



**MODUL PINTAS
TINGKATAN 5**

3472/2

**ADDITIONAL MATHEMATICS
Kertas 2**

$2\frac{1}{2}$ jam

Dua jam tiga puluh minit

**PERATURAN PEMARKAHAN
ADDITIONAL MATHEMATICS K2
3472/2**

No.	Solution and Mark Scheme	Sub Marks	Total Marks
1(a)	Shape of cosine graph P1 Max = 5, Min = 0 (Amplitude = 4) P1 Cosine graph for $0 \leq x \leq 2\pi$ P1 Modulus of cosine graph P1 } Accept sine graph <u>Note:</u> - Do not accept tangent graph - Ignore graph outside the range	4	
(b)	$4\cos x - 1 = 2$ and $4\cos x - 1 = -2$ K1 K1 Based angle = 41.41° N1 $x = 41.41^\circ, 104.48^\circ, 255.52^\circ, 318.59^\circ$	3	7

No.	Solution and Mark Scheme	Sub Marks	Total Marks
2(a)(i)	Use triangle law K1 $\overrightarrow{PQ} = \overrightarrow{PO} + \overrightarrow{OQ}$ Or $7x - 12y + 7x + 10y$ N1 $\overrightarrow{PQ} = 14x - 2y$	4	
(a)(ii)	Use triangle law K1 $\overrightarrow{PR} = \overrightarrow{PO} + \overrightarrow{OR}$ Or $7x - 12y + (m - 1)x + 9y$ N1 $\overrightarrow{PQ} = (6 + m)x - 3y$		
(b)	$\overrightarrow{PQ} = \lambda \overrightarrow{PR}$ K1 K1 Compare coefficient of y $-2 = -3\lambda$ N1 $m = 15$	3	
			7

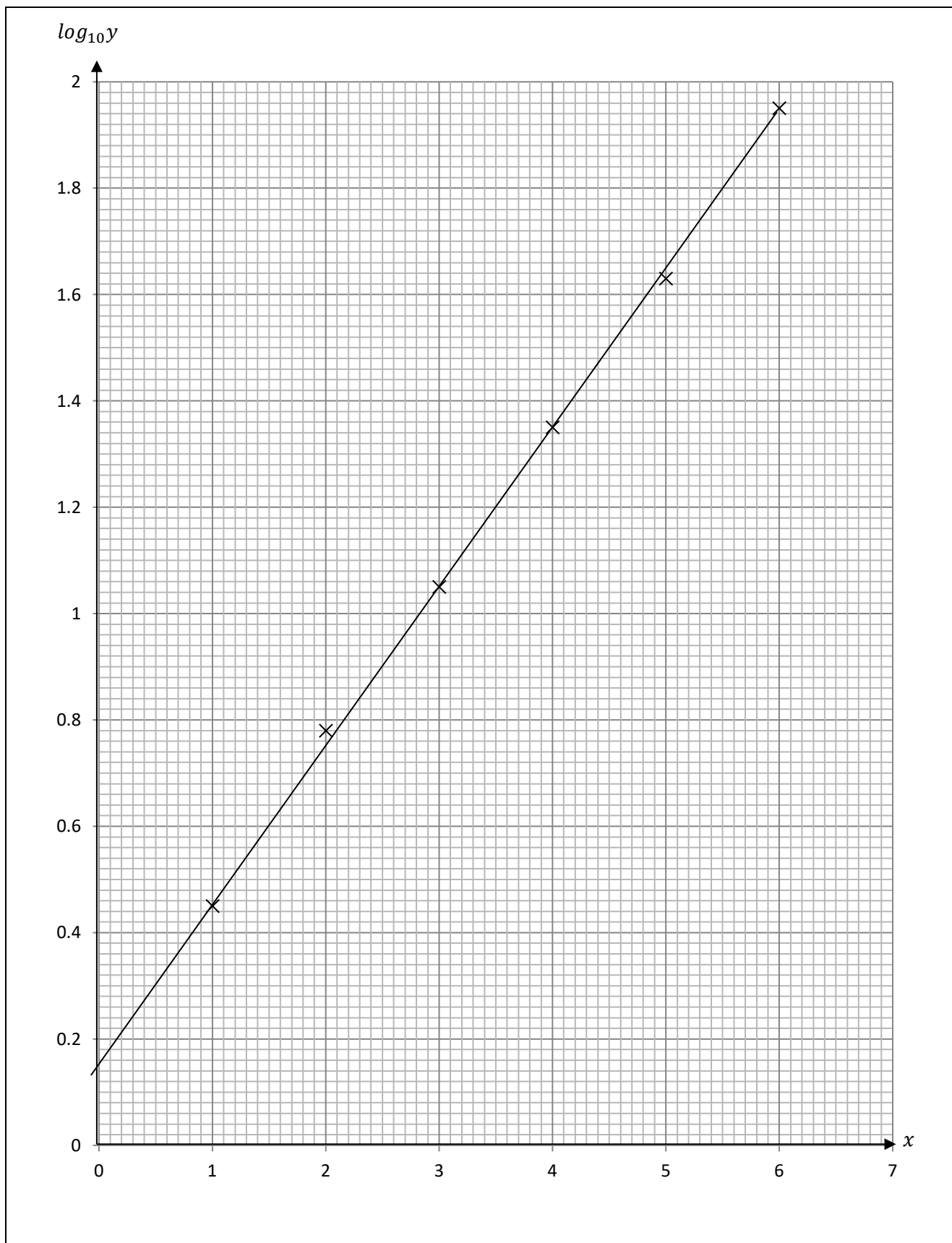
No.	Solution and Mark Scheme	Sub Marks	Total Marks
3(a)	$8 = 80 + (n - 1)(-4)$ <i>and</i> <i>get n = 19</i> K1 N1 Height = 152 cm	2	
(b)	$S_{19} = \frac{19}{2} [2(80) + (19 - 1)(-4)]$ K1 N1 $836 \times RM0.75$ RM 627	3	
			5

No.	Solution and Mark Scheme	Sub Marks	Total Marks
4	$-2x + y = 14$ or $15y - xy + 2x = 238$ $y = 2x + 14$ or $x = \frac{y-14}{2}$ K1 $15(2x + 14) - x(2x + 14) + 2x = 238$ or $15y - \left(\frac{y-14}{2}\right)y + 2\left(\frac{y-14}{2}\right) = 238$ K1 Solve the quadratic equation $ax^2 + bx + c = 0$ for $b \neq 0$ Completing the square $\left(x - \frac{9}{2}\right)^2 - \left(-\frac{9}{2}\right)^2 - 14 = 0$ or $(y - 23)^2 - (-23)^2 + 504 = 0$ OR Formula $x = \frac{-(-9) \pm \sqrt{(-9)^2 - 4(1)(-14)}}{2(1)}$ or $y = \frac{-(-46) \pm \sqrt{(-46)^2 - 4(1)(504)}}{2(1)}$ N1 $x = 7, 2$ or $y = 28, 18$ N1 $y = 28, 18$ or $x = 7, 2$ N1 Luas kawasan berlitup dengan rumput tiruan = 124 m^2 <i>Hanya guna $x = 2\text{m}$ dan $y = 18\text{m}$ untuk memenuhi syarat panjang kolam renang mesti melebihi 20m</i>	7	7

No.	Solution and Mark Scheme	Sub Marks	Total Marks
5(a)	<u>Use law of logarithms</u> $\frac{5\log_2 x^2}{2}$ or $\log_2 x^4$ $\log_2 \frac{2x+1}{x^5} \times x^4$ <u>Use law of logarithms</u> $\log_2 \frac{2x+1}{x} = 3$	3	
(b)	$\log_2 \frac{2x+1}{x} = \log_2 2^3$ $6x = 1$ $\frac{2x+1}{x} = 8$ $x = \frac{1}{6}$	4	7

No.	Solution and Mark Scheme	Sub Marks	Total Marks
6(a)	<u>Use Completing the Square</u> $\left(x + \frac{p}{2}\right)^2 - \left(\frac{p}{2}\right)^2 + q$ $p = -6 \text{ or } q = -1$ Compare the value of x and y $-\frac{p}{2} = 3$ or $\frac{p^2}{4} + q = 8$ $q = -1 \text{ or } p = -6$	4	
(b)	Substitute $p = -6 \text{ and } q = -1$ into $f(x) - 15 < 0$ Solve the quadratic inequalities $(x - 8)(x + 2) < 0$ $-2 < x < 8$	3	
			7

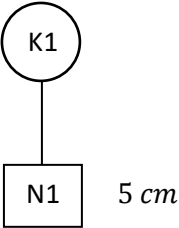
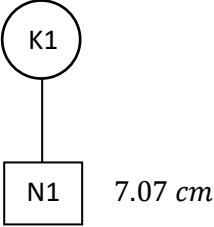
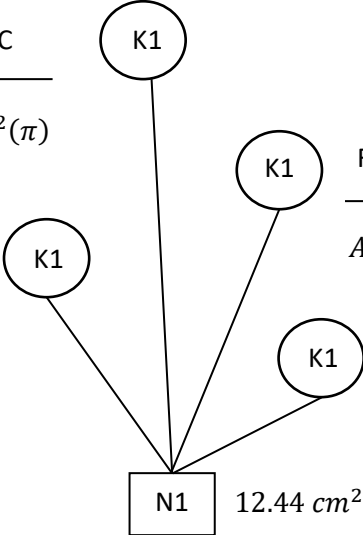
No.	Solution and Mark Scheme	Sub Marks	Total Marks								
7(a)	<table border="1"><tr><td>$\log_{10}y$</td><td>0.45</td><td>0.78</td><td>1.05</td><td>1.35</td><td>1.63</td><td>1.95</td></tr></table>	$\log_{10}y$	0.45	0.78	1.05	1.35	1.63	1.95	<table border="1"><tr><td>N1</td></tr></table>	N1	
	$\log_{10}y$	0.45	0.78	1.05	1.35	1.63	1.95				
	N1										
	1										
	Plot $\log_{10}y$ against x (Correct axes and uniform scales)	<table border="1"><tr><td>K1</td></tr></table>	K1	If table not shown, all the points are correctly plotted award N1	3						
K1											
6 *points plotted correctly	<table border="1"><tr><td>N1</td></tr></table>	N1									
N1											
Line of best fit (At least *5 points plotted)	<table border="1"><tr><td>N1</td></tr></table>	N1									
N1											
$\log_{10}y = \log_{10}a(x) + b\log_{10}a$	<table border="1"><tr><td>P1</td></tr></table>	P1	Implied	1							
P1											
(b)(i)(ii)	Use * $m = \log_{10}a$ <table border="1"><tr><td>K1</td></tr></table> $a = 1.995$ <table border="1"><tr><td>N1</td></tr></table> Use * $c = b\log_{10}a$ <table border="1"><tr><td>K1</td></tr></table> $b = 0.5$ <table border="1"><tr><td>N1</td></tr></table>	K1	N1	K1	N1	5					
K1											
N1											
K1											
N1											
(iii)	<table border="1"><tr><td>N1</td></tr></table> $y = 31.62$	N1									
N1											
	<u>Note:</u> SS-1 if part of scale is not uniform at the $\log_{10}y - axis$ and/or the $x - axis$ from the first point to the last point OR does not use the given scales OR does not use the graph paper										
			10								



No.	Solution and Mark Scheme	Sub Marks	Total Marks
8(a)	$\frac{1}{2} [(-2 \times -1) + 0 + 0] - [(5 \times 5) + 0 + 0] $ K1 N1 $11.5 @ \frac{23}{2} @ 11 \frac{1}{2} \text{ unit}^2$	2	
(b)	$\left(\frac{(-2 \times 2) + (5 \times 3)}{2 + 3}, \frac{(5 \times 2) + (-1 \times 3)}{2 + 3} \right)$ K1 N1 $\left(\frac{11}{5}, \frac{7}{5} \right)$	2	
(c)(i)	$PA = \sqrt{(x+2)^2 + (y-5)^2}$ Or $PB = \sqrt{(x-5)^2 + (y+1)^2}$ K1 N1 $3x^2 + 3y^2 - 44x + 18y + 75 = 0$ K1 $PA = 2PB$	3	
(ii)	Substitute x=0 into $3x^2 + 3y^2 - 44x + 18y + 75 = 0$ K1 N1 $\begin{aligned} &\text{Use } b^2 - 4ac \\ &(-6)^2 - 4(1)(25) \\ &= -44 \end{aligned}$ Not intercept y - axis	3	
			10

No.	Solution and Mark Scheme	Sub Marks	Total Marks
9(a)	seen $y - intercept = 4$ and $x - intercept = -2$ (P1) Integrate $\int (4 - x^2) dx$ (K1) $A_1 = 4x - \frac{x^3}{3}$ $A_2 = \frac{1}{2}(2)(4)$ (K1) (K1) Use limit $\int_{-2}^0$ into A_1 (K1) * $A_1 - A_2$ (N1) $\frac{4}{3} unit^2$	6	
(b)	Integrate $\pi \int (4 - y) dy$ (K1) $V_1 = 4y - \frac{y^2}{2}$ * $V_1 - V_2$ (K1) (K1) Use limit $\int_0^4$ into A_1 or $V_2 = \frac{1}{3}\pi(2)^2(4)$ (N1) $\frac{3}{8}\pi unit^3$	4	
			10

No.	Solution and Mark Scheme	Sub Marks	Total Marks
10(a)(i)	$\frac{\text{Use } P(X = r) = {}^{10}C_r(0.4)^r(0.6)^{10-r}}{P(X = 0) = {}^{10}C_0(0.4)^0(0.6)^{10}}$ K1 N1 0.00605	2	
(ii)	K1 K1 N1 $1 - P(X = 0) - P(X = 1)$ or $P(X = 2) + P(X = 3)$ $+ P(X = 4) + P(X = 5)$ $+ P(X = 6) + P(X = 7)$ $+ P(X = 8) + P(X = 9)$ $+ P(X = 10)$ 0.95364 N1	3	
(b)(i)	$z = \left(\frac{65 - 50}{8}\right)$ K1 N1 1.875	2	
(ii)	$z = \left(\frac{38 - 50}{8}\right)$ K1 K1 N1 Find $P(-1.5 \leq z \leq 1.875)$ and multiply 1200 1083 N1	3	
			10

No.	Solution and Mark Scheme	Sub Marks	Total Marks
11(a)	$r + r + (r \times 1.571) = 17.85$ 	2	
(b)	$\sqrt{5^2 + 5^2}$ 	2	
(c)	Find AD = 3.535 P1 Find are DAFC $A_1 = \frac{1}{2} (3.535)^2 (\pi)$ Find area OABC $A_3 = \frac{1}{2} (5)^2 \left(\frac{\pi}{2}\right)$ Find area AOC $A_2 = \frac{1}{2} \times 5 \times 5$ * A₁ + * A₂ - * A₃ 	6	10

No.	Solution and Mark Scheme	Sub Marks	Total Marks
13(a)	$2ms^{-1}$ N1	1	
(b)	Differentiate v and $a=0$ K1 $6t - 7 = 0$ N1 $t = \frac{7}{6} \text{ saat}$	2	
(c)	$V_{max}, a = 0$ K1 K1 N1 $-\frac{25}{12}ms^{-1}$ Subtitute $t = \frac{7}{6}$ into V $V = 3\left(\frac{7}{6}\right)^2 - 7\left(\frac{7}{6}\right) + 2$	3	
(d)	Integrate $\int (3t^2 - 7t + 2)dt$ K1 $s = t^3 - \frac{7t^2}{2} + 2t$ Find $s_{t=\frac{1}{3}}$ or $s_{t=2}$ $s_{t=\frac{1}{3}} = \frac{7}{18}, s_{t=2} = -2$ $\left(s_{t=\frac{1}{3}} \times 2\right) + s_{t=2}$ K1 K1 N1 $\frac{25}{9} @ 2\frac{7}{9}$	4	
			10

No.	Solution and Mark Scheme	Sub Marks	Total Marks
14(a)	$x = 124.92$ N1	3	
	$y = 16.2$ N1		
	$z = 25$ N1		
	(b)(i) $(* 124.92 \times 35) + (125 \times 25) + (135 \times 20) + (116 \times 20)$ K1	3	
	$\bar{I} = \frac{(* 124.92 \times 35) + (125 \times 25) + (135 \times 20) + (116 \times 20)}{100}$ K1 125.172 N1		
(ii)	$\frac{RM28.30}{Cost\ 2014} \times 100 = 125.172$ K1 N1 RM22.61	2	
(c)	$\frac{125.172 \times 120}{100}$ K1 N1 150.21	2	
			10

No.	Solution and Mark Scheme	Sub Marks	Total Marks
15(a)	$x + y \geq 90$ N1	3	
	$4x + 3y \leq 360$ N1		
	$y \leq 3x$ N1		
	(b) Draw line correctly at least one straight line from *inequalitiea involving x only K1	3	
	Region shaded correctly N1 N1 Draw correctly all the three *straight line <u>Note:</u> Accept dotted lines and solid line		
(c)(i)	Find range of y from graph if x = 40 K1 N1 $50 \leq y \leq 66$	2	
(ii)	Subtitute any point in the * shaded region into $0.2x + 0.4y$ K1 N1 $(28,82)$ RM38.40	2	
			10

