



**MAJLIS PENGETUA SEKOLAH MALAYSIA (MPSM)
CAWANGAN KELANTAN**

**MODUL KOLEKSI ITEM
PERCUBAAN SPM
2026**

**MATEMATIK TAMBAHAN
KERTAS 1**

UNTUK KEGUNAAN PEMERIKSA SAHAJA

**SKEMA
PEMARKAHAN**

PERATURAN PEMARKAHAN PEPERIKSAAN PERCUBAAN TAHUN 2026

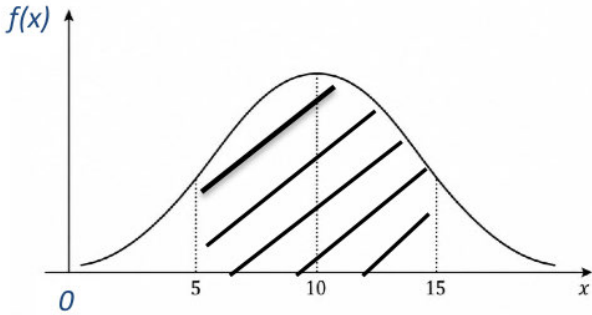
MATEMATIK TAMBAHAN (3472/1)

TINGKATAN 5

NO.	PERATURAN PEMARKAHAN	SUB-MARKAH	MARKAH PENUH
1.			
(a)	$p = 4 - q$	N1	4
(b)	(i) $m = 4$	N1	
	(ii) Ganti $m = 4$ dan 7 ke dalam $f(x)$ @ $-1 \leq f(x) \leq 8$	K1	
	$-1 \leq x \leq 8$	N1	
2.			
(a)	$y = (2x - 3)^2$ $\sqrt{y} = 2x - 3$	K1 N1	4
(b)	$7 = 2k - 3$ $k = 5$	K1 N1	
3	$60 @ \frac{\pi}{3} @ 1.047$ Perimeter = $3.5 + 3.5 + (2\pi - 1.047)(3.5) @ 18.33$ = 25.33	P1 K1 N1	3



4 (a)	$n = 2k + 1$ $S_A = \frac{2k+1}{2}(2k+4k)$ $6k^2 + 3k$	K1 N1	5
(b)	$n = k + 1$ $S_B = \frac{k+1}{2}(2k+4k)$ $3k^2 + 3k$	K1 N1	
(c)	$\frac{S_A}{S_B} = \frac{6k^2 + 3k}{3k^2 + 3k}$ $= \frac{3k(2k+1)}{3k(k+1)}$ Catatan : mesti melibatkan 2 langkah di atas ini, $= \frac{2k+1}{k+1}$ terbukti	N1	
5 (a) (i)	${}^{15}C_{10} = \frac{15!}{10!(15-10)!}$ 3003	K1 N1	8
(ii)	${}^9C_1 \times {}^8C_1 \text{ or } {}^6C_1 \times {}^5C_1 \text{ or } {}^{11}C_6$	K1	
	$({}^9C_1 \times {}^8C_1) \times ({}^6C_1 \times {}^5C_1) \times {}^{11}C_6 @ ({}^9P_2 \times {}^6P_2 \times {}^{11}C_6$	K1	
	997920	N1	
(b)	${}^2P_2 \text{ atau } (9-1)!$ ${}^2P_2 \times (9-1)!$ 80640	P1 K1 N1	

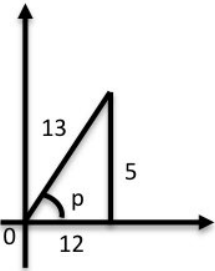
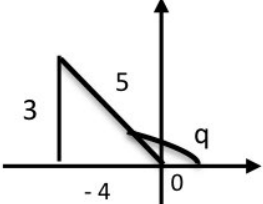
6			
(a)			
(i)	${}^8C_5(0.8)^5(0.2)^{8-5}$ <i>dan</i> 0.1468	N1	
(ii)	$P(X = 6) + P(X = 7) + P(X = 8)$ Atau $P(Y = 2) + P(Y = 1) + P(Y = 0)$ ${}^8C_6(0.8)^6(0.2)^{8-6} + {}^8C_7(0.8)^7(0.2)^{8-7} + {}^8C_8(0.8)^8(0.2)^{8-8}$ 0.7969	K1 N1	
(b)			
(i)	$\mu = 10$	N1	6
(ii)	 1 - 0.28 - 0.28 DAN 0.44	K1 N1	

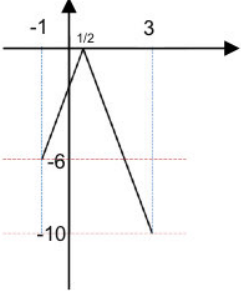
7 (a)	$f(x) = x^2 - 6kx + \left(\frac{-6k}{2}\right)^2 - \left(\frac{-6k}{2}\right)^2 + h$ $f(x) = (x - 3k)^2 - 9k^2 + h$ $k + 4 = 3k \text{ atau } -9k^2 + h = 2k - 9k^2$ $k = 2 \text{ dan } h = 4$ Catatan : $f(x) = 0$, KOKOKON0	K1 K1 K1 N1	8
(b)	Bentuk U dan menyilang pada paksi-x pada 2 titik Pintasan-y = (0,4) dan titik minimum = (6, -32)	P1 P1	
(c)	$f(x) = (x - 2)^2 - 29$ Nilai minimum baharu = -29 DAN Paksi simetri $x = 2$	N1 N1	
8 (a)	$\frac{dy}{dx} = (4p + 4)x^p + 6px^{p-1}$ $4p + 4 = q \text{ dan } 6p = q$ $p = 2, q = 12$	K1 K1 N1, N1	9
(b) (i)	$\frac{dy}{dx} = (-3)(8)x^{-4}$ $\frac{dy}{dx} = -\frac{24}{x^4}$	K1 N1	
(ii)	$\delta y = \left(-\frac{24}{(2)^4}\right)(-0.2)$ $y_b = y_a + \delta y$ $y_b = \frac{8}{(2)^3} + (0.3)$ 1.30	K1 K1 N1	

9 (a)	$u = 3 - 2x, \quad \frac{du}{dx} = -2, \quad \frac{dx}{du} = -\frac{1}{2}, \quad dx = -\frac{1}{2} du$ $\int_0^3 5(3 - 2x)^{-4} dx = \int_0^3 5u^{-4} \left(-\frac{1}{2}\right) du$ $-\frac{5}{2} \left[-\frac{1}{3u^3} \right]_0^3$ $-\frac{5}{2} \left[-\frac{1}{3(3 - 2x)^3} \right]_0^3$ $\left(-\frac{5}{2} \left[-\frac{1}{3(3 - 2(3))^3} \right] \right) - \left(-\frac{5}{2} \left[-\frac{1}{3(3 - 2(0))^3} \right] \right)$ $-\frac{5}{81}$	K1 K1 K1 N1	9
(b)	$y = \int 2x - 6 dx$ $\frac{dy}{dx} = 0, \quad 2x - 6 = 0$ $x = 3$ $y = x^2 - 6x + c$ $(-4) = (3)^2 - 6(3) + c$ $c = 5$ $y = x^2 - 6x + 5$	K1 K1 N1	
(c)	$\int_a^3 f(x) dx + [4x]_0^3 = 9 \quad \text{atau} \quad 5 + [4x]_0^3 = 9$ $a = 2$	K1 N1	

10	$2^{2m} = a, 2^n = b$ $\frac{a^3 b^2}{ab^4} = 2^{pm+qn}$ $\frac{(2^{2m})^2}{(2^n)^2} = 2^{pm+qn}$ $2^{4m-2n} = 2^{pm+qn}$ $p = 4, q = -2, (\text{both})$	K1 K1 N1	3
11	$\frac{3}{2} \log_a 2$ $\frac{3}{2} (p^{-1})$ $\frac{3}{2p}$	K1 N1	2
12	$r \begin{pmatrix} 2 \\ 3 \end{pmatrix} + s \begin{pmatrix} -2 \\ 1 \end{pmatrix} = \begin{pmatrix} 6 \\ 5 \end{pmatrix}$ Hapuskan 1 pemalar $r = 2 \text{ DAN } s = -1$	K1 K1 N1	3
13 (a)	$\sqrt{(x-2)^2 + (y-3)^2} \text{ atau } \sqrt{(-2-2)^2 + (0-3)^2}$ $\sqrt{(x-2)^2 + (y-3)^2} = 5$ $x^2 + y^2 - 4x - 6y - 12 = 0$ $5^2 + h^2 - 4(5) - 6h - 12 = 0$ $(h+1)(h-7) = 0$ $h = -1 \text{ dan } h = 7$	K1 K1 N1 K1 K1 N1	8
(b)	$\frac{1}{2} (2 \times 0) + (-2 \times -1) + 5 \times 3 - [3 \times -2 + (0 \times 5) + (-1 \times 2)] $ 12.5	K1 N1	



14 (a) (i)	 atau  $\tan p = \frac{5}{13}$ (ii) $\left(\frac{12}{13}\right)\left(-\frac{4}{5}\right) - \left(\frac{5}{13}\right)\left(\frac{3}{5}\right)$ $-\frac{63}{65}$ (b) $\cos x(3 \sin x - 1) = 0$ $x = 90^\circ / \frac{1}{2}\pi$ $x = 19.47^\circ / 0.1082\pi$ $x = \frac{1}{2}\pi, \frac{3}{2}\pi, 0.1082\pi, 0.8918\pi$	P1 N1 K1 N1 P1 K1 K1 N1	8
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15.		Bentuk V terbalik (pantul pada paksi-x)	P1	
(a)		Pintasan-x = 1/2 &	P1	
(i)		Graf dalam domain $-1 \leq x \leq 3$	N1	
(ii)	$f(x)$ tidak mempunyai fungsi songsang, ujian garis mengufuk memotong graf lebih dari satu titik.		P1	
(b)	Andaikan $\frac{x+1}{2x+1} = y$, terima huruf selain x dan k DAN $x = \frac{1-y}{2y-1}$ $f(y) = \frac{2\left(\frac{1-y}{2y-1}\right) - 1}{1 - \left(\frac{1-y}{2y-1}\right)}$ $\frac{3-4k}{3k-2} = 3$ $k = \frac{9}{13}$ ATAU $3 = \frac{2x-1}{1-x}$ $x = \frac{4}{5}$ $k = \frac{\frac{4}{5} + 1}{2\left(\frac{4}{5}\right) + 1}$ $k = \frac{9}{13}$		K1	8
			K1	
			N1	
			K1	
			N1	
			K1	
			N1	



MAJLIS PENGETUA SEKOLAH MALAYSIA (MPSM) CAWANGAN KELANTAN

MODUL KOLEKSI ITEM PERCUBAAN SPM 2026

MATEMATIK TAMBAHAN KERTAS 2

UNTUK KEGUNAAN PEMERIKSA SAHAJA

SKEMA PEMARKAHAN

PERATURAN PEMARKAHAN PEPERIKSAAN PERCUBAAN TAHUN 2026

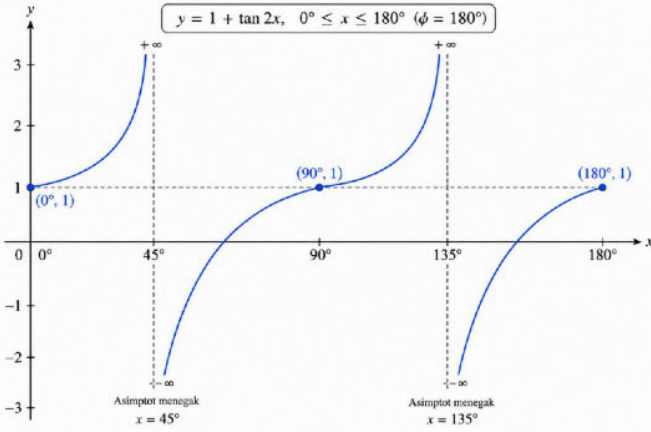
MATEMATIK TAMBAHAN (3472/2)

TINGKATAN 5

KERTAS 2

NO.	PERATURAN PEMARKAHAN	SUB-MARKAH	MARKAH PENUH																
1	$(m-1)+(n+2)=9$ $(m-1)(n+2)=20$ $m=8-n$ atau $n=8-m$ $(8-n-1)(n+2)=20$ atau $(m-1)(8-m+2)=20$ Pemfaktoran Kuadratik @ Rumus $n=2,3$ $m=6,5$	P1 P1 P1 K1 K1 N1 N1	7																
2 (a)	$x^2 + x(r-2x) - 4 = 0$ $(-r)^2 - 4(1)(4) < 0$ <table border="1" data-bbox="306 1279 995 1487"> <tr> <td></td><td>$r < -4$</td><td>$-4 < r < 4$</td><td>$r > 4$</td></tr> <tr> <td>$(r-4)$</td><td>-</td><td>-</td><td>+</td></tr> <tr> <td>$(r+4)$</td><td>-</td><td>+</td><td>+</td></tr> <tr> <td>$(r-4)(r+4)$</td><td>+</td><td>-</td><td>+</td></tr> </table> $-4 < r < 4$		$r < -4$	$-4 < r < 4$	$r > 4$	$(r-4)$	-	-	+	$(r+4)$	-	+	+	$(r-4)(r+4)$	+	-	+	K1 K1 K1 N1	7
	$r < -4$	$-4 < r < 4$	$r > 4$																
$(r-4)$	-	-	+																
$(r+4)$	-	+	+																
$(r-4)(r+4)$	+	-	+																
(b)	$x = \frac{-(-2m) \pm \sqrt{(-2m)^2 - 4(1)(m^2 - n^2)}}{2(1)}$ $x = \frac{2m \pm \sqrt{4n^2}}{2}$ $x = m + n, x = m - n$	K1 K1 N1																	

NO.	PERATURAN PEMARKAHAN	SUB-MARKAH	MARKAH PENUH
3(a)	$\frac{n(6) + m(1)}{m + n} = 4$ $m : n = 2 : 3$	K1 N1	7
3(b)	$p = \frac{3(-3) + 2(7)}{2 + 3}$ $p = 1$	K1 N1	
3(c)	$-\frac{1}{2}m_2 = -1$ $y - 4 = 2(x - 1)$ $\frac{x}{-1} + \frac{y}{2} = 1$	K1 K1 N1	
4	$j(2.09) = 104.5$ $j = 50$ $\theta_D = \frac{2\pi - 2.09}{12} \times 5$ $= 1.748$ $L_D = \frac{1}{2} \times 50^2 \times 1.748$ $= 2185$ $\frac{2185}{600} = 3.642$ 4 tin	K1 K1 K1 K1 N1	5

NO.	PERATURAN PEMARKAHAN	SUB-MARKAH	MARKAH PENUH
5 (a)	$P\left(Z > \frac{7-5.8}{1.5}\right)$	K1	9
	0.2119	N1	
5 (b)	$P(-0.533 < Z < 0.8)$	K1	
	$1 - 0.2970 - 0.2119$	K1	
	245 / 246	N1	
5 (c)	$P(X > k) = 0.857$	P1	
	1.067	P1	
	$P\left(Z > \frac{k-5.8}{1.5}\right) = -1.067$	K1	
	4.1995	N1	
6 (a)	 $y = 1 + \tan 2x, 0^\circ \leq x \leq 180^\circ (\phi = 180^\circ)$ - Bentuk graf tan (cukup 1 tempoh) - Paksi berlabel, asalan dilabel dan garis asimptot dilukis - Pintasan $y = 1$ - Graf tan seperti di atas	P1 P1 P1 P1	8

6 (b)	$a = 4$ $120^0 = \frac{360}{b}$ $b = 3$ $c = 1$	N1 K1 N1 N1	
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NO.	PERATURAN PEMARKAHAN	SUB-MARKAH	MARKAH PENUH
7 (a)	$\frac{(3 - \sqrt{5})}{4} \times \frac{(3 + \sqrt{5})}{(3 + \sqrt{5})}$ $1\left(\frac{1}{3+\sqrt{5}}\right), \text{ mesti bentuk } p\left(\frac{1}{q+\sqrt{5}}\right)$ $p = 1, q = 3 \text{ (both)}$	K1 K1 N1	7
7 (b) (i)	$2 \ln x + \frac{1}{2} \ln y \text{ atau } 2 \log_e x + \frac{1}{2} \log_e y$ $2p + \frac{1}{2}q$	K1 N1	
(b)(ii)	$\frac{\ln y}{2 \ln x} \text{ atau } \frac{\log_e y}{\log_e x}$ $\frac{q}{2p}$	K1 N1	
8(a)	$a = 200, r = 1.2$ $T_n = 200(1.2)^{n-1}$ $T_n = \frac{500}{3}(1.2)^n$	K1 N1	10
8 (b)	$T_6 = \frac{500}{3}(1.2)^6$ 498	K1 N1	

NO.	PERATURAN PEMARKAHAN	SUB-MARKAH	MARKAH PENUH
8(c)	$S_8 = \frac{200((1.2)^8 - 1)}{1.2 - 1}$ 3299.82 3300/3299	K1 K1 N1	
8 (d)	$S_{10} = \frac{200((1.2)^{10} - 1)}{1.2 - 1}$ 5191.74 5192 Tidak mencukupi , 5192 > 5000 iaitu lebih 192 kerusi	K1 K1 N1	

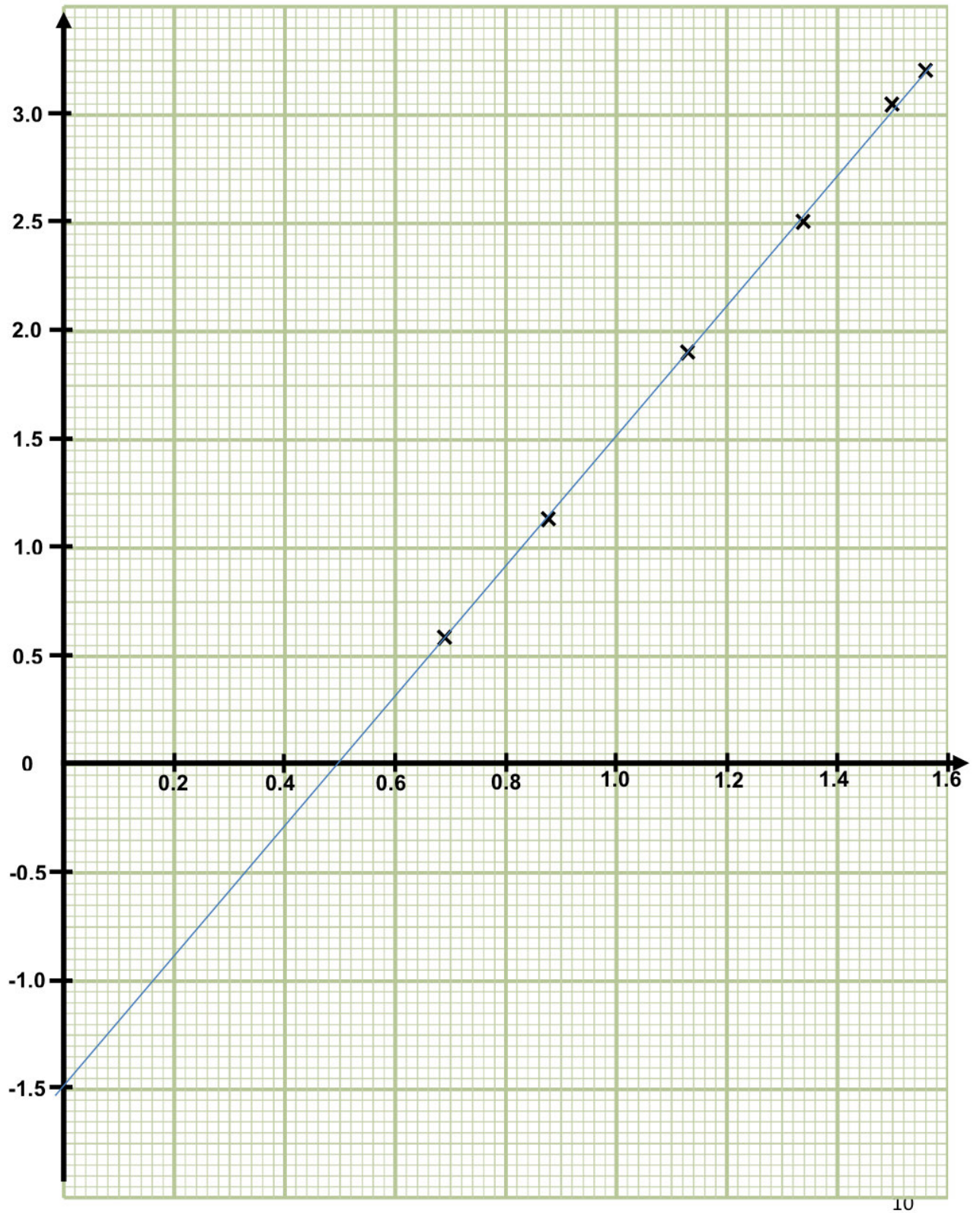

SERTAI TELEGRAM @exercise_students

NO.	PERATURAN PEMARKAHAN	SUB-MARKAH	MARKAH PENUH
9 (a)	$\frac{dy}{dx} = -\frac{18}{x^3}$ atau $m = -\frac{2}{3}$ $y - (1) = -\frac{2}{3}(x - (3))$ $y = -\frac{2}{3}x + 3$ OR $1 = -\frac{2}{3}(3) + q$ $p = -\frac{2}{3}$ dan $q = 3$, both	K1 K1 K1 N1	10
9 (b)	$\left[-\frac{9}{x}\right]_3^6$ atau $\frac{1}{2}\left(\frac{3}{2}\right)(1)$ (luas lengkung atau luas segitiga) $\left[\left(-\frac{9}{6}\right) - \left(-\frac{9}{(3)}\right)\right]$ dan $\frac{3}{4}$ $\left(\frac{3}{2}\right) - \left(\frac{3}{4}\right)$ $\frac{3}{4}$ Catatan : Boleh diterima kamiran luas terhadap paksi y	K1 K1 N1	
9(c)	$V_x = \pi \int_3^m \frac{81}{x^4} dx$ atau $y^2 = \frac{81}{x^4}$ $\pi \left[-\frac{27}{m^3}\right]_3^m = \frac{98\pi}{125}$ $\left(-\frac{27}{(m)^3}\right) - \left(-\frac{27}{(3)^3}\right) = \frac{98}{125}$ $m^3 = 125$ $m = 5$	K1 K1 N1	

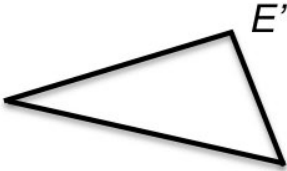
NO.	PERATURAN PEMARKAHAN	SUB-MARKAH	MARKAH PENUH
10 (a)	$\overrightarrow{EB} = \overrightarrow{EA} + \overrightarrow{AB}$ atau $\overrightarrow{AD} = \overrightarrow{AC} + \overrightarrow{CD}$ $\overrightarrow{EB} = -b + a$ $\overrightarrow{AD} = 3a + 2b$	K1 N1 N1	10
10 (b) (i)	$\overrightarrow{AF} = b + m(-b + a)$ $\overrightarrow{AF} = ma + (1-m)b$	K1 N1	
10 (b) (ii)	$3n = m$ DAN $2n = 1 - m$ Hapuskan satu pemalar $n = \frac{1}{5}$ $m = \frac{3}{5}$	K1 K1 N1 N1	
10 (c)	2:3	N1	

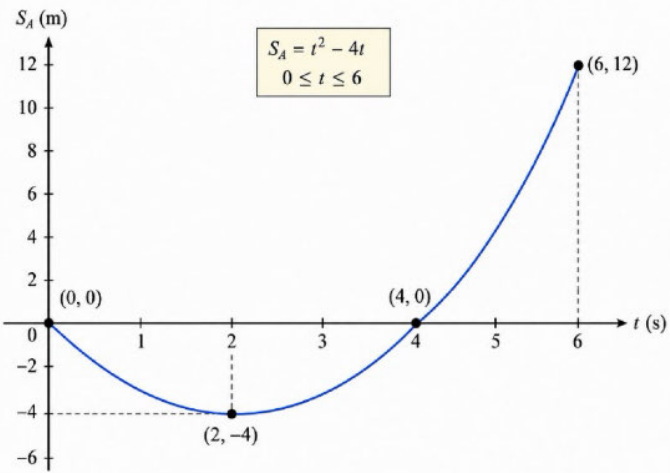
NO.	PERATURAN PEMARKAHAN	SUB-MARKAH	MARKAH PENUH												
11.															
(a)	<table><tr><td>ln x</td><td>0.69</td><td>0.88</td><td>1.13</td><td>1.34</td><td>1.50</td><td>1.57</td></tr><tr><td>ln T</td><td>0.58</td><td>1.12</td><td>1.89</td><td>2.50</td><td>3.03</td><td>3.21</td></tr></table> ➤ Plot ln T melawan ln x • Paksi-paksi betul dan skala seragam • Sekurang-kurangnya satu titik betul ➤ 6 titik diplot dengan betul Garis lurus penyuaian terbaik 	ln x	0.69	0.88	1.13	1.34	1.50	1.57	ln T	0.58	1.12	1.89	2.50	3.03	3.21
ln x	0.69	0.88	1.13	1.34	1.50	1.57									
ln T	0.58	1.12	1.89	2.50	3.03	3.21									

Jawapan Soalan 11



NO.	PERATURAN PEMARKAHAN	SUB-MARKAH	MARKAH PENUH
12 (a)	$\frac{4.10}{a} \times 100 = 140$ $a = 2.93$ $b = 2.99$ $c = 80$ dan $d = 100$	K1 N1 N1 N1	10
12 (b)(i)	$\frac{130x + 80y}{x + y} = 120$ $x:y = 4:1$	K1 N1	
12 (b)(ii)	$\frac{130(4) + 80(1) + 140(3) + 100z}{4 + 1 + 3 + z} = 120$ $z = 3$	K1 N1	
12 (c)	$\frac{125}{120} \times 100$ 104.17 Menokok 4.17%	K1 N1	

NO.	PERATURAN PEMARKAHAN	SUB-MARKAH	MARKAH PENUH
13 (a)(i)	$\frac{\sin \angle AEB}{8} = \frac{\sin 30^\circ}{6}$ $\angle BED = 138.19^\circ$ $BD^2 = 6^2 + 10^2 - 2(6)(10)\cos 138.19^\circ$ $BD = 15.01$	K1 N1 K1 N1	10
13 (a)(ii)	$50 = \frac{1}{2}(15.01)(12)\sin \angle CDB$ $\angle CDB = 33.72^\circ$	K1 N1	
13 (a)(iii)	$50 = \frac{1}{2}(15.01)t$ $t = 6.662$ <i>Catatan</i> (boleh sebarang simbol mewakili jarak terdekat)	K1 N1	
13 (b)(i)		K1	
13(b)(ii)	$\angle A'E'B' = 78.19^\circ$	N1	

NO.	PERATURAN PEMARKAHAN	SUB-MARKAH	MARKAH PENUH
14 (a)	$2t - 4 < 0$ <i>Julat nilai t ialah $0 \leq t < 2$</i>	K1 N1	10
14 (b)	$S = \int_0^2 (2t - 4) dt$ $[(2)^2 - 4(2)] - [(0)^2 - 4(0)]$ -4 <i>Zarah itu tidak sampai ke B</i>	K1 K1 N1	
14 (c)	$\int_2^6 (2t - 4) dt$ <i>dan</i> $[(6)^2 - 4(6)] - [(2)^2 - 4(2)]$ $4 + 16$ 20	K1 K1 N1	
14 (d)	 $S_A = t^2 - 4t$ $0 \leq t \leq 6$ - Bentuk, paksi dilukis dengan alat tepi lurus, asalan dilabel - Mesti melalui ke empat – empat titik (0,0), (2,-4), (4,0) dan (6,12)	P1 P1	

NO.	PERATURAN PEMARKAHAN	SUB-MARKAH	MARKAH PENUH
15.			
(a)	$8x + 18y \geq 720$ atau setara $5x + 8y \leq 800$ atau setara $8y \leq 5x$ atau setara	N1 N1 N1	10
(b)	- Lukis dengan betul sekurang-kurangnya satu garis lurus daripada ketaksamaan yang melibatkan x dan y - Lukis dengan betul ketiga-tiga garis lurus - rantau berlorek	K1 K1 N1	
(c)		N1	
i)	Bilangan maksimum = 120 Bilangan minimum = 40	N1	
(ii)	Gunakan $10x + 30y$ untuk ganti titik dalam rantau $10(80) + 30(50)$ RM 2300	K1 N1	



SERTAI TELEGRAM @exercise_students

Jawapan soalan 15

