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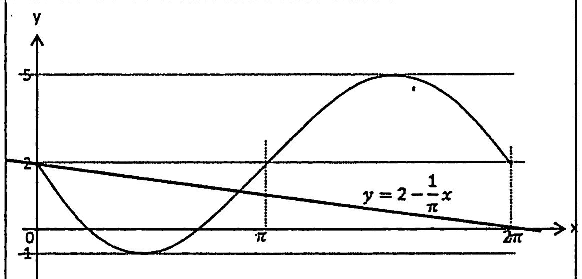
PEPERIKSAAN PERCUBAAN SPM 2013
SKEMA PERMARKAHAN MATEMATIK TAMBAHAN KERTAS 2

NO	SOLUTIONS	MARKS	TOTAL
1.	$y = 2x + 3$ or $x = \frac{y-3}{2}$ $x = \frac{y+4}{2}$	P1	
	$x^2 - 2(2x+3)^2 - x(2x+3) + 27 = 0$ or $\left(\frac{y-3}{2}\right)^2 - 2y^2 - \left(\frac{y-3}{2}\right)y + 27 = 0$	K1	
	$x^2 + 3x - 1 = 0$ or $y^2 = 13$		
	$x = \frac{-3 \pm \sqrt{3^2 - 4(1)(-1)}}{2(1)}$ or $y = \frac{-(-2) \pm \sqrt{(-2)^2 - 4(1)(-28)}}{2(1)}$	K1	5
	$x = 0.303, -3.303$ (*both*) $y = 3.6060, -3.606$ (*both*)	N1 N1	
2(a)			
	shape of *sine* curve P1 1 cycle for $0 \le x \le 2\pi$ P1 maximum = 5 and minimum = -1 P1		7
(b)	straight line $y = 2 - \frac{1}{\pi}x$	N1 K1 N1	
	No. of solutions = 2	N1	
3(a)	$\frac{dy}{dx} = x^2 + kx + p$	K1	6

	$(2,0): 4 + 2k + p = 0$ $(-1, \frac{9}{2}): 1 - k + p = 0$	K1	
	$k = -1$ *and* $p = -2$	N1	
(b)	$y = \int (x^2 - x - 2)\,dx$ $= \frac{x^3}{3} - \frac{x^2}{2} - 2x + c$	K1	
	gantian $(2, 0)$ *or* $(-1, \frac{9}{2})$: $y = \frac{x^3}{3} - \frac{x^2}{2} - 2x + \frac{10}{3}$	K1 N1	
4(a)	$a = 2\pi(2) = 4\pi$ or $l = 2\pi(16) = 32\pi$	P1	
	$S_n = \frac{n}{2}[4\pi + 32\pi] = 144\pi$ $n = 8$	K1 N1	
(b)	$T_8 = 4\pi + 7d = 32\pi$ $d = 4\pi$	K1 N1	8
	$T_6 = 4\pi + 5(4\pi)$ $= 24\pi$	N1	
(c)	$S_6 = \frac{6}{2}[2(4\pi) + 5(4\pi)]$ $= 84\pi$	K1 N1	
5(a)	(i) $\vec{AD} = \vec{AB} + \vec{BD}$ $= 8\underset{\sim}{x} + 6\underset{\sim}{y}$	N1	
	(ii) $\vec{BC} = \vec{BA} + \vec{AC}$ $= -8\underset{\sim}{x} + 10\underset{\sim}{y}$	N1	

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5.(b)	(i) $\vec{AE} = m\vec{AD}$ $= 8m\underset{\sim}{x} + 6m\underset{\sim}{y}$	P1	
	(ii) $\vec{EC} = k\vec{BC}$ $\vec{EA} + \vec{AC} = k\vec{BC}$ $\vec{EA} = -8k\underset{\sim}{x} + 10k\underset{\sim}{y} - 10\underset{\sim}{y}$ $\vec{AE} = 8k\underset{\sim}{x} + (10-10k)\underset{\sim}{y}$	K1 N1	8
(c)	$8m = 8k$ $m = k$ or $6m = 10 - 10k$ $m = \frac{5}{8}$ $n = \frac{5}{8}$	K1 N1 N1	
6(a)	$\frac{k+k+1+2k-1+2k+4}{4} = 7$ $k = 4$	K1 N1	
	(i) New mean $= \frac{7}{7} + 1 = 2$	N1	
	(ii) 4, 5, 7, 12 Standard deviation $= \sqrt{\frac{4^2+5^2+7^2+12^2}{4} - (7)^2}$ $= 3.08$ New standard deviation $= \frac{3.08}{7} = 0.44$	K1 N1 N1	6

7 (a)	see table below Both axes correct (at least plotting 1 point) Plotting all 6 points – correct line of the best fit - correct.	N1 N1 K1 K1 N1	
(b)	(i) $xy = k + \frac{p}{x}$ $k = 16$ $p = gradient = -\frac{16}{1.3} = -12.31$	P1 N1 N1	10
	(ii) $x = 1.72$, $\frac{1}{x} = 0.58$ $xy = 9$ $y = \frac{9}{1.72} = 5.23$	K1 N1	
8 (a)	$y = \frac{4}{(2x+1)^2}$ $\frac{dy}{dx} = -\frac{16}{(2x+1)^3}$ $A(-1, 4)$; $\frac{dy}{dx} = 16$ Equation of tangent : $y - 4 = 16(x+1)$ $y = 16x + 20$	K1 N1 K1 N1	
(b)	**(i) Area of the shaded region:** Integrate $\int_0^1 4(2x+1)^{-2}\,dx$ $= \frac{4(2x+1)^{-1}}{2(-1)}$ $= \frac{4(2x+1)^{-1}}{2(-1)}\Big\|_{-1}^{-2} = \left\|-\frac{4}{15}\right\|$ $= \frac{4}{15}$ unit^2 @ 0.267	K1 K1 N1	10

Table for 7 (a):

xy	3.80	7.80	9.90	11.20	12.00	12.50
$\frac{1}{x}$	1.00	0.67	0.50	0.40	0.33	0.29

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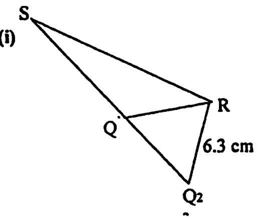
(c)	(ii) Volume: Integrate = $\pi\int_{-3}^{-2}16(2x+1)^{-4}dx$	K1	
	$=\left[-\frac{8}{3(2x+1)^3}\right]_{-3}^{-2}$	N1	
	$=0.077\pi$ or $\frac{784}{10125}\pi$ unit^3 or 0.243	N1	
9 (a)	$3y-2x=2$ $y=\frac{2}{3}x+\frac{2}{3}$ $m_{DC}=\frac{2}{3}$ $\therefore m_{AB}=\frac{0+1}{k-4}=\frac{2}{3}$	K1	
	$k=\frac{11}{2}$	N1	
(b)	$m_{AD}=-\frac{3}{2}$ $\therefore$ equation of AD: $y+1=-\frac{3}{2}(x-4)$	K1	
	$2y+3x=10$	N1	10
(c)	$3y-2x=2$ ..... (1) $2y+3x=10$ .....(2)	K1 K1	
	D(2, 2)	N1	
(d)	Mid-point AC $=\left(\frac{4+7}{2},\frac{-1+9}{2}\right)$ $=\left(\frac{11}{2},4\right)$	P1	
	Equation bisector AC: $y-4=-\frac{3}{10}(x-\frac{11}{2})$	K1	
	$20y+6x=113$	N1	

10 (a)	$\cos\left(\frac{1}{2}\angle MOK\right)=\frac{8}{17}$	K1	
	$\frac{1}{2}\angle MOK=61.9275°$	N1	
	$\angle MOK=\frac{123.855x\pi}{180}=2.162$ rad	N1	
(b)	Perimter $=2(\sqrt{17^2-8^2})+17(2.162)$	K1 K1	10
	$=66.754$ cm	N1	
(c)	Area $=\frac{1}{2}(17^2)(2.162)-\frac{1}{2}(17^2)\sin(123.855)$	K1 K1	
	$=312.409-120$	K1	
	$=192.409$	N1	
11(a)	$\mu=nk=360$ and $\sigma^2=nkq=72$	P1	
	$360q=72$	K1	
	$q=0.2$ $\therefore k=0.8$	N1	
	$nk=360$ $n=\frac{360}{0.8}$	K1	
	$=450$	N1	
(b)	(i) $\mu=140$ $\sigma=10$ $P\left(\frac{135-140}{10}<z<\frac{145-140}{10}\right)$	K1	10
	$P(-0.5<z<0.5)$ $=2(0.1915)$	N1	
	$=0.3829$		
(c)	(ii) (ii) $P\left(z>\frac{150-140}{10}\right)$	K1	
	$P(z>1.0)$ $=0.1587$ $\frac{80}{N}=0.1587$	K1	
	$\therefore N=504/505$	N1	

12(a)	(i) $QS=\sqrt{7^2+18.2^2-2(7)(18.2)\cos(52^o)}$	K1	
	$=\sqrt{223.3695}$		
	$=14.946\ cm$	N1	
	(ii) $\frac{\sin\angle PQS}{7}=\frac{\sin 52^o}{14.946}$	K1	
	$\sin\angle PQS=0.3691$		
	$\angle PQS=21.66^o\ /\ 21^o40'$	N1	
(b)	(i) 	N1	
(ii)	$\frac{\sin\angle QSR}{6.3}=\frac{\sin 110^o}{14.946}$	K1	
	$\angle QSR=23^o20'$	N1	10
	$\therefore\ \angle SQR=180^o-110^o-23^o20'$		
	$=46^o40'$		
	and	N1	
	$\therefore\ \angle QRQ'=180^o-2(46^o40')$		
	$=86^o40'$		
	Area of $Q'RS=\frac{1}{2}(14.946)(6.3)(\sin 46^o40')-\frac{1}{2}(6.3)(6.3)\sin 86^o40')$	K1	
	$=34.2447-19.8114$		
	$=14.433\ cm^2$	N1	

13 (a)	Use $I=\frac{Q_1}{Q_o}\times 100$	K1	
	$x=140,\quad y=7$	N1	
(b)	$I_{05/02}=\frac{120(4)+140(2)+125(3)+110(1)}{4+2+3+1}$	K1 N1	
	$=124.5$	N1	
(c)	$\frac{P_{05}}{9600}x100=124.5$	K1	
	$P_{05}=RM11952$	N1	10
(d)	(table below)	P1	
	$I_{07/02}=\frac{132x4+154x2+131.25x3+115.5x1}{10}$	K1	
	$=134.525$	N1	

	$I_{07\cdot 02}$	w
P	120x1.1= 132	4
Q	140x1.1=154	2
R	125x1.05=131.25	3
S	110x1.05=115.5	1

14 (a)	$x+y\le 9$	N1	
	$x\le 2y\ \ or\ \ y\ge\frac{1}{2}x$	N1	
	$900x+400y\ge 3600\ \ or\ \ 9x+4y\ge 36$	N1	
(b)	Draw correctly all three straight line which involves x and y.	K1	
	Region shaded correctly	N1 N1	10
(c)	(i) $x=4,\ y=5$	N1	
	(ii) Use $45x+20y$ for point in the shaded region	K1	
	$(6,3):45(6)+20(3)$	N1	
	$=330$	N1	

15(a)	$v = \int 2t - 8 \; dt$		
	$= t^2 - 8t + 12$	K1	
	V minimum, a =0		
	$2t - 8 = 0$		
	$t = 4$	N1	
	$V_{min} = (4^2) - 8(4) + 12$	K1	
	$= -4ms^{-1}$	N1	
(b)	rest, v =0		
	$t^2 - 8t + 12 = 0$	K1	
	$(t-2)(t-6) = 0$		
	$t = 2, \; t = 6$	N1	
(c)	$s = \int t^2 - 8t + 12 \; dt$		
	$= \frac{t^3}{3} - 4t^2 + 12t$	K1	10
	$total \; distance = \int_0^2 v dt + \left\lvert \int_2^4 v dt \right\rvert$		
	$= \left[\frac{t^3}{3} - 4t^2 + 12t \right]_0^2 + \left\lvert \frac{t^3}{3} - 4t^2 + 12t \right\rvert_2^4$	K1 K1	
	$= \frac{32}{3} + \left\lvert -\frac{16}{3} \right\rvert$		
	$= 16 m$	N1	

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