PERATURAN PEMARKAHAN PEPERIKSAAN PERCUBAAN SPM 2019
PROGRAM INTERVENSI TERBILANG AKADEMIK SELANGOR
(PINTAS)
MATEMATIK TAMBAHAN KERTAS 2

NO	SOLUTIONS	MARKS		
1	(a) $V = \pi \int_0^4 (4x - x^2)^2 dx$ $\pi \left[\frac{16x^3}{3} - 2x^4 + \frac{x^5}{5}\right]_0^4$ (Integrate + limit) $\pi \left[\frac{16(4)^3}{3} - 2(4)^4 + \frac{(4)^5}{5}\right] - 0$ $\frac{512}{15}\pi$	K1 K1K1 N1	4	
	(b) $2 \times \frac{32}{3}$ $-\frac{64}{3}$	K1 N1	2	**6**
2	(a) $8^{\frac{1}{3}}$ n = 2 Accept answer without working for K1N1	K1 N1	2	
	b) $3^r(9^s)^2 = 81$ or $\frac{(3^r)^2}{9^s} = \frac{1}{3}$ or equivalent $3^r(3)^{4s} = 3^4$ or $3^{2r-2s} = 3^{-1}$ or equivalent $r + 4s = 4$ or $2r-2s = -1$ or equivalent Accept any method of solving simultaneous equation $r = \frac{2}{5}$ $s = \frac{9}{10}$	K1 K1 K1 K1 N1 N1	6	**8**

NO	SOLUTIONS	MARKS		
3	a) $\overrightarrow{AD} = \overrightarrow{AB} + \overrightarrow{BC} + \overrightarrow{CD}$	K1		
	$\overrightarrow{AD} = (q-p)a + qb$			
	$q - p = -5$ or $q = \dfrac{p+3}{2}$	K1	3	
	$p = 13$ and $q = 8$	N1		
	(b) $\dfrac{1}{2}$ x DC x $4 = 52$	K1	3	
	p $|a| = 26$	K1		
	2	N1		6
4	$5x + y + (x+y) = 24$ or $(5x)^2 + (y)^2 = (x+y)^2$	P1		
	$y = 12 - 3x$	K1		
	$12x^2 - x(12-3x) = 0$	K1		
	$5x^2 - 4x = 0$ $x(5x-4) = 0$ or equivalent	K1	7	
	$x = \dfrac{4}{5}$ or $y = \dfrac{48}{5}$	N1		
	$\dfrac{48}{5} \times \dfrac{4}{5}$	K1		
	$\dfrac{192}{25}$ or equivalent	N1		7

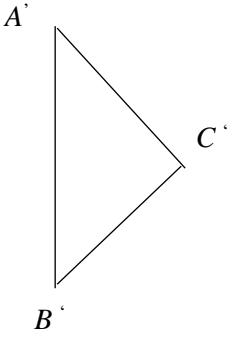| NO	SOLUTIONS	MARKS		
5	$(4.6 \times 3) + (5.1 \times 5) + (5.6 \times 5) + (6.1 \times 10) + (6.6 \times 12) + (7.1 \times 5)$ or $(4.6 \times 2) + (5.1 \times 7) + (5.6 \times 5) + (6.1 \times 12) + (6.6 \times 8) + (7.1 \times 6)$	K1		
	$\dfrac{(4.6 \times 3) + (5.1 \times 5) + (5.6 \times 5) + (6.1 \times 10) + (6.6 \times 12) + (7.1 \times 5)}{40}$ or $\dfrac{(4.6 \times 2) + (5.1 \times 7) + (5.6 \times 5) + (6.1 \times 12) + (6.6 \times 8) + (7.1 \times 6)}{40}$	K1		
	6.075 or 6.0375	N1		
	$(3 \times 4.6^2) + (5 \times 5.1^2) + (5 \times 5.6^2) + (10 \times 6.1^2) + (12 \times 6.6^2) + (7.1^2 \times 5)$ or $(2 \times 4.6^2) + (7 \times 5.1^2) + (5 \times 5.6^2) + (12 \times 6.1^2) + (8 \times 6.6^2) + (7.1^2 \times 6)$	K1		
	$\sqrt{\dfrac{(3 \times 4.6^2) + (5 \times 5.1^2) + (5 \times 5.6^2) + (10 \times 6.1^2) + (12 \times 6.6^2) + (7.1^2 \times 5)}{40} - (6.075)^2}$ or $\sqrt{\dfrac{(2 \times 4.6^2) + (7 \times 5.1^2) + (5 \times 5.6^2) + (12 \times 6.1^2) + (8 \times 6.6^2) + (7.1^2 \times 6)}{40} - (6.0375)^2}$	K1		
	0.7242 or 0.7175	N1		
	ORCHARD B	N1		
			7	**7**
6	(a) $\dfrac{\cot^2 \theta - 1}{\cot^2 \theta + 1}$			
	$\dfrac{\left(\dfrac{\cos^2 \theta}{\sin^2 \theta}\right) - 1}{\left(\dfrac{\cos^2 \theta}{\sin^2 \theta}\right) + 1}$	K1		
	$\dfrac{\left(\dfrac{\cos^2 \theta - \sin^2 \theta}{\sin^2 \theta}\right)}{\left(\dfrac{\cos^2 \theta + \sin^2 \theta}{\sin^2 \theta}\right)}$	K1		

NO	SOLUTIONS	MARKS		
	$\cos^2 \theta - \sin^2 \theta$ $\cos 2\theta$	N1	3	
	(b) $\cos 2\theta = \dfrac{1}{\cos ek\theta}$ $\cos 2\theta = \dfrac{1}{\dfrac{1}{\sin \theta}}$ $1 - 2\sin^2 \theta = \sin \theta$ $2\sin^2 \theta + \sin \theta - 1 = 0$ $(2\sin \theta - 1)(\sin \theta + 1) = 0$ $\sin \theta = \dfrac{1}{2}$, $\sin \theta = -1$ $30°$, $150°$, $270°$	K1 K1 N1	3	6
7	(a) $60°$ _or_ $120°$ _or_ $240°$ 4.189 _or_ $\dfrac{4}{3}\pi$	K1 N1	2	
	(b) $OP = 12$ _or_ $\cos 60° = \dfrac{6}{OP}$ $PS = \sqrt{108}$ or equivalent _Length of arc_ $PQR = 12 \times \left(120 \times \dfrac{3.142}{180}\right)$ or 25.14 $25.14 + 2\sqrt{108}$ 45.92	K1 K1 K1 K1 N1	5	
	(c) $\dfrac{1}{2}(12)^2\left(120 \times \dfrac{3.142}{180}\right)$ _or_ $\dfrac{1}{2}(12)^2 \sin 120$ _or_ $\dfrac{1}{2} \times 2\sqrt{128} \times 6$ $150.8 - 62.35$ 88.45	K1 K1 N1	3	10

NO	SOLUTIONS	MARKS	
8	(a) $\left(\dfrac{0+8}{2}, \dfrac{5+9}{2}\right)$	K1	
		N1	2
	(4, 7)		
	(b) $\dfrac{1}{2}\left\|0(5)+0(9)+8(1)+4(0)-0(0)-5(8)-9(4)-1(0)\right\|$	K1	
		N1	2
	34		
	(c) $m = -\dfrac{1}{2}$	K1	
	midpoint QR (6,5)	K1	
	$y-5 = -\dfrac{1}{2}(x-6)$ or equivalent	K1	
	$y = -\dfrac{1}{2}x + 8$	N1	4
	(d) $\dfrac{h-5}{\dfrac{14}{3}-6} = -\dfrac{1}{2}$ or $h = -\dfrac{1}{2}\left(\dfrac{14}{3}\right)+8$	K1	
	$h = \dfrac{17}{3}$	N1	2	10
9	(a) $p = 0.75$ or $q = 0.25$ or		
	$^{15}C_r (0.75)^r (0.25)^{n-r}$	P1	
	(i) $P(X \geq 12)$ $P(X =12) + P(X =13) + P(X =14) + P(X =15)$ 0.4 613	K1 N1	
	(ii) $\mu = 15 \times 0.75$ 11.25	K1 N1	5
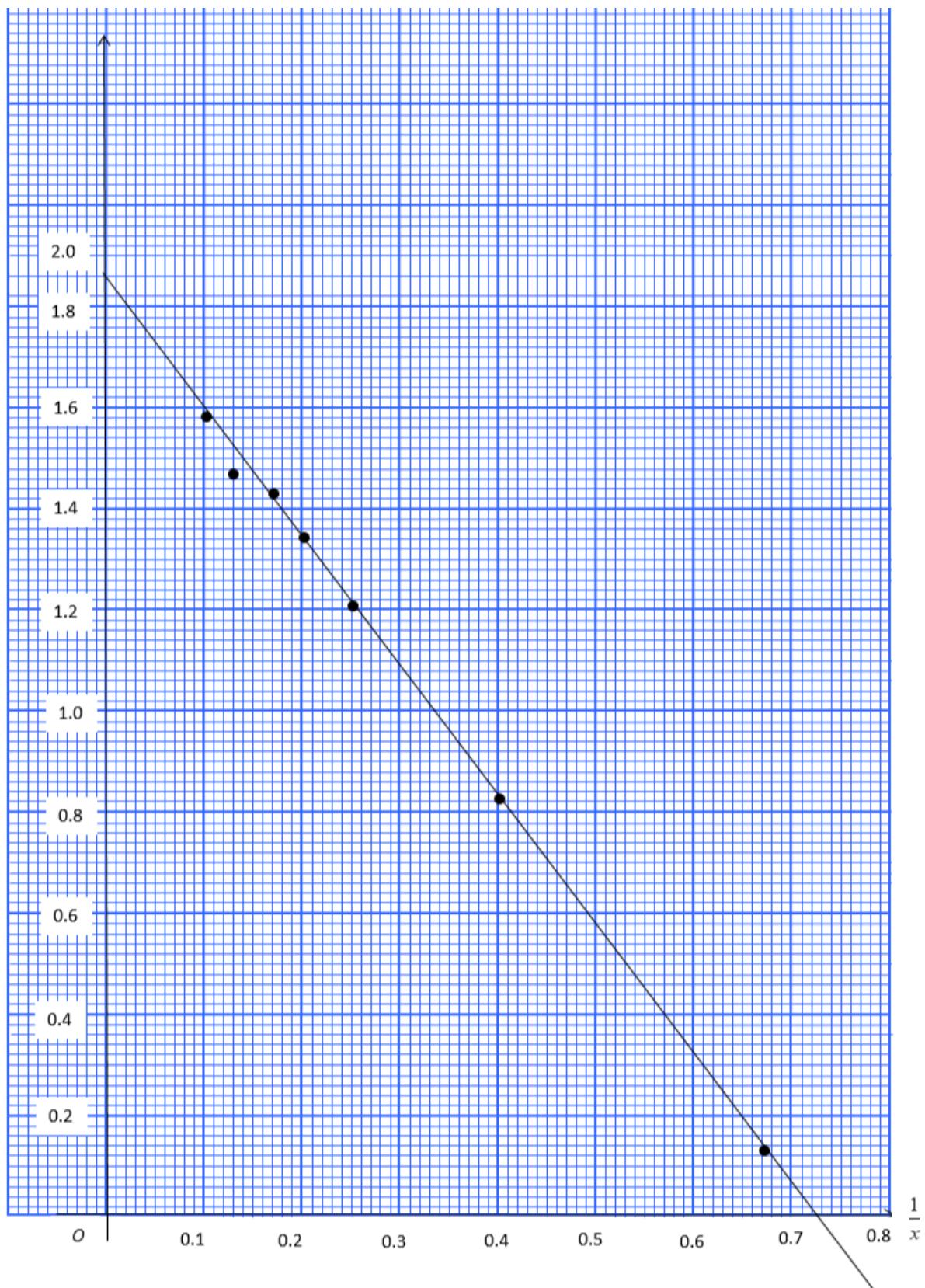
NO	SOLUTIONS	MARKS		
	(b)(i) $\mu = 370$ $\sigma = 8$	P1		
	$P\left(\dfrac{355-370}{8} < Z < \dfrac{380-370}{8}\right)$ or $P(-1.875 < Z < 1.25)$	K1		
	0.8641 0.86396	N1		
	(ii) 0.8641 x 3130	K1		
	2704	N1		
			5	10
10	(a) All values of $\dfrac{1}{x}$ and $\dfrac{1}{y}$ correct.	N1, N1		
	$\begin{array}{\|c\|c\|c\|c\|c\|c\|c\|c\|} \hline \frac{1}{x} & 0.67 & 0.40 & 0.25 & 0.20 & 0.17 & 0.13 & 0.10 \\ \hline \frac{1}{y} & 0.22 & 0.91 & 1.30 & 1.43 & 1.52 & 1.56 & 1.67 \\ \hline \end{array}$		2	
	(b) *Refer graph paper* Plot $\log_{10} y$ against x with correct axes, uniform scales and at least one point.	K1		
	6 points plotted correctly	N1		
	Line of best fit	N1	3	
	(c) $\dfrac{1}{y} = \dfrac{k}{h}\left(\dfrac{1}{x}\right) + \dfrac{1}{h}$	P1		
	(i) $1.92 = \dfrac{1}{h}$	K1		
	$h = 0.5208$	N1		
	(ii) $\dfrac{k}{0.5208} = -2.5439$	K1		
	$k = -1.3248$	N1	5	10

6

NO	SOLUTIONS	MARKS		
11	(a) $r = x - 5$ or $h = x - 2$	P1	3	
	$V = \pi (x-5)^2 (x-2)$ or equivalent	N1		
	(b)			
	$\dfrac{dv}{dx} = \pi \left[(x-5)^2 (1) + (x-2)(2)(x-5)(1) \right]$	K1		
	$3\pi(x-5)(x-3)$	N1		
		K1		
	$3\pi(x-5)(x-3) = 0$	N1	4	
	3 or 5	N1		
	When $x = 3$, $V = 4\pi$			
	(c) $\delta x = 0.01$	P1		
	$9\pi (0.01)$	K1		
	0.09π	N1	3	
				10
12	(a) $v = 3$	N1	1	
	(b) $(3t + 1)(t - 3) = 0$	K1		
	$t = 3$	N1	2	
	(c) $s_p = 3t + 4t^2 - t^3$	K1		
	$t = 3$, $s_p = 18$ or $t = 4$ $s_p = 12$	K1		
	24	N1	3	
	(d) $8 - 6t = 0$ or $t = \dfrac{4}{3}$	K1		
	$v_Q = 3t^2 - 6t - 6$	K1		
	$v_Q = 3\left(\dfrac{4}{3}\right)^2 - 6\left(\dfrac{4}{3}\right) - 6$	K1		
	$v_Q = -\dfrac{26}{3}$	N1	4	10

NO	SOLUTIONS	MARKS		

13	(a) $\dfrac{x}{2.80} \times 100 = 80$ or $\dfrac{2.60}{y} \times 100 = 130$ or $\dfrac{5.85}{5} \times 100 = z$
	
	 $x = 2.24, y = 2, z = 117$
	 Note : All three values correct N2
	         Any two values correct N1
	         One or none values correct N0
		K1
		
		 N2
			3	

	(b) $(80 \times 15) + (120 \times 14) + (130 \times 45) + (117 \times 26)$ $\dfrac{(80 \times 15) + (120 \times 14) + (130 \times 45) + (117 \times 26)}{100}$ 117.72	K1 K1 N1	3	
	(c) $\dfrac{x}{35} \times 100 = 117.72$ RM 41. 20	K1 N1	2	
	(d) $\dfrac{117.72 \times 114}{100}$ 134.2	K1 N1	2	10

NO	SOLUTIONS	MARKS		
14	(a) (i) $\frac{1}{2}(8)(BC)(\sin 120) = 24$ 6.928 (ii) $AC^2 = 8^2 + 6.928^2 - 2(8)(6.928)\,\text{kos}\,120$ 12.94 (iii) $\frac{\sin A}{6.928} = \frac{\sin 120}{12.94}$ 27.62	K1 N1 K1 N1 K1 N1	6	
	(b) $A`$     $C`$ $B`$ $180 - 27.62 - 60 = 92.38$ $\frac{1}{2}(12.94)(6.928)\sin 92.38$ 45.12	P1 K1 K1 N1	10 4	

NO	SOLUTIONS	MARKS		
15	(a) x + y ≥ 10	N1	3	
	10x + 8 y ≤ 420	N1		
	$x \leq 2y$	N1		
	(b)Refer to graph paper			
	One *straight line drawn correctly	K1	3	
	All * straight line drawn correctly	K1		
	Correct region	N1		
	(c) $13 \leq y \leq 21$	K1	4	
	420 – [20(10) + 10(8)]	N1		
	Seen (20 , 10)	N1		10
	= 140	N1		