	$Luas = \frac{1}{2}(8+12)5 - \frac{1}{2}(10)^2(0.5236)$ $= 23.82$	**K1 K1 K1** **Use formula** $A = \frac{1}{2}r^2\theta$ **N1**
		10

N0.	SOLUTION	MARKS
9 **(a)**	$C\ (1, 5)$	**P1**
	$F = \left(\frac{7+2}{3}, \frac{-1+10}{3}\right)$	**K1**
	$= (3,3)$	**N1**
(b)	$D\ (-1, 1)$	**P1**
	$m_{BC} = \frac{5+1}{1-7}$ $= -1$ $y-1 = 1(x+1)$	**K1** for using $m_1m_2 = -1$ to form equation
	$y = x+2$	**N1**
(c)	Area of quadrilateral $= \frac{1}{2}\begin{vmatrix} 1 & 7 & -1 & -1 & 1 \\ 5 & -1 & -1 & 1 & 5 \end{vmatrix}$	
	$= \frac{1}{2}\left\|(-1-7-1-5)-(12+1+1+1)\right\|$	**K1**
	$= 14.5 \text{ unit}^2$	**N1**
(d)	$PA = AD$	
	$\sqrt{(x+1)^2+(y+1)^2} = \sqrt{(-1+1)^2+(1+1)^2}$	**K1**
	$x^2+y^2+2x+2y-2=0$	**N1**
		10

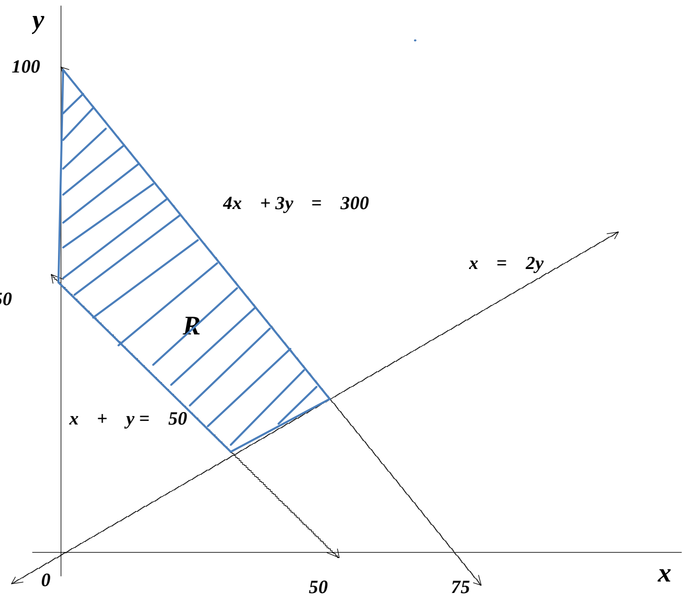
N0.	SOLUTION	MARKS
10		
(a)	$(9-x)^2 = 9(x+1)$	**K1**
	$(x-24)(x-3)=0$	**K1**
	$(3,6)$	**N1**
(b)	$Area\ of\ trapezium = \frac{1}{2}(3+9)6$ $=36$	**K1**
	$Area = \int_3^6 (\frac{y^2}{2}-1)dy = \left[\frac{y^3}{27}-y\right]_3^6$ $=4$	**K1** **integrate and sub. the limit correctly**
	$Area\ of\ shaded\ region = 36-4$	**K1**
	32	**N1**
(c)	$v=\pi\int_0^3\left(\frac{y^2}{9}-1\right)^2 dy$ $=\pi\int_0^3\left(\frac{y^4}{81}-\frac{2y^2}{9}+1\right)dy$	**K1**
	$=\pi\left[\frac{y^5}{405}-\frac{2y^3}{27}+y\right]_0^3$	**K1** **integrate and sub. the limit correctly**
	$=1.6\pi$	**N1**
		10

N0.	SOLUTION	MARKS
11 (a)		
	<table><tr><td>$\frac{1}{x}$</td><td>0.33</td><td>0.25</td><td>0.20</td><td>0.17</td><td>0.14</td><td>0.10</td></tr><tr><td>$\frac{1}{y}$</td><td>0.98</td><td>1.85</td><td>2.34</td><td>2.55</td><td>2.90</td><td>3.30</td></tr></table>	**N1 6 correct values** **N1 6 correct values**
		**K1 Plot / Correct axes & uniform scale** **N1 6 points plotted correctly** **N1 Line of best-fit**
(b) (i)	$\frac{1}{y} = pq\left(\frac{1}{x}\right) + p$ $p = 4.3$	**K1 for y-intercept** **N1**
(ii)	$q(4.3) = -10.06$ $q = 2.340$	**K1 finding gradient** **N1**
(iii)	$\frac{1}{y} = 3.05$ $y = 0.3279$	**N1**
		10

N0.	SOLUTION	MARKS
12		
(a)	$S=\int (3t^2-4t-4)dt$	
	$=t^3-2t^2-4t$	K1
	$=(3)^3-2(3)^2-4(3)$	K1
	$=-3$	N1
(b)	$(3t+2)(t-2)=0$	K1
	$t=2$	N1
(c)	$a=0$	
	$6t-4=0$	
	$t=\frac{2}{3}s$	
	$v=3(\frac{2}{3})^2-4(\frac{2}{3})-4$	K1 sub. $t=\frac{2}{3}s$ into v
	$=-5\frac{1}{3}$	N1
(d)	$S_{\frac{2}{3}}=(\frac{2}{3})^3-2\left(\frac{2}{3}\right)^2-4(\frac{2}{3})$ *or* $S_4=(4)^3-2\left(4\right)^2-4(4)$	K1
	Total distance	
	$=3\frac{7}{27}\times 2+16$	K1
	$=22\frac{14}{27}$	N1
		10

N0.	SOLUTION	MARKS
13	(a) $PR = 4\cdot 8 + 1\cdot 6 = 6\cdot 4$ $\dfrac{\sin\angle PQN}{6\cdot 4} = \dfrac{\sin 40^\circ}{18\cdot 6}$ $\sin\angle PQN = 0\cdot 221174$ $\angle PQN = 12.778^\circ$	**P1** **K1 Use sine rule** **N1**
	(b) $6\cdot 4^2 = 18\cdot 6^2 + QR^2 - 2(18\cdot 6)(QR)\cos 12\cdot 778^\circ$ $QR^2 - 36\cdot 2787QR + 305 = 0$ $QR = 23\cdot 042 \quad , \quad 13\cdot 2367$ $\therefore \; QR = 23\cdot 042$	**K1 Use cosine rule** **K1 Solve quadratic equation** **N1**
	(c) $\dfrac{16}{64} = \dfrac{1}{4}$ $MN = \dfrac{18\cdot 6}{4} = 4\cdot 65$ $\angle NMR = 127\cdot 222^\circ$ $A = \dfrac{1}{2}(4\cdot 65)(1\cdot 6)\sin 127\cdot 222^\circ$ $= 2\cdot 962$	**P1** **P1** **K1 Use** $A = \dfrac{1}{2}ab\sin c$ **N1**
		10

N0.	SOLUTION	MARKS
14		
(a)	$\dfrac{p}{2.50}\times 100 = 108$	**K1**
	$p = 2.70$	**N1**
(b)	$120, 100, 105, 90$	**P1**
	$P: \dfrac{125\times 120}{100} = 150$ $Q: \dfrac{115\times 100}{100} = 115$ $R: \dfrac{108\times 105}{100} = 113.40$ $S: \dfrac{148\times 90}{100} = 133.20$	**K1** **N1**
	$\bar{I} = \dfrac{150\times 2\ +\ 115\times 4 + 113.40\times 1 + 133.20\times\ 3}{10}$	**K1**
	$= 127.30$	**N1**
(c)	$\bar{I} \quad = \dfrac{1250\times\ 2 + 100\times 4 + 105\times 1 + 90\times 3}{10}$ $= 101\cdot 5$	**K1**
	$\dfrac{p}{25}\times 100 = 101.5$	**K1**
	$p = 25.375$	**N1**
		10

N0.	SOLUTION	MARKS
15 **(a)**	$x + y \geq 50$	**N1**
	$y \geq \frac{1}{2}x$	**N1**
	$20x + 15y \leq 1500$ $4x + 3y \leq 300$	**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) **(i)**	20	**N1**
(ii)	$\cos t = 20(20) + 15(30)$ $= 850$	**K1**
	$P_{\max} = 1500 - 850$ $= \text{RM}650$	**K1** **N1**
		10

END OF MARKING SCHEME