

**3472/2**  
**ADDITIONAL**  
**MATHEMATICS**  
**Kertas 2**  
**Ogos 2017**  
2 ½ hours

**PENILAIAN PERCUBAAN SPM NEGERI PAHANG 2017**

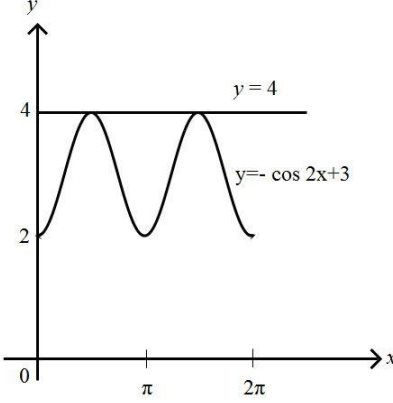
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**ADDITIONAL MATHEMATICS**

**PERATURAN PERMARKAHAN**

**Kertas 2**

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No	Solution	Sub Mark	Total
1(a)	$x^2 - \left(\frac{2}{m} + 1\right)x + \frac{3n - 1}{m} = 0$	1	7
	$n + \frac{1}{m} = \frac{2}{m} + 1$ (S.O.R/H.T.P) OR $\frac{n}{m} = \frac{3n-1}{m}$ (P.O.R/H.D.P)	1	
	$n = 3n - 1$ OR other method of simultaneous equation	1	
	$m = -2$	1	
	$n = \frac{1}{2}$	1	
1 (b)	3 (S.O.R/H.T.P) OR 2 (P.O.R/H.D.P)	1	
	$x^2 - 3x + 2 = 0$	1	
2 (a)	$\sqrt{\frac{75\ 019\ 200}{12} - \left(\frac{30\ 000}{12}\right)^2}, N = 12$	1	6
	$\bar{X} = 2\ 500$	1	
	$\sigma = 40$	1	
2 (b)	$\bar{X} = 2\ 500 + 2\ 500$	1	
	$\bar{X} = 5\ 000$	1	
	$\sigma = 40$	1	
3 (a)	Use $\operatorname{cosec} x = 1 + \cot^2 x$	1	
	Use $1 - 2 \sin^2 x = \cos 2x$	1	
3 (b) (i)	 <p>Shape of <math>\cos x</math> graph                  2 cycles for <math>0 \leq x \leq 2\pi</math>                  Max =4 and min=2 , Extension +3                  Reflection</p>	<p>1                      1                      1                      1</p>	8

3 (b) (ii)	$-5a + 3 = 4$							1	
	$a = -\frac{1}{5}$							1	
4	$4pq + \pi p^2 = 240\pi$ (non linear)							1	6
	$q = \frac{p}{2}\pi + 2\pi$ (linear)							1	
	$4p\left(\frac{p}{2}\pi + 2\pi\right) + \pi p^2 = 240\pi$ (eliminate $q$ )							1	
	$p = \frac{-8 \pm \sqrt{(-8)^2 - 4(3)(-240)}}{2(3)}$							1	
	$p = 7.71 \text{ cm}$							1	
	$q = 18.40 \text{ cm}$							1	
5 (a)	$2x^2h = 72$ $h = \frac{36}{x^2}$							1	6
	$L = 4x^2 + 6xh$							1	
	$L = 4x^2 + 6x\left(\frac{36}{x^2}\right)$ $L = 4x^2 + \frac{216}{x}$ (shown)							1	
5 (b)	$8x - \frac{216}{x^2} = 0$							1	
	$x = 3$							1	
	$L = 108 \text{ cm}^2$							1	
6 (a)	$\vec{OA} + \vec{AB} = 9\vec{i} + 15\vec{j}$							1	7
	$ \vec{OB}  = \sqrt{9^2 + 15^2}$							1	
	Unit vector in the direction $\vec{OB} = \frac{1}{\sqrt{34}}(3\vec{i} + 5\vec{j})$ (can be implied)							1	
6 (b)	$\vec{CA} = -\vec{i} - 9\vec{j}$							1	
	$\vec{CE} = \vec{i} - 6\vec{j}$							1	
	$\vec{CE} = \vec{CA} + \vec{AE}$							1	
	$\vec{CE} \neq k\vec{OC}$							1	
7 (a)	$x$	1	2	3	4	5	6	1	10
	$\frac{1}{y}$	0.46	0.39	0.30	0.22	0.15	0.07		

	Plot $\frac{1}{y}$ against $x$ and correct axes and uniform scales (pg 9 )	1	
	6 points plotted correctly	1	
	Line of best fit (Attachment, pg 9. )	1	
7 (b)	$\frac{1}{y} = \frac{r}{3}x + 2s$ can be implied	1	
	$\frac{1}{y} = 0.25$	1	
	$y = 4$	1	
	Gradient, $\frac{r}{3} = \frac{0.56-1}{0-7}$	1	
	$r = -0.24$	1	
	$s = 0.28$	1	
8(a)	$\frac{dy}{dx} = 2x - 6 = 0$	1	
	P(3, 1)	1	
8(b)	$5x^2 = x^2 - 6x + 10$ solve simultaneous equation	1	
	$(2x + 5)(x - 1) = 0$	1	
	Q(1, 5)	1	
8(c)	$\left[\frac{5x^3}{3}\right]_0^1$ or $\left[\frac{x^3}{3} - 3x^2 + 10x\right]_1^3$	1	
	$\frac{5(1)^3}{3} + \left(\frac{3^3}{3} - 3(3)^2 + 10(3)\right) - \left(\frac{1^3}{3} - 3(1)^2 + 10(1)\right)$	1	
	$6\frac{1}{3}$	1	
8(d)	$\pi \left[\frac{25x^5}{5}\right]_0^1$	1	
	$5\pi$	1	10

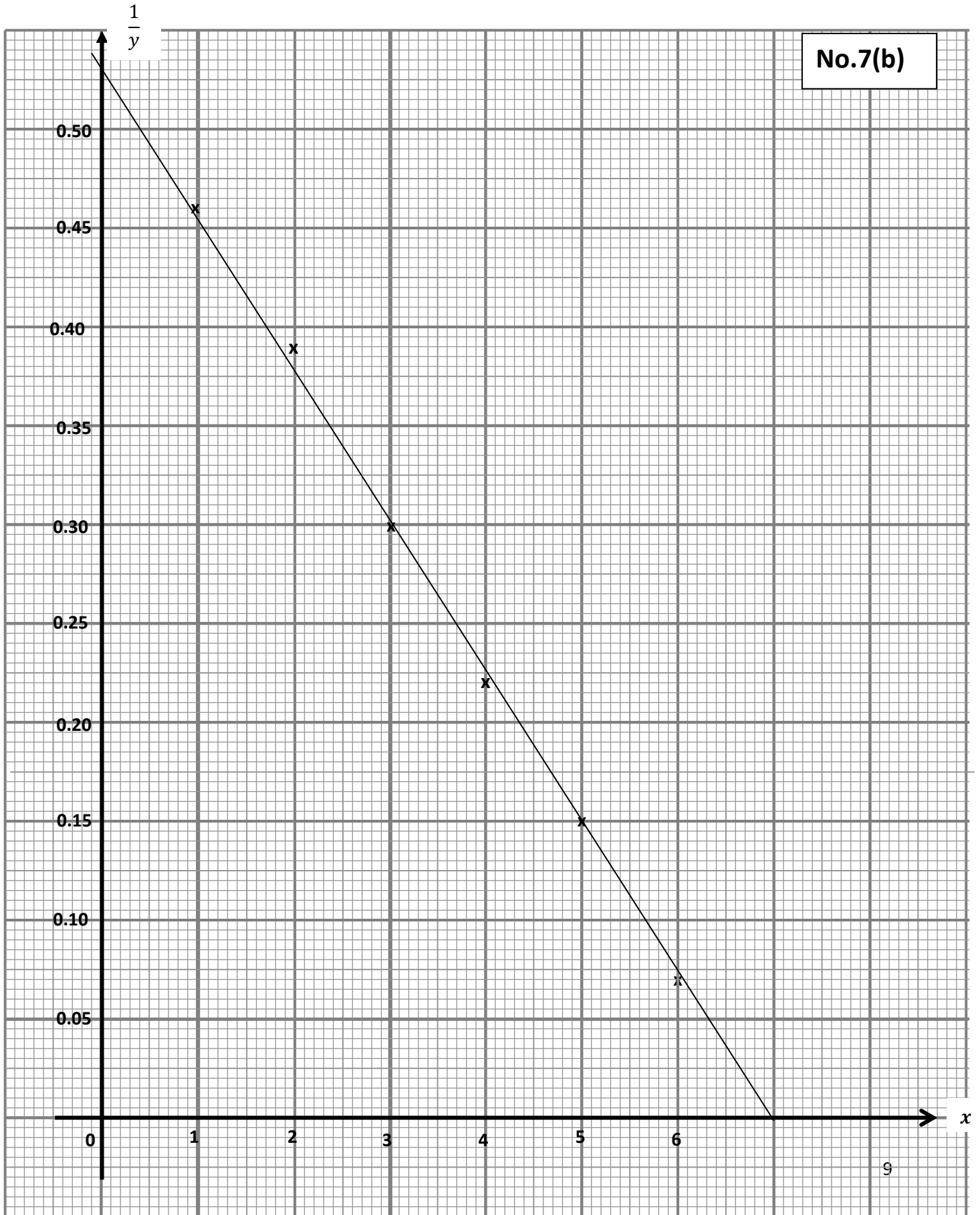
9(a)	$\sin \angle POQ = \frac{12}{15}$	1	10
	$\angle POQ = 1.855 \text{ rad}$	1	
9(b)	$15(1.855)$	1	
	$12(3.142)$	1	
	$15(1.855) + 12(3.142) + 20 + 11 + 11$	1	
	$107.5$	1	
9(c)	$\frac{1}{2}(3.142)(12)^2$	1	
	$\frac{1}{2}(15)^2(1.855) \text{ or } \frac{1}{2}(15)^2 \sin 106.26$	1	
	$\frac{1}{2}(3.142)(12)^2 - [\frac{1}{2}(15)^2(1.855) - \frac{1}{2}(15)^2 \sin 106.26] + \frac{1}{2}(1.818)(11)^2$	1	
	$235.5$	1	
10(a)(i)	$7 {}_5C_5(0.4)^5(0.6)^2 \text{ or } 7 {}_6C_6(0.4)^6(0.6)^1 \text{ or } 7 {}_7C_7(0.4)^7(0.6)^0$	1	
	$1 - 7 {}_5C_5(0.4)^5(0.6)^2 - 7 {}_6C_6(0.4)^6(0.6)^1 - 7 {}_7C_7(0.4)^7(0.6)^0$	1	
	$0.9037$	1	
10(a)(ii)	$1000(0.4) = 400$	1	
	$\sqrt{1000(0.4)(0.6)} = 15.49$	1	
10(b)(i)	$\frac{7.5 - \mu}{0.5} = 1.0$	1	
	$7$	1	
10(b)(ii)	$\frac{6.2-7}{0.5} \text{ or } \frac{6.4-7}{0.5}$	1	
	$0.0603$	1	
	$0.0603 \times 4000 = 241$	1	

11(a)	$m_{PR} = -\frac{3}{2}$	1	10
	$y - 2 = -\frac{3}{2}(x - 16)$	1	
	$y = -\frac{3}{2}x + 26$	1	
11(b)	$\frac{2}{3}x = -\frac{3}{2}x + 26$ solve simultaneous equation	1	
	$x = 12$	1	
	R (12, 8)	1	
11(c)	$\frac{1}{2} 0 + 24 + 0 - 0 - 128 - 0 $	1	
	52	1	
	$\sqrt{(x - 12)^2 + (y - 8)^2} = 150$	1	
	$x^2 + y^2 - 24x - 16y - 22292 = 0$	1	
12(a)	$130 = \frac{p_{2014}}{500} \times 100$	1	10
	RM650	1	
12(b)	$\frac{130(120) + 110(100) + 105(35) + 115(35) + 120(70)}{360}$	2	
	118.61	1	
	The monthly expenses increased 18.61% in the year 2014 based on the year 2010	1	
12(c)	$118.61 = \frac{3000}{p_{2010}} \times 100$	1	
	RM 2529.30	1	
12(d)	$118.61 \times \frac{112}{100}$	1	
	132.84	1	

13(a)(i)	ST = 15	1	10
13(a)(ii)	$PT^2 = 9^2 + 15^2 - 2(9)(15) \cos 50$	1	
	11.51	1	
13(b)	$\frac{\sin \theta}{9} = \frac{\sin 50}{11.51}$	1	
	$36.80^\circ$	1	
13(c)	$\frac{1}{2}(9)(15) \sin 50$	1	
	51.71	1	
13(d)	$\frac{1}{2}(h)(15) = 51.71 \quad h = 6.895$	1	
	$\frac{1}{3} \times \left( \frac{1}{2}(16)(15) \right) \times 6.895$	1	
	275.8	1	
14(a)	10	1	10
14(b)	$\left(\frac{7}{2}\right)^2 - 7\left(\frac{7}{2}\right) + 10 \text{ or } \left(t - \frac{7}{2}\right)^2 - \frac{9}{4}$	1	
	$q = -\frac{9}{4}$	1	
	$q$ represents the minimum velocity of the particle	1	
14(c)	$a = 2t - 7$	1	
	$[2(3) - 7] - [2(2) - 7]$	1	
	2	1	
14(d)	$\left[\frac{t^3}{3} - \frac{7t^2}{2} + 10t\right]_0^2 \text{ or } \left \left[\frac{t^3}{3} - \frac{7t^2}{2} + 10t\right]_2^5\right $	1	
	$\left[\frac{2^3}{3} - \frac{7(2)^2}{2} + 10(2) - 0\right] + \left \left[\frac{5^3}{3} - \frac{7(5)^2}{2} + 10(5)\right] - \left[\frac{2^3}{3} - \frac{7(2)^2}{2} + 10(2)\right]\right $	1	
	$13\frac{1}{6}$	1	

15(a)	I $x + y \leq 80$	1	
	II $y - x \leq 20$	1	
	III $x \leq 3y$	1	
15(b)	Graph (Attachment, pg.10)		
	At least <b>one</b> straight line is drawn correctly from the inequalities involving $x$ and $y$ .	1	
	All the straight lines are drawn correctly.	1	
	Region is shaded correctly.	1	
15(c)(i)	$x_{max} = 45$	1	
15(c)(ii)	Maximum point = (60, 20)	1	
	Maximum cost = $30(60) + 25(20)$	1	
	RM 2300	1	
			10





y

No.14(b)

