KEPIMPINAN BERKUALITI
MPSM

MAJLIS PENGETUA SEKOLAH MALAYSIA (MPSM)
CAWANGAN KELANTAN

MODUL KOLEKSI ITEM
PERCUBAAN SPM
2026

MATEMATIK TAMBAHAN
KERTAS 1

UNTUK KEGUNAAN PEMERIKSA SAHAJA

SKEMA PEMARKAHAN

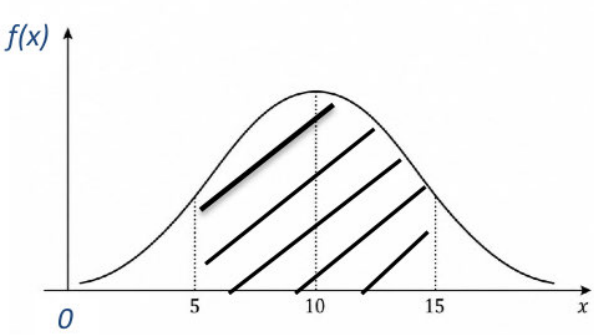
PERATURAN PEMARKAHAN PEPERIKSAAN PERCUBAAN TAHUN2026

MATEMATIK TAMBAHAN (3472/1)

TINGKATAN 5

NO.	PERATURAN PEMARKAHAN	SUB-MARKAH	MARKAH PENUH
1. (a) (b)	$p = 4 - q$ $(i)\ \ m = 4$ $(ii)\ Ganti\ m = 4\ \ dan\ 7\ ke\ dalam\ f(x) @ -1 \le f(x) \le 8$ $-1 \le x \le 8$	N1 N1 K1 N1	4
2. (a) (b)	$y = (2x - 3)^2$ $\sqrt{y} = 2x - 3$ $7 = 2\mathrm{k} - 3$ $k = 5$	K1 N1 K1 N1	4
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

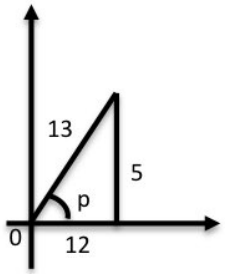
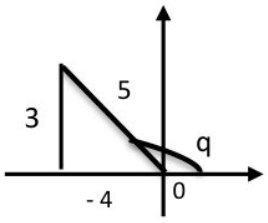
4 (a)	$n = 2k + 1$ $S_A = \frac{2k+1}{2}(2k + 4k)$ $6k^2 + 3k$ (b) $n = k + 1$ $S_B = \frac{k+1}{2}(2k + 4k)$ $3k^2 + 3k$ (c) $\frac{S_A}{S_B} = \frac{6k^2+3k}{3k^2+3k}$ $= \frac{3k(2k+1)}{3k(k+1)}$ Catatan : mesti melibatkan 2 langkah di atas ini, $= \frac{2k+1}{k+1}$ terbukti	K1 N1 K1 N1 N1	5
5 (a)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

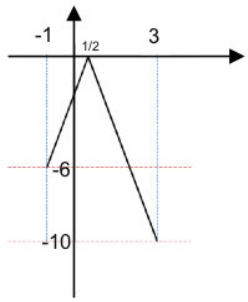
6 (a) (i)	${}^8C_5(0.8)^5(0.2)^{8-5}$ *dan* 0.1468	N1	
(ii)	$P(X=6)+P(X=7)+P(X=8)$ Atau $P(Y=2)+P(Y=1)+P(Y=0)$ ${}^8C_6(0.8)^6(0.2)^{8-6}+{}^8C_7(0.8)^7(0.2)^{8-7}+{}^8C_8(0.8)^8(0.2)^{8-8}$ 0.7969	K1 N1	
(b) (i)	$\mu = 10$	N1	6
(ii)	 $1-0.28-0.28$ DAN 0.44	K1 N1	

7 (a)	$f(x) = x^2 - 6kx + (\frac{-6k}{2})^2 - (\frac{-6k}{2})^2 + h$ $f(x) = (x - 3k)^2 - 9k^2 + h$ $k + 4 = 3k$ atau $-9k^2 + h = 2k - 9k^2$ $k = 2$ dan $h = 4$ Catatan : $f(x) = 0$, K0K0K0N0	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)	$\frac{dy}{dx} = (4p + 4)x^p + 6px^{p-1}$ $4p + 4 = q$ 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)	$u = 3 - 2x$, $\frac{du}{dx} = -2$, $\frac{dx}{du} = -\frac{1}{2}$, $dx = -\frac{1}{2}du$		
	$\int_0^3 5(3-2x)^{-4}dx = \int_0^3 5u^{-4}\left(-\frac{1}{2}\right)du$	K1	
	$-\frac{5}{2}\left[-\frac{1}{3u^3}\right]_0^3$	K1	
	$-\frac{5}{2}\left[-\frac{1}{3(3-2x)^3}\right]_0^3$		
	$\left(-\frac{5}{2}\left[-\frac{1}{3(3-2(3))^3}\right]\right) - \left(-\frac{5}{2}\left[-\frac{1}{3(3-2(0)^3}\right]\right)$	K1	
	$-\frac{5}{81}$	N1	
(b)	$y = \int 2x - 6dx$		9
	$\frac{dy}{dx} = 0$, $2x - 6 = 0$ $x = 3$	K1	
	$y = x^2 - 6x + c$		
	$(-4) = (3)^2 - 6(3) + c$ $c = 5$	K1	
	$y = x^2 - 6x + 5$	N1	
(c)	$\int_a^3 f(x)dx + [4x]_0^3 = 9$ atau $5 + [4x]_0^3 = 9$	K1	
	$a = 2$	N1	

10	$2^{2m} = a\ , 2^n = b$ $\frac{a^3b^2}{ab^4} = 2^{pm+qn}$ $\frac{(2^{2m})^2}{(2^n)^2} = 2^{pm+qn}$ $2^{4m-2n} = 2^{pm+qn}$ $p = 4\ , q = -2$, (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 $r = 2$ DAN $s = -1$	K1 K1 N1	 3
13 (a)	$\sqrt{(x-2)^2+(y-3)^2}$ atau $\sqrt{(-2-2)^2+(0-3)^2}$ $\sqrt{(x-2)^2+(y-3)^2} = 5$ $x^2+y^2-4x-6y-12=0$ $5^2+h^2-4(5)-6h-12=0$ $(h+1)(h-7)=0$ $h=-1$ dan $h=7$ (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 K1 N1 K1 K1 N1 K1 N1	 8

14 (a) (i)	 atau  	P1	
	$\tan p = \frac{5}{13}$	N1	
(ii)	$\left(\frac{12}{13}\right)\left(-\frac{4}{5}\right)-\left(\frac{5}{13}\right)\left(\frac{3}{5}\right)$	K1	
	$-\frac{63}{65}$	N1	8
(b)	$kos\, x\left(3\sin x - 1\right) = 0$	P1	
	$x = 90^0 / \frac{1}{2}\pi$	K1	
	$x = 19.47^0 / 0.1082\pi$	K1	
	$x = \frac{1}{2}\pi, \frac{3}{2}\pi, 0.1082\pi, 0.8918\pi$	N1	

15. (a) (i)	 Bentuk V terbalik (pantul pada paksi-x) Pintasan-x =1/2 & Graf dalam domain $-1 \le x \le 3$	P1 P1 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 K1 K1 N1 K1 N1 K1 N1	8

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MATEMATIK TAMBAHAN
KERTAS 2

UNTUK KEGUNAAN PEMERIKSA SAHAJA

SKEMA PEMARKAHAN

PERATURAN PEMARKAHAN PEPERIKSAAN PERCUBAAN TAHUN 2026

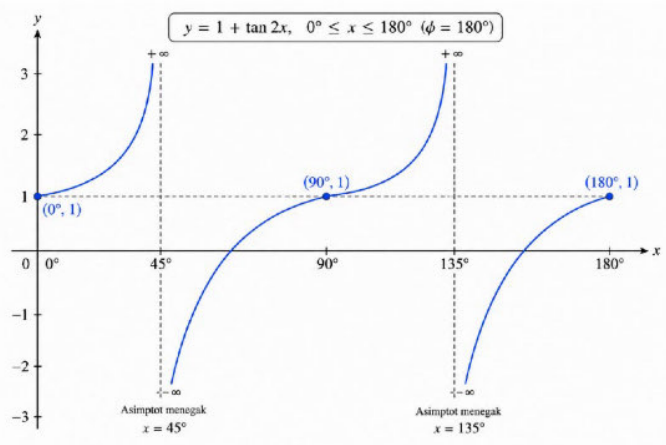
MATEMATIK TAMBAHAN (3472/2)

TINGKATAN 5

KERTAS 2

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

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)	$P\left(Z > \frac{7-5.8}{1.5}\right)$ 0.2119	K1 N1	9
5 (b)	$P(-0.533 < Z < 0.8)$ $1-0.2970-0.2119$ $245/246$	K1 K1 N1	
5 (c)	$P(X > k) = 0.857$ 1.067 $P\left(Z > \frac{k-5.8}{1.5}\right) = -1.067$ 4.1995	P1 P1 K1 N1	
6 (a)	 - 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)	$a = 4$	N1	
	$120^0 = \frac{360}{b}$	K1	
	$b = 3$	N1	
	$c = 1$	N1	

NO.	PERATURAN PEMARKAHAN	SUB-MARKAH	MARKAH PENUH
7 (a)	$\frac{(3-\sqrt{5})}{4} \times \frac{(3+\sqrt{5})}{(3+\sqrt{5})}$ $1\left(\frac{1}{3+\sqrt{5}}\right)$, mesti bentuk $p\left(\frac{1}{q+\sqrt{5}}\right)$ $p = 1\,, q = 3$ (both)	K1 K1 N1	7
7 (b) (i)	$2\ln x + \frac{1}{2}lny$ atau $2log_e x + \frac{1}{2}log_e y$ $2p + \frac{1}{2}q$	K1 N1	
(b)(ii)	$\frac{lny}{2lnx}$ 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)	$S_8 = \frac{200((1.2)^8 - 1)}{1.2 - 1}$	K1	
	3299.82	K1	
	3300/3299	N1	
8 (d)	$S_{10} = \frac{200((1.2)^{10} - 1)}{1.2 - 1}$	K1	
	5191.74		
	5192	K1	
	Tidak mencukupi , 5192 > 5000 iaitu lebih 192 kerusi	N1	

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

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

N1

N1

➢ Plot ln T melawan ln x
- Paksi-paksi betul dan skala seragam
- Sekurang-kurangnya satu titik betul

K1

➢ 6 titik diplot dengan betul

N1

Garis lurus penyuaian terbaik

N1

10

$\ln T = N \ln x - K$

P1`

$-K = C = -1.50$

N1

$K = 1.50$

$N = kec$

$= \dfrac{3.33 - 1.89}{1.61 - 1.13}$

K1

$= 3.0$

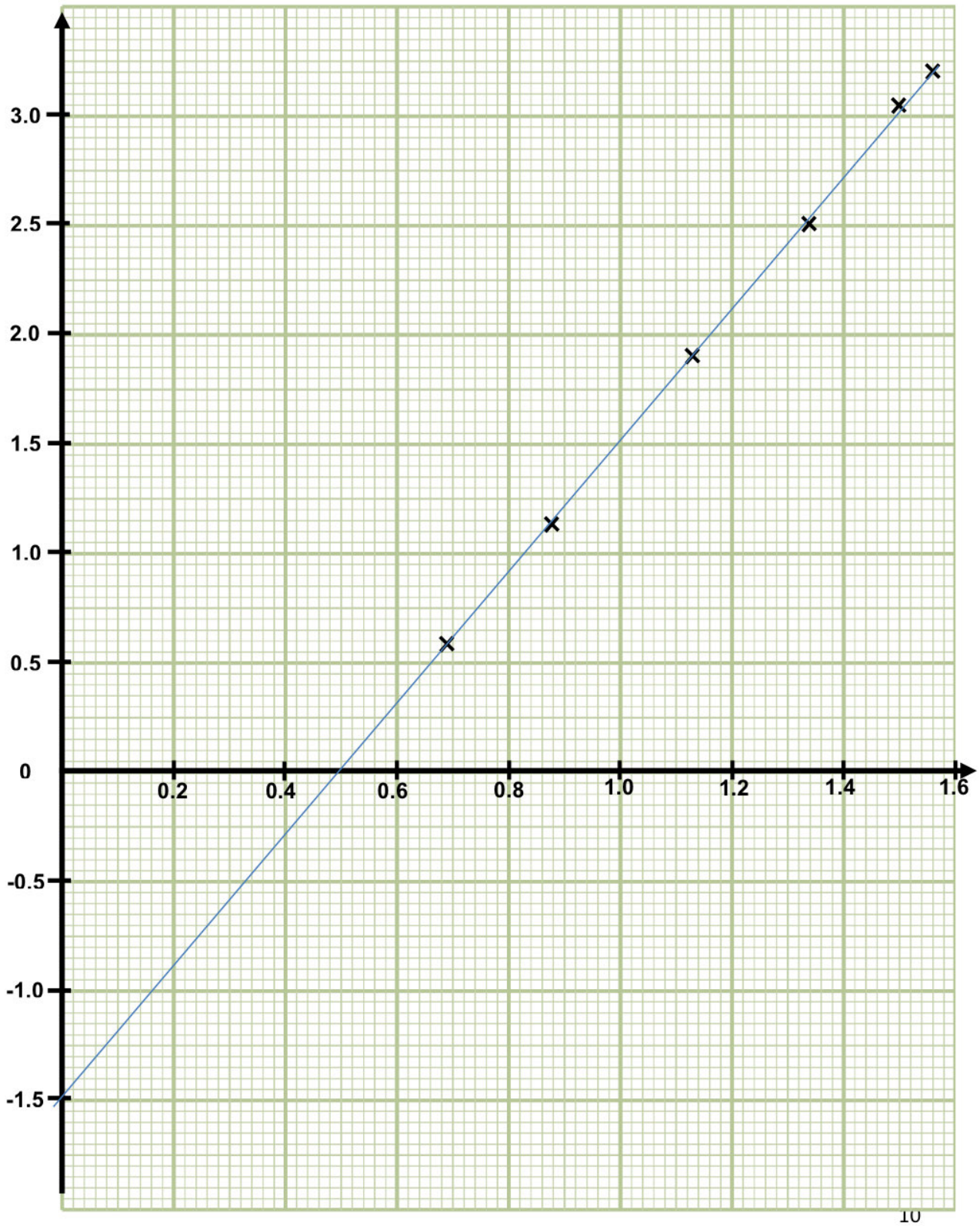
$\ln T = 2.25$

K1

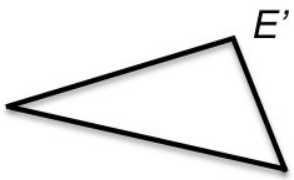
$T = 9.488$

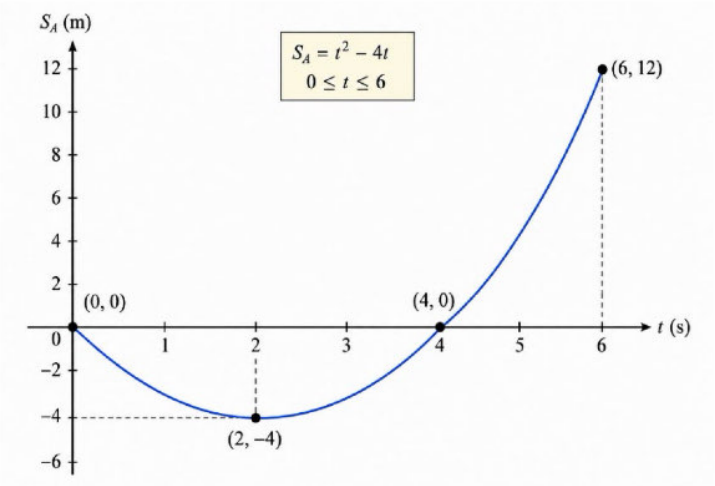
N1

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)	$\frac{\sin\angle AEB}{8}=\frac{\sin 30°}{6}$ $\angle BED=138.19°$ $BD^2=6^2+10^2-2(6)(10)\cos 138.19°$ $BD=15.01$	K1 N1 K1 N1	10
13 (a)(ii)	$50=\frac{1}{2}(15.01)(12)\sin\angle CDB$ $\angle CDB=33.72°$	K1 N1	
13 (a)(iii)	$50=\frac{1}{2}(15.01)t$ $t=6.662$ *Catatan* *(boleh sebarang simbol mewakili jarak terdekat)*	K1 N1	
13 (b)(i) 13(b)(ii)	 $\angle A'E'B'=78.19°$	K1 N1	

NO.	PERATURAN PEMARKAHAN	SUB-MARKAH	MARKAH PENUH
14 (a)	$2t-4<0$ *Julat nilai t ialah* $0 \le t < 2$	K1 N1	10
14 (b)	$S=\int_0^2 (2t-4)\,dt$ $\left[(2)^2-4(2)\right]-\left[(0)^2-4(0)\right]$ -4 *Zarah itu tidak sampai ke B*	K1 K1 N1	
14 (c)	$\int_2^6 (2t-4)dt$ *dan* $\left[(6)^2-4(6)\right]-\left[(2)^2-4(2)\right]$ $4+16$ 20	K1 K1 N1	
14 (d)	 - 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*	N1	
	$5x + 8y \leq 800$ *atau setara*	N1	
	$8y \leq 5x$ *atau setara*	N1	
(b)			
	• Lukis dengan betul sekurang-kurangnya satu garis lurus daripada ketaksamaan yang melibatkan *x* dan *y*	K1	
	• Lukis dengan betul ketiga-tiga garis lurus	K1	10
	• rantau berlorek	N1	
(c)		N1	
	i) Bilangan maksimum = 120	N1	
	Bilangan minimum = 40		
	(ii) Gunakan 10*x* + 30*y* untuk ganti titik dalam rantau 10(80) + 30(50)	K1	
	RM 2300	N1	

Jawapan soalan 15