

KERTAS 1



TERHAD

PP Perc SPM 2026 AddMath (K1) N9

No		SKEMA	MARKAH	MARKAH PENUH
1	(a)	$X = \frac{1}{x^3}$ $Y = \frac{y}{x^3}$	N1 N1	2
	(b)	$0 = -7 + 5(h)$	K1	2
		$h = \frac{7}{5}$	N1	
				4
2	(a)	$a = \frac{1}{2}r$ atau $r = 2a$	P1	4
		$(\frac{1}{2}r)r^{3-1} = 1372$ atau $a(2a)^2 = 1372$	K1	
		$r = 14$	N1	
		$a = 7$	N1	
	(b)	$\frac{7}{13}(14^n - 1)$ atau setara	N1	1
				5
3	(a)	$(\frac{-4+0}{2}, \frac{2+0}{2})$	K1	2
		$(-2, 1)$	N1	
	(b)	$\frac{1}{2} \times m_{CE} = -1$	K1	3
		$y - 1 = -2(x - (-2))$ atau $c = -3$	K1	
		$y = -2x - 3$	N1	
				5

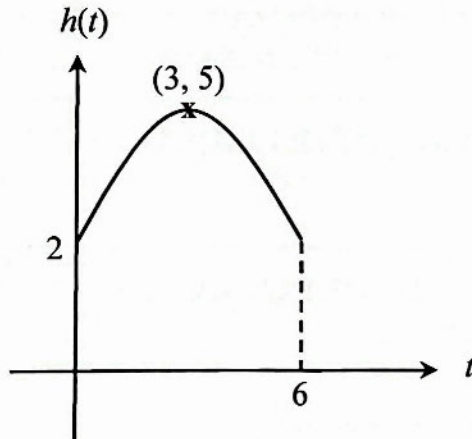
No		SKEMA	MARKAH	MARKAH PENUH
4	(a)	p^2	N1	1
	(b)	$\sqrt{1-p^2}$	P1	2
		$\frac{1}{\sqrt{1-p^2}}$	N1	
				3
5	(a)	9C_3	K1	2
		84	N1	
	(b)	$(9-1)!$ atau $(8-1)! \times 2!$	K1	3
		$(9-1)! - (8-1)! \times 2!$	K1	
		30240	N1	
				5
6	(a)	$\overrightarrow{OA} = \begin{pmatrix} -3 \\ -1 \end{pmatrix}$	N1	1
	(b)	$\overrightarrow{A'B} = \overrightarrow{A'O} + \overrightarrow{OB}$ dan $\overrightarrow{A'B} = 3\hat{i} - \hat{j} + 3\hat{i} + 4\hat{j}$	K1	3
		$\overrightarrow{A'B} = \frac{6\hat{i} + 3\hat{j}}{\sqrt{(6)^2 + (3)^2}}$	K1	
		$\overrightarrow{A'B} = \frac{2}{\sqrt{5}}\hat{i} + \frac{1}{\sqrt{5}}\hat{j}$	N1	
				4
7	(a)	$-9k$	P1	1
	(b)	$\frac{5(2x-3)^{-1}}{2(-1)} + c$	K1	3
		$4 = -\frac{5}{2(2(1)-3)} + c$	K1	
		$y = -\frac{5}{2(2x-3)} + \frac{3}{2}$	N1	
				4



No		SKEMA	MARKAH	MARKAH PENUH
8	(a)	$f(x) = \frac{2x-1}{3}$	P1	1
	(b)	$f^{-1}(x) = \frac{3x+1}{2}$ atau $g(x) = gf(f^{-1}(x))$	P1	3
		$= \frac{5\left(\frac{3x+1}{2}\right) + 7}{2}$	K1	
		$= \frac{15x+19}{4}$	N1	
				4
9	(a)	$\log_c d = \left(\frac{1}{3}\right)^3$ atau $d = c^{\frac{1}{27}}$	K1	2
		27	N1	
	(b)	$20(2^x)^{\frac{1}{2}} - (2^x)(2^2) = 24$	K1	4
		$a = 2^{\frac{x}{2}}$ dan $(a-2)(a-3) = 0$ ATAU $a = 2^x$ dan $(\sqrt{a}-2)(\sqrt{a}-3) = 0$	K1	
		$2^1 = 2^{\frac{x}{2}}$, $3 = 2^{\frac{x}{2}}$ (reject) ATAU $2^2 = 2^x$, $9 = 2^x$ (reject)	K1	
		2	N1	
				6
10	(a)	$\frac{9}{16}$	P1	1
	(b)	(i) ${}^nC_n(0.75)^n(0.25)^{n-n} = 0.3164$	K1	5
		$n = \frac{\log_{10} 0.3164}{\log_{10} 0.75}$	K1	
		$n = 4$	N1	
		(ii) $1 - P(X=0)$ dan $1 - {}^4C_0(0.75)^0(0.25)^4$ atau setara	K1	
		0.9961	N1	
				6

No		SKEMA	MARKAH	MARKAH PENUH
11	(a)	$\angle POB = 1.176$	P1	3
		$s = 5(2.352)$	K1	
		11.76	N1	
	(b)	$(5)(2(3.142) - 2.352)$ atau $AC^2 = 20^2 + 21^2 - 2(20)(21)\cos(45.24)$ atau setara	K1	3
		$19.66 + 15.80 + 9 + 8$	K1	
		52.46	N1	
	(c)	$\frac{1}{2}(20)(21)\sin(45.24)$ atau $\frac{1}{2}(5)^2(2(3.142))$ atau $(3.142)(5)^2$ atau setara	K1	3
		$\frac{1}{2}(20)(21)\sin(45.24) - \frac{1}{2}(5)^2(2(3.142))$ atau setara	K1	
		70.56	N1	
				9
12	(a)	$\frac{du}{dx} = 3$ dan $\frac{dy}{du} = 2(3)u^{3-1}$ Terima semua huruf lain sebagai u	K1	3
		$\frac{dy}{dx} = 6u^2 \times 3$	K1	
		$\frac{dy}{dx} = 18(3x - 4)^2$	N1	
	(b) (i)	$\frac{dy}{dx} = 18(3(1.20) - 4)^2$ dan 2.88 atau setara	N1	1
	(ii)	$2.88 \times (1.19 - 1.20)$ dan -0.0288 atau setara	K1	6
		$2(3(1.20) - 4)^3 + (-0.0288)$	K1	
		-0.1568	N1	
		$\frac{-0.0288}{-0.128} \times 100$	K1	
		22.5 %	N1	
				9

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No		SKEMA	MARKAH	MARKAH PENUH
13	(a)	$-\frac{1}{3}\left[t^2 - 6t + \left(\frac{-6}{2}\right)^2 - \left(\frac{-6}{2}\right)^2 - 6\right]$	K1	4
		$-\frac{1}{3}(t-3)^2 + 5$	N1	
		$3p = 3$ atau $\frac{5}{p} = 5$	K1	
		$p = 1$	N1	
	(b)	 Bentuk graf dan paksi-paksi guna pembaris Titik maksimum, 2 titik lain, label paksi-paksi dan asalan.	P1 P1	2
	(c)	$-\frac{1}{3}t^2 + 2t + 2 = 0$ dan $\frac{-(2) \pm \sqrt{(2)^2 - 4(-\frac{1}{3})(2)}}{2(2)}$	K1	2
		$t = 6.873$	N1	
				8



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No			SKEMA	MARKAH	MARKAH PENUH
14	(a)		$S_n = a + a + d + a + 2d + \dots + a + (n-1)d$ $S_n = a + (n-1)d + a + (n-2)d + \dots + a$	K1	3
			$2S_n = n[2a + (n-1)d]$	K1	
			$S_n = \frac{n}{2}[2a + (n-1)d]$	N1	3
	(b)	(i)	$2d = 15$	K1	
			$\frac{15}{2}$ atau setara	N1	
		(ii)	$T_2 = y = x + \frac{15}{2}$ atau $T_3 = z = x + 2\left(\frac{15}{2}\right)$	K1	3
			$3(x+15) = 2(x+x+\frac{15}{2})$	K1	
			$x = 30$	N1	
					8
15	(a)	(i)	Andaikan $\angle A = \angle B = \theta$ $\sin(\theta + \theta) = \sin \theta \cos \theta + \sin \theta \cos \theta$	K1	2
			$\sin 2\theta = 2 \sin \theta \cos \theta$	N1	
		(ii)	$2 \sin 2\theta = 1$ atau setara	K1	3
			30° dilihat	N1	
			$\theta = 15^\circ, 75^\circ, 195^\circ, 255^\circ$	N1	
	(b)		1 atau 2 dilihat	P1	3
			$\frac{\frac{2}{2} + \frac{2}{1}}{1 - \left(\frac{2}{2}\right)\left(\frac{2}{1}\right)}$	K1	
			-3	N1	
					8

KERTAS 2

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SKEMA PEMARKAHAN : PP per SPM 2026 Addmath (k2) v9

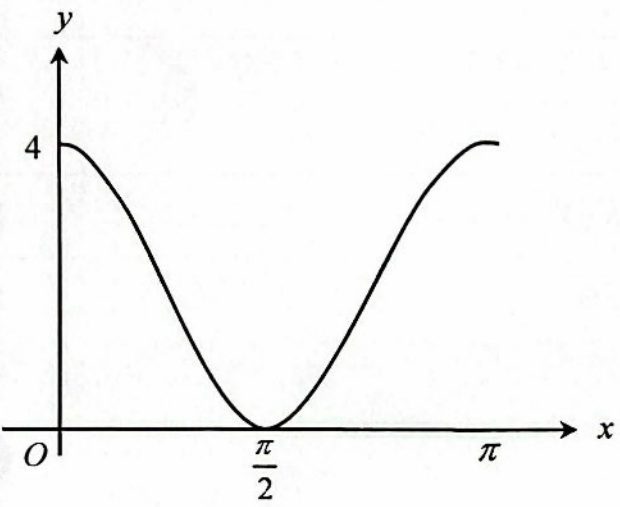
No			SKEMA	MARKAH	MARKAH PENUH
1	(a)		$2x + 2(2z - 3) - 2z = 7$ atau $-2x + 5(2z - 3) - 12z = 6$	K1	3
			selesaikan $2x + 2z = 13$ $-2x - 2z = 21$ dan $0 = 34$	K1	
			Tiada penyelesaian	N1	
	(b)		$2x + 2y = 80$ atau $xy = 384$	P1	4
			$x = 40 - y$ dan $x(40 - x) = 384$ atau setara	K1	
			$(x - 16)(x - 24) = 0$ atau $x = \frac{-(-40) \pm \sqrt{(-40)^2 - 4(1)(384)}}{2(1)}$	K1	
			Panjang = 24 dan Lebar = 16	N1	
					7
2	(a)	(i)	$x = y^3$	K1	2
			$g(x) = x^3$	N1	
		(ii)	(n, m)	P1	1
		(iii)	$x^3 = \sqrt[3]{x}$ dan $x(x^8 - 1) = 0$	K1	2
			$P(1, 1)$	N1	
	(b)	(i)	$k^2(x) = \frac{5}{\left(\frac{5}{x}\right)}$ dan $k^2(x) = x$	N1	3
			$k^3(x) = \frac{5}{x}, x \neq 0$	N1	
		(ii)	$k^{67}(x) = \frac{5}{x}, x \neq 0$	N1	
					8

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No		SKEMA	MARKAH	MARKAH PENUH
3	(a)	$\left(\frac{1(-3)+3(5)}{3+1}, \frac{1(2)+3(6)}{3+1} \right)$	K1	2
		(3,5)	N1	
	(b)	$\frac{1}{2} (-3(6)+5(k)+(-2)(2))-(5(2)+(-2)(6)+(-3)(k)) =22$	K1	3
		$8k = 64 \text{ dan } 8k = -24$	K1	
		$k = 8$	N1	
	(c)	$PB = 7 \text{ dan } (-2)^2 + (8)^2 - 10(-2) - 12(8) + 12$ $\sqrt{(x-5)^2 + (y-6)^2} = 7$	K1	3
		$x^2 + y^2 - 10x - 12y + 12 = 0$	K1	
		$4 \neq 0 \text{ dan tidak}$	N1	
				8

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No		SKEMA	MARKAH	MARKAH PENUH
4	(a)	$\frac{\frac{1}{\cos x}}{2\cos x - \frac{1}{\cos x}}$	K1	3
		$\frac{1}{\cos 2x}$	K1	
		sek 2x	N1	
	(b)			3
		Bentuk graf kosinus Nota: 1. Paksi-paksi dilukis menggunakan alat tepi lurus Permulaan graf berbentuk kosinus	P1	
		1 kitaran Nota: 1. Paksi-x, paksi-y dan asalan, O dilabel betul 2. Untuk $0 \leq x \leq \pi$ π mesti dilabel	P1	
		Julat graf $0 \leq y \leq 4$ Nota: Jika tidak label maksimum=4, maka P0	P1	
	(c)	$y = 0$	P1	2
		$m = -2$	N1	
				8

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No		SKEMA	MARKAH	MARKAH PENUH
5	(a)	$\sqrt{9 \times 2p} - \sqrt{4 \times 2q}$	K1	2
		$3\sqrt{2}p - 2\sqrt{2}q$ atau $\sqrt{2}(3p - 2q)$	N1	
	(b)	$\ln x^4 + \ln\left(\frac{x}{e^3}\right) - \ln(x^3) = 1$	P1	3
		$\ln \frac{(x^4)(x)}{(x^3)(e^3)} = 1$ atau $\ln \frac{(x^4)(x)}{(x^3)(e^3)} = \ln e$ (guna mana-mana hukum logaritma)	K1	
		$\frac{x^2}{e^3} = e^1$ atau setara	K1	
		$x = e^2$	N1	
				6
6	(a)	$(1 - 2r)^2 - 4(1)(r^2) < 0$	K1	2
		$r > \frac{1}{4}$	N1	
	(b)	$\alpha + \beta = \frac{-(1-2r)}{1}$ dan $\alpha\beta = \frac{r^2}{1}$	K1	4
		HTP: $(\alpha - \beta) + (\beta - \alpha) = 0$	K1	
		HDP: $(\alpha - \beta)(\beta - \alpha) = 2\alpha\beta - [(\alpha + \beta)^2 - 2\alpha\beta] = -1 + 4r$	K1	
		$x^2 + 4r - 1 = 0$	N1	
				6

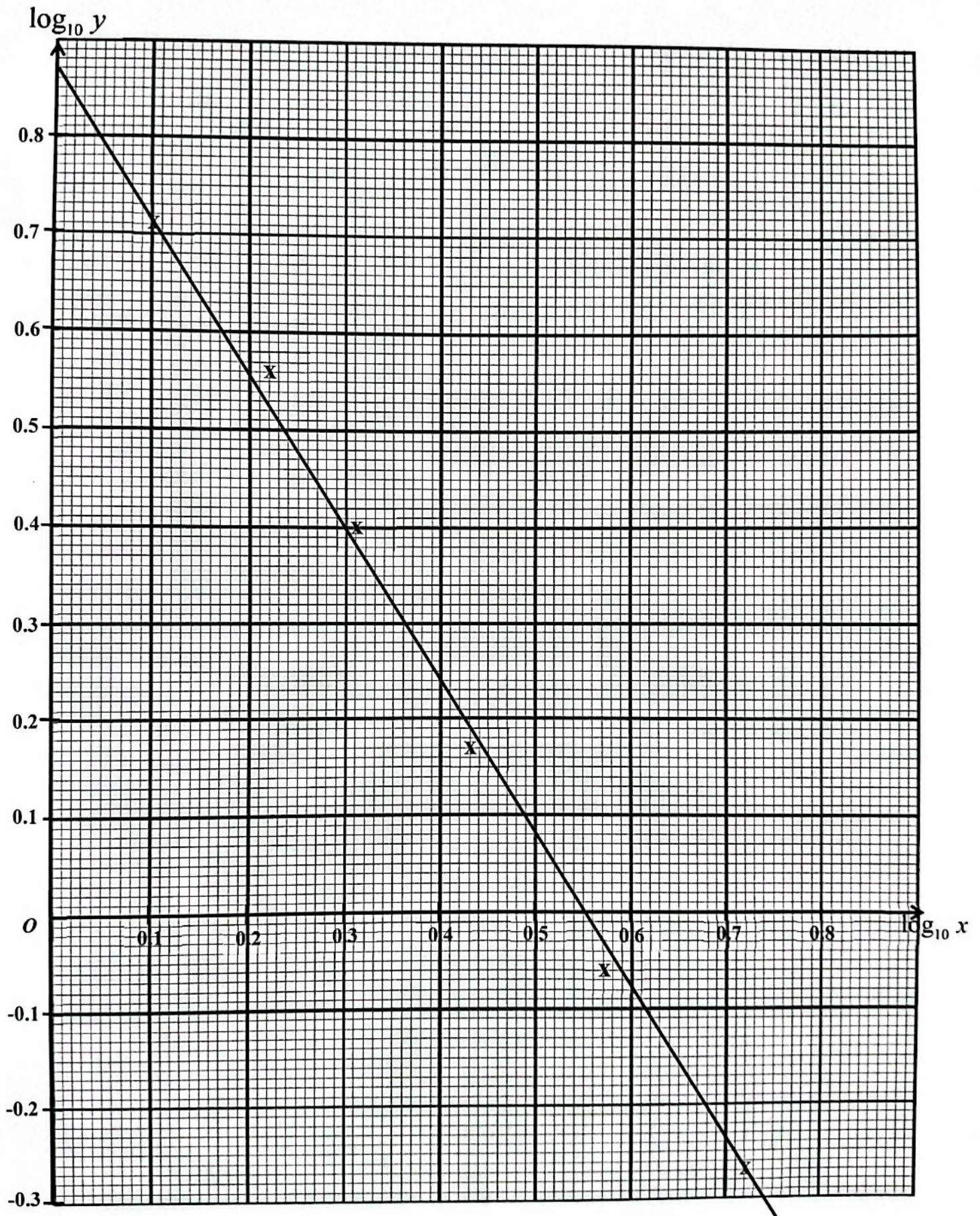


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No			SKEMA	MARKAH	MARKAH PENUH														
7	(a)		$L = 10x - \frac{x^2}{2}$	K1	3														
			$10 - x = 0$	K1															
			10	N1															
	(b)		$V = 50h^2 - \frac{25h^3}{2}$ atau $V = \left(10 - \frac{5h}{2}\right)(5h)(h)$	K1	4														
			$\frac{dV}{dh} = 100\left(\frac{3}{5}\right) - \frac{75}{2}\left(\frac{3}{5}\right)^2$	K1															
			$-0.004 = \left[100\left(\frac{3}{5}\right) - \frac{75}{2}\left(\frac{3}{5}\right)^2\right] \times \frac{dh}{dt}$ atau setara	K1															
			$-\frac{1}{11625}$ atau setara	N1															
					7														
8	(a)		<table><tr><td>$\log_{10} x$</td><td>0.10</td><td>0.22</td><td>0.31</td><td>0.43</td><td>0.57</td><td>0.72</td></tr><tr><td>$\log_{10} y$</td><td>0.71</td><td>0.56</td><td>0.40</td><td>0.17</td><td>-0.06</td><td>-0.27</td></tr></table>	$\log_{10} x$	0.10	0.22	0.31	0.43	0.57	0.72	$\log_{10} y$	0.71	0.56	0.40	0.17	-0.06	-0.27	N1 N1	2
$\log_{10} x$	0.10	0.22	0.31	0.43	0.57	0.72													
$\log_{10} y$	0.71	0.56	0.40	0.17	-0.06	-0.27													
	(b)		Satu titik diplot betul Keenam-enam titik diplot betul Garis penyuaian terbaik (jarak seragam, titik seimbang)	K1 K1 N1	3														
	(c)		$\log_{10} y = -b \log_{10} x + \log_{10} a$	P1	5														
			$-b = \frac{*0.71 - (*-0.27)}{*0.10 - *0.72}$	K1															
			$b = *1.581$	N1															
			$\log_{10} a = 0.87$ $0.87 \leq c \leq 0.88$	K1															
			$a = *7.413$	N1	10														

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No		SKEMA	MARKAH	MARKAH PENUH
9	(a)	$h=2 \quad k=5$	N1 N1	2
	(b)	$\left[\frac{(x+4)^{\frac{3}{2}}}{\frac{3}{2}(1)} \right]$ ATAU $\left[\frac{y^3}{3} - 4y \right]$	K1	4
		$\frac{1}{2} \times 3 \times 5$ atau $\frac{3}{5} \left(\frac{x^2}{2} \right)$ ATAU $\frac{5y^2}{3(2)}$	K1	
		$\left[\frac{2}{3}(3+4)^{\frac{3}{2}} \right] - \left[\frac{2}{3}(0+4)^{\frac{3}{2}} \right] - \frac{1}{2} \times 3 \times 5$ ATAU $\frac{1}{2} \times 3 \times 5 - \left[\left(\frac{(3)^3}{3} - 4(3) \right) - \left(\frac{(2)^3}{3} - 4(2) \right) \right]$ atau setara	K1	
		$\frac{31}{6}$ atau $5\frac{1}{6}$ atau 5.167	N1	
	(c)	$\frac{x^2}{2} + 4x$	K1	4
		$\frac{1}{3} \times \pi \times (3)^2 \times 5$ atau setara	K1	
		$\frac{3}{4} \pi \left[\left(\frac{(5)^2}{2} + 4(5) \right) - \left(\frac{(0)^2}{2} + 4(0) \right) \right] - \frac{3}{4} \pi \left(\frac{1}{3} \times \pi \times (3)^2 \times 5 \right)$ atau setara	K1	
		$\frac{105}{8} \pi$ atau 13.125π atau $13\frac{1}{8} \pi$	N1	
				10

TERHAD

No			SKEMA	MARKAH	MARKAH PENUH
10	(a)	(i)	${}^{15}C_4(0.07)^4(0.93)^{11}$	K1	2
			0.01475	N1	
		(ii)	$P(X \leq 13) = 1 - P(X = 14) - P(X = 15)$	P1	3
			$1 - {}^{15}C_{14}(0.93)^{14}(0.85)^{15-14} - {}^{15}C_{15}(0.15)^{15}(0.85)^{15-15}$	K1	
			0.2832	N1	
	(b)	(i)	$P\left(\frac{1850-2000}{\sqrt{7500}} \leq z \leq \frac{2150-2000}{\sqrt{7500}}\right)$ dan $1 - P(z > 1.732) - P(z < -1.732)$	K1	5
			0.9168	N1	
		(ii)	$P\left(z \leq \frac{k-2000}{\sqrt{7500}}\right) = 0.025$ dan $z = (-) 1.96$	K1	
			$\frac{k-2000}{\sqrt{7500}} = -1.96$	K1	
			$k = 1830$ jam	N1	
					10

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No			SKEMA	MARKAH	MARKAH PENUH
11	(a)	(i)	$\overrightarrow{PU} = \overrightarrow{PO} + \overrightarrow{OU}$ atau setara (Guna hukum segi tiga)	K1	2
			$\overrightarrow{PU} = 4\hat{x} - 7\hat{y}$	N1	
		(ii)	$\overrightarrow{OW} = \frac{72}{5}\hat{x} + \frac{14}{5}\hat{y}$	N1	3
	(b)		$\overrightarrow{OV} = 4k\hat{x} + (7-7k)\hat{y}$ atau $\overrightarrow{OV} = \frac{72h}{5}\hat{x} + \frac{14h}{5}\hat{y}$ atau setara (Guna hukum segi tiga)	K1	
			$4k\hat{x} + (7-7k)\hat{y} = \frac{72h}{5}\hat{x} + \frac{14h}{5}\hat{y}$ atau setara	K1	
			Banding $4k = \frac{72h}{5}$ dan $(7-7k) = \frac{14h}{5}$	K1	2
			$h = \frac{1}{4}$	N1	
			$k = \frac{9}{10}$	N1	3
	(c)		$ \overrightarrow{PQ} = \sqrt{(24(2))^2 + (-7(3))^2}$	K1	
			52.39 unit	N1	
					10

TERHAD

No			SKEMA	MARKAH	MARKAH PENUH
12	(a)		$t = 8$	P1	1
	(b)	(i)	$a(8)^2 + b(8) = 0$ atau $a(10)^2 + b(10) = 0$ ATAU $at(t-8)$	K1	3
			$a = \frac{7}{10}$ dan $b = -\frac{28}{5}$	N1	
			$v = \frac{7}{10}t(t-8)$	N1	
		(ii)	$\frac{14}{10}t - \frac{56}{10} = 7$	K1	2
			$t = 9$	N1	
		(iii)	$\frac{7}{10}\left(\frac{t^3}{3}\right) - \frac{56}{10}\left(\frac{t^2}{3}\right)$	K1	4
			$\frac{7}{10}\left(\frac{(8)^3}{3}\right) - \frac{56}{10}\left(\frac{(8)^2}{3}\right)$ atau $\frac{7}{10}\left(\frac{(4)^3}{3}\right) - \frac{56}{10}\left(\frac{(4)^2}{3}\right)$ atau $\frac{7}{10}\left(\frac{(10)^3}{3}\right) - \frac{56}{10}\left(\frac{(10)^2}{3}\right)$	K1	
			$\left[\frac{7}{10}\left(\frac{(8)^3}{3}\right) - \frac{56}{10}\left(\frac{(8)^2}{3}\right) - \left(\frac{7}{10}\left(\frac{(4)^3}{3}\right) - \frac{56}{10}\left(\frac{(4)^2}{3}\right)\right)\right] +$ $\left[\frac{7}{10}\left(\frac{(10)^3}{3}\right) - \frac{56}{10}\left(\frac{(10)^2}{3}\right) - \left(\frac{7}{10}\left(\frac{(8)^3}{3}\right) - \frac{56}{10}\left(\frac{(8)^2}{3}\right)\right)\right]$	K1	
			$\frac{644}{15}$ atau 42.93	N1	
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No			SKEMA	MARKAH	MARKAH PENUH
13	(a)		[Katakan tinggi segitiga ialah t] $\sin F = \frac{t}{e}$ dan $\sin E = \frac{t}{f}$ atau setara	K1	2
			$\frac{e}{\sin E} = \frac{f}{\sin F}$	N1	
	(b)	(i)	$DE^2 = 12^2 + 10^2 - 2(12)(10)\cos 38^\circ$	K1	2
			$DE = 7.408 \text{ cm}$	N1	
		(ii)	$\tan 52^\circ = \frac{CD}{12}$ atau $CD = 15.36 \text{ cm}$ ATAU $CE = \sqrt{7.408^2 + 15.36^2}$	K1	2
			$CE = 17.05 \text{ cm}$	N1	
		(iii)	$CF = \sqrt{12^2 + 15.36^2}$ atau 19.49 cm DAN $17.05^2 = 10^2 + 19.49^2 - 2(10)(19.49)\cos CFE$	K1	4
			$\angle CFE = 60.97^\circ$	N1	
			$\frac{1}{2}(19.49)(10)\sin 60.97^\circ$ atau setara	K1	
			85.207	N1	
					10

TERHAD

No		SKEMA	MARKAH	MARKAH PENUH
14	(a)	$p = 110$	N1	3
		$\frac{448}{r} \times 100 = 128$	K1	
		$r = 350$	N1	
	(b)	$\frac{110(40) + 130(35) + 128(25)}{40 + 35 + 25}$	K1	2
		121.5	N1	
	(c)	$\frac{110}{100} \times 113.5$ atau $\frac{130}{100} \times 113.5$ atau $\frac{128}{100} \times 113.5$	K1	5
		$25 - x$ dilihat	P1	
		$\frac{124.85 * (40) + 147.55 * (35) + 145.28 * (25 - x)}{40 + 35 + 25 - x} \leq 137$	K1	
		$x \geq 10.98$	N1	
		$x \text{ min} = 11$	N1	
				10

TERHAD

No			SKEMA	MARKAH	MARKAH PENUH
15	(a)		$30x + 42y \geq 420$	N1	3
			$40x + 30y \leq 600$	N1	
			$\frac{x}{y} \geq \frac{1}{3} @ y \leq 3x$	N1	
	(b)		Satu garis lurus betul Ketiga-tiga betul Rantau berlorek R	K1 K1 N1	3
	(c)	(i)	6	P1	4
		(ii)	$k = 50x + 80y$ dan $50(5) + 80(13)$	K1	
			1290	N1	
			$x \min = 11$	N1	
					10



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