SKEMA

NAMA : ..... TINGKATAN: .....

KEMENTERIAN PENDIDIKAN MALAYSIA
Jabatan Pendidikan WP Putrajaya

PEPERIKSAAN PERCUBAAN SPM 2026
MATEMATIK TAMBAHAN

3472/1

Kertas 1
Ogos 2026
2jam **Dua jam**

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. *Tuliskan nama dan tingkatan pada ruang yang disediakan*
2. *Kertas ini mengandungi dua bahagian iaitu **Bahagian A dan B***
3. *Jawab **semua** soalan di **Bahagian A**, dan **2** soalan di **Bahagian B***
4. *Tulis jawapan dan langkah kerja di ruang jawapan yang disediakan*
5. *Rajah yang mengiringi soalan tidak dilukis mengikut skala kecuali dinyatakan*
6. *Markah yang diperuntukkan bagi setiap soalan ditunjukkan dalam kurungan*
7. *Anda dibenarkan menggunakan kalkulator saintifik yang tidak boleh diprogramkan*

Bahagian	Soalan	Markah Penuh	Markah diperoleh
A	1	5	
	2	6	
	3	3	
	4	3	
	5	6	
	6	6	
	7	4	
	8	8	
	9	5	
	10	6	
	11	4	
	12	8	
B	13	8	
	14	8	
	15	8	
Jumlah markah			

Kertas ini mengandungi 28 halaman bercetak

MATEMATIK TAMBAHAN KERTAS 1. **NO SOALAN : 1**

Jawapan / *Answer*:

$2^{n+3} + 2^{n+1} - 2^n = 36$

$(2^n \cdot 2^3) + (2^n \cdot 2^1) - 2^n = 36$ ✓ K1

$2^n (2^3 + 2^1 - 1) = 36$

$2^n (9) = 36$

$2^n = \frac{36}{9}$

$2^n = 4$

$2^n = 2^2$ ✓ K1

$n = 2$ ✓ N1

/3

MATEMATIK TAMBAHAN KERTAS 1. **NO SOALAN : 2**

Jawapan / *Answer*:

(a) 80, 60, 45

$r = \frac{60}{80}$ @ $r = \frac{45}{60}$

$r = 0.75$ $r = 0.75$ ✓ P1 a atau r

$T_7 = 80(0.75)^{7-1}$ ✓ K1

$= 14.23$ ✓ N1

(b) $S_\infty = \frac{80}{1 - 0.75}$ ✓ K1

$= 320$ ✓ N1

/5

MATEMATIK TAMBAHAN KERTAS 1. **NO SOALAN : 3**

Jawapan / *Answer*:

a) P. Lengkok $ST = (9.73 - 7)(0.803)$ ✓K1

$= 2.192$ ✓N1

b)

$\angle QPR = 44 \times \frac{3.142}{180}$ ✓ @

$= 0.768$ ✓P1 (seen)

Luas $\triangle PQR = \frac{1}{2}(7)(9.73)\sin 44$

$= 23.657$ ✓

Sektor $RST = \frac{1}{2}(2.73)^2(0.803)$ @

$= 2.992$ ✓

Sektor $PQS = \frac{1}{2}(7)^2(0.768)$ @

$= 18.816$ ✓ K1

Luas kawasan berlorek $= 23.657 - 2.992 - 18.816$ ✓K1

$= 1.849 / 1.847$ ✓N1

16

MATEMATIK TAMBAHAN KERTAS 1. **NO SOALAN : 4**

Jawapan / *Answer*:

$$\sqrt{a+b\sqrt{5}} = \frac{4}{3-\sqrt{5}} \times \frac{3+\sqrt{5}}{3+\sqrt{5}} \quad \checkmark K_1$$

$$= \frac{4(3+\sqrt{5})}{(3)^2-(\sqrt{5})^2}$$

$$= \frac{12+4\sqrt{5}}{9-5}$$

$$= \frac{4(3+\sqrt{5})}{4}$$

$$\left(\sqrt{a+b\sqrt{5}}\right)^2 = \left(3+\sqrt{5}\right)^2$$

$$a+b\sqrt{5} = (3+\sqrt{5})(3+\sqrt{5})$$

$$= 9+3\sqrt{5}+3\sqrt{5}+(\sqrt{5})^2 \quad \checkmark K_1$$

$$a+b\sqrt{5} = 14+6\sqrt{5}$$

$$a = 14, \quad b = 6$$

$\checkmark N_1$ $\checkmark N_1$

/4

MATEMATIK TAMBAHAN KERTAS 1. **NO SOALAN : 5**

Jawapan / *Answer*:

a) $\log_8 235$

$= \frac{\log_e 235}{\log_e 8}$ ✓ @ $= \frac{\ln 235}{\ln 8}$ ✓ K_1

$= 2.6256$ ✓ $= 2.6255$ ✓ N_1

b) $x \log_{10}\left(1 - \frac{2}{y}\right) = \log_{10} h - \log_{10} k$

$x \log_{10}\left(1 - \frac{2}{15}\right) = \log_{10} 45000 - \log_{10} 125000$ ✓ K_1

Penggantian nilai y, h dan k

$x \log_{10}\left(\frac{13}{15}\right) = \log_{10}\left(\frac{45\,000}{125\,000}\right)$ ✓ K_1 - hukum log

$x = 7.1393$

$x \simeq 7$ tahun ✓ N_1

/5

MATEMATIK TAMBAHAN KERTAS 1. **NO SOALAN : 6**

Jawapan / *Answer*:

a) $F = F_1 + F_2$

$= (12\underset{\sim}{i} + 4\underset{\sim}{j}) + (20\underset{\sim}{i} - 6\underset{\sim}{j})$ ✓ K1

$= 12\underset{\sim}{i} + 20\underset{\sim}{i} + 4\underset{\sim}{j} - 6\underset{\sim}{j}$

$= 32\underset{\sim}{i} - 2\underset{\sim}{j}$ ✓ N1

b) $|F| = \sqrt{(32)^2 + (-2)^2}$ ✓ K1

$= 2\sqrt{257}$

$\hat{F} = \dfrac{16\underset{\sim}{i} - 1\underset{\sim}{j}}{\sqrt{257}}$

$= \dfrac{16}{\sqrt{257}}\underset{\sim}{i} - \dfrac{\underset{\sim}{j}}{\sqrt{257}}$ ✓ N1

c) $\tan\theta = \dfrac{|-2|}{32}$ ✓ K1

$\tan\theta = \dfrac{1}{16}$

$\theta = 3.5763^\circ / 3.58^\circ$

bergerak ke kanan ✓ dan ke bawah ✓ dengan sudut 3.5763° merujuk garis mengufuk. ✓ N1 (2) 093.58°

/6

MATEMATIK TAMBAHAN KERTAS 1. **NO SOALAN : 7**

Jawapan / *Answer*:

a) $p + q + (p+q) + (q+p) + 0.1 = 1$

$3p + 3q = 0.9$

$3(p+q) = 0.9$

$p + q = 0.3$ — ①

K1

$P(x=3) - P(x=1) = 0.1$

$(p+q) - q = 0.1$

$p = 0.1$ — ② N1

Subs ② into ①

$(0.1) + q = 0.3$

$q = 0.2$ N1

b) $P(X > 1)$

$= 1 - P(X=0) - P(X=1)$

$= 1 - 0.1 - 0.2$

$= 0.7$ N1

/4

MATEMATIK TAMBAHAN KERTAS 1. **NO SOALAN : 8 (a)**

Jawapan / *Answer*:

a) $y = \frac{1}{3}x^3 - \frac{7}{2}x^2 + 10x$

$\frac{dy}{dx} = x^2 - 7x + 10$

$\frac{dy}{dx} = 0$

$x^2 - 7x + 10 = 0$ ✓ K1

$(x-2)(x-5) = 0$

$x_1 = 2$ atau $x_2 = 5$

$y_1 = \frac{1}{3}(2)^3 - \frac{7}{2}(2)^2 + 10(2)$

$= \frac{26}{3}$

$y_2 = \frac{1}{3}(5)^3 - \frac{7}{2}(5)^2 + 10(5)$ } atau K1

$= \frac{25}{6}$

$\therefore (2, \frac{26}{3})$ atau $(5, \frac{25}{6})$ #

$\frac{dy}{dx} = x^2 - 7x + 10$

$\frac{d^2y}{dx^2} = 2x - 7$ atau $\frac{d^2y}{dx^2} = 2x - 7$

$x_2 = 5$ ✓ K1

$x_1 = 2$

$= 2(2) - 7$

$= -3 (< 0)$

$\frac{d^2y}{dx^2} = 2(5) - 7$

$= 3 (> 0)$

$\therefore (2, \frac{26}{3})$ titik maksimum ✓ N1 #

$\therefore (5, \frac{25}{6})$ titik minimum ✓ N1 #

/5

MATEMATIK TAMBAHAN KERTAS 1. **NO SOALAN :** 8(b)

Jawapan / *Answer*:

b) $P(3, 4)$ $y = 2x^2 + 3x + 7$

$\frac{dy}{dx} = 4x + 3$ ✓ K1

$x = 3$ $= 4(3) + 3$

$= 15$

$m_N m_T = -1$

$m_N (15) = -1$

$m_N = -\frac{1}{15}$

$y - y_1 = m(x - x_1)$

$y - 4 = -\frac{1}{15}(x - 3)$ ✓ K1 & ditiha $m_N(15) = -1$

$y = -\frac{1}{15}x + \frac{21}{5}$ ✓ N1

terima kaedah setara

$y = mx + c$

/3

MATEMATIK TAMBAHAN KERTAS 1. **NO SOALAN : 9**

Jawapan / *Answer*:

a) $L = \frac{1}{2}\begin{vmatrix} 1 & 6 & 3 & 1 \\ 4 & 10 & -4 & 4 \end{vmatrix}$

$= \frac{1}{2}\left|\left[(1\times10)+(6\times-4)+(3\times4)\right]-\left[(4\times6)+(3\times10)+(1\times-4)\right]\right|$ ✓ K1

$= \frac{1}{2}\left|-52\right|$

$= \frac{1}{2}(52)$

$= 26$ ✓ N1

b) $m_{RQ} = \frac{10-(-4)}{6-3}$ ✓ $R(3,-4)$ $Q(6,10)$

$= \frac{14}{3}$

$\frac{14}{3} \times m_2 = -1$ ✓ K1

$m_2 = \frac{-3}{14}$

$P(1,4)$

$y - 4 = -\frac{3}{14}(x-1)$ ✓ K1

$y = -\frac{3}{14}x + \frac{3}{14} + 4$

$= -\frac{3}{14}x + \frac{59}{14}$ ✓ N1

/5

MATEMATIK TAMBAHAN KERTAS 1 **NO SOALAN : 10**

Jawapan / *Answer*:

(a)

$$\int (3x+2)^n dx = a(3x+2)^{-2} + C$$

$$\frac{(3x+2)^{n+1}}{(3)(n+1)} + C \quad / \text{K1}$$

$n+1 = -2$

$n = -3$ / N1

$$a = \frac{1}{3(-3+1)}$$

$$= \frac{1}{3(-2)}$$

$$= \frac{-1}{6} \quad / \text{N1}$$

/3

Jawapan / *Answer*:

(b) $\frac{d}{dx}\left(\frac{2x}{2x^2+3}\right) = g(x)$

$\int g(x)\,dx = \frac{2x}{2x^2+3}$

$\int_0^2 \frac{g(x)}{2}\,dx - \int_0^2 2x\,dx$

$= \frac{1}{2}\int_0^2 g(x) - \int_0^2 2x\,dx$

$= \frac{1}{2}\left[\frac{2x}{2x^2+3}\Big|_0^2\right] - \left[\frac{2x^2}{2}\Big|_0^2\right]$ / K1

$= \frac{1}{2}\left[\frac{2(2)}{2(2)^2+3} - \frac{2(0)}{2(0)^2+3}\right] - \left[(2)^2 - (0)^2\right]$ / K1

$= -\frac{42}{11}$ / N1

MATEMATIK TAMBAHAN KERTAS 1. **NO SOALAN :** 11

Jawapan / *Answer*:

a) $m = -\frac{7}{7} = -1$ ✓ P1

$\log_{10} y = (-1)x + 7$ ✓ K1

$= 7 - x$

$\therefore y = 10^{7-x}$ ✓ N1

b) $y = 10^{7-3}$

$= 10^{4}$ atau

$= 10000$ ✓ N1

/4

MATEMATIK TAMBAHAN KERTAS 1. **NO SOALAN :** 12

Jawapan / *Answer*:

a)i) ${}^nC_r = \frac{n!}{(n-r)!r!}$

${}^nC_{n-r} = \frac{n!}{(n-(n-r))!(n-r)!}$ /K1

$= \frac{n!}{r!(n-r)!}$

$= {}^nC_r$ /N1

ii) 6B, 5M

P(sekurang-kurang 3B)

3B 2M atau 4B 1M atau 5B 0M

${}^6C_3 \times {}^5C_2 + {}^6C_4 \times {}^5C_1 + {}^6C_5 \times {}^5C_0$ ✓K1

$= 200 + 75 + 6$

$= 281$ /N1

/4

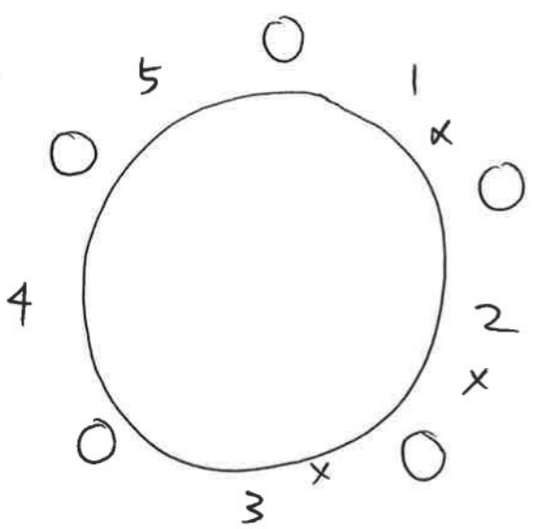
MATEMATIK TAMBAHAN KERTAS 1. **NO SOALAN : 12**

Jawapan / *Answer*:

b) i. $7! \, 2!$ ✓P1

$= 10080$ ✓N1 Terima kaedah setara

ii.



$= (5-1)! \, {}^{5}P_{3}$ ✓K1

$= 1440$ ✓N1

/4

MATEMATIK TAMBAHAN KERTAS 1. **NO SOALAN : 13**

Jawapan / *Answer*:

a) $f(x) = \frac{5x-1}{10}$ $\quad gf(x) = 5x+2$

i) $g\left(\frac{5x-1}{10}\right) = 5x+2$

katakan $y = \frac{5x-1}{10}$

$x = \frac{10y+1}{5}$ ✓K1

$g(y) = 5\left(\frac{10y+1}{5}\right) + 2$ ✓K1

$= 10y + 3$

$g(x) = 10x + 3$ ✓N1

kaedah songsangan

$g(x) = gff^{-1}(x)$

$= gf\left(\frac{10x+1}{5}\right)$ ✓K1

$= 5\left(\frac{10x+1}{5}\right) + 2$ ✓K1

$g(x) = 10x + 3$ ✓N1

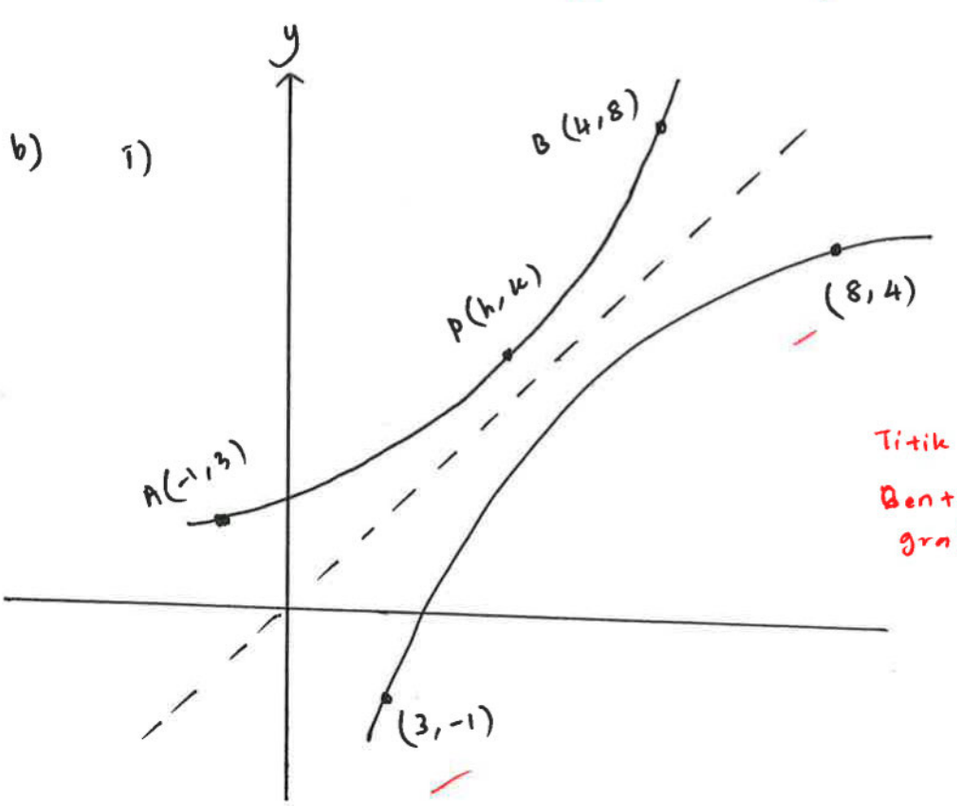
ii) $10x + 3 = x$ ✓K1

$10x - x = 3$

$9x = 3$

$x = \frac{1}{3}$ ✓N1

b) i)



ii) (2,5) ✓N1

Titik A @ B ✓K1

Bentuk graf ✓N1

/8

MATEMATIK TAMBAHAN KERTAS 1. **NO SOALAN : 14**

Jawapan / *Answer*:

a) $f(x) = -2x^2 + 8x - 3$

$f(x) = -2\left[x^2 - 4x + \frac{3}{2}\right]$

$= -2\left[x^2 - 4x + \left(\frac{-4}{2}\right)^2 - \left(\frac{-4}{2}\right)^2 + \frac{3}{2}\right]$ – K1

$= -2\left[(x-2)^2 - \frac{5}{2}\right]$

$f(x) = -2(x-2)^2 + 5$ – N1

Lakaran graf rujuk lampiran.

Bentuk – 1M – P1

Titik max – 1M – N1

Punca / Pintasan y – 1M – N1

b) i) $f(x) = 2(x-2)^2 - 5$ – N1

ii) Bentuk : 1M – N1

Titik min : 1M – N1

/8

MATEMATIK TAMBAHAN KERTAS 2 / 1 **NO SOALAN : 15**

Jawapan / *Answer*:

(a) $\dfrac{1+\sin 2x}{1-2(1-\cos^2 x)} - \dfrac{1}{\cos 2x}$ ✓ K1

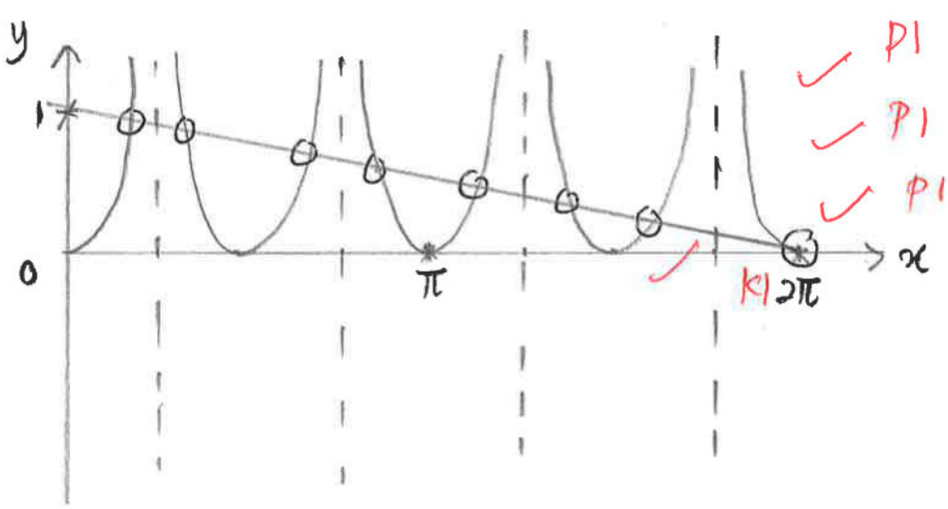
$= \dfrac{1+\sin 2x}{2\cos^2 x - 1} - \dfrac{1}{\cos 2x}$

$= \dfrac{1+\sin 2x - 1}{\cos 2x}$ ✓ K1

$= \dfrac{\sin 2x}{\cos 2x}$

$= \tan 2x$ ✓ N1

(b)



✓ P1 bentuk

✓ P1 kitaran

✓ P1 modulus

$\tan 2x + \dfrac{\pi}{2\pi} = 1$

$y = 1 - \dfrac{x}{2\pi}$ ✓ K1

* lukis garis lurus dan persamaan garis lurus

Bilangan penyelesaian = 8 ✓ N1

/8

SKEMA

NAMA : ..... TINGKATAN: .....

KEMENTERIAN PENDIDIKAN MALAYSIA
Jabatan Pendidikan WP Putrajaya

PEPERIKSAAN PERCUBAAN SPM 2026
MATEMATIK TAMBAHAN

3472/2

Kertas 2
Ogos 2026
$2\frac{1}{2}$ jam

Dua jam tiga puluh minit

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. *Tuliskan nama dan tingkatan pada ruang yang disediakan*
2. *Kertas ini mengandungi tiga bahagian iaitu **Bahagian A, B dan C***
3. *Jawab **semua** soalan di **Bahagian A**, **3** soalan di **Bahagian B** dan **2** soalan di **Bahagian C***
4. *Tulis jawapan dan langkah kerja di ruang jawapan yang disediakan*
5. *Rajah yang mengiringi soalan tidak dilukis mengikut skala kecuali dinyatakan*
6. *Markah yang diperuntukkan bagi setiap soalan ditunjukkan dalam kurungan*
7. *Anda dibenarkan menggunakan kalkulator saintifik yang tidak boleh diprogramkan*

Bahagian	Soalan	Markah Penuh	Markah diperoleh
A	1		
	2		
	3		
	4		
	5		
	6		
	7		
B	8	10	
	9	10	
	10	10	
	11	10	
C	12	10	
	13	10	
	14	10	
	15	10	
Jumlah markah			

Kertas ini mengandungi 38 halaman bercetak

MATEMATIK TAMBAHAN KERTAS 2. **NO SOALAN : 1**

Jawapan / *Answer*:

a) $|4p - 8| = 0$ K1 @

$p = 2$ ✓N1

$q = |4(0) - 8|$

$q = 8$ ✓N1

c) $4x - 8 = 12$ ✓ dan $4x - 8 = -12$ ✓K1

$4x = 20$

$x = 5$ ✓

dan

$4x = -4$

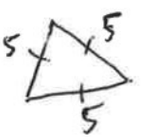
$x = -1$ ✓N1

15

MATEMATIK TAMBAHAN KERTAS 2. **NO SOALAN : 2**

Jawapan / *Answer*:

a) $120 \times \frac{3.142}{180} = 2.095$ ✓K1 ✓N1



b) Lilitan bulatan $= 2 \times 3.142 \times 5$

$= 31.42$ ✓@

P. Lengkok $= 2 \times 5 \times 2.095$

$= 20.95$ ✓K1

perimeter $= 31.42 + 20.95 + 4(5)$ ✓K1

$= 72.37$ ✓N1

c) Luas kaw. berlorek = Luas bulatan − 2 (Luas Sektor)

$= 3.142 (5)^2 - 2\left(\frac{1}{2} \times 5^2 \times 2.095\right)$ ✓@ ✓K1

$= \cancel{26.175}$ $78.55 - 52.375$ ✓K1

$= 26.175$ ✓N1

/8

MATEMATIK TAMBAHAN KERTAS 2. **NO SOALAN : 3**

Jawapan / *Answer*:

a) had $\lim_{k \to 2} \frac{k^2 - 81}{k - 9}$

$= \text{had}_{k \to 2} \frac{(k-9)(k+9)}{(k-9)}$

$= \text{had}_{k \to 2} \; k+9$

$= 2 + 9$

$= 11$ ✓ N1

#

atau

$\frac{2^2 - 81}{2 - 9}$

$= \frac{-77}{-7}$

$= 11$ ✓ N1

b) $V = 3r^2 - \frac{1}{3}r^3$

i) $\frac{dr}{dt} = 0.05$

$\frac{dV}{dt} = ?$

$V = 3r^2 - \frac{1}{3}r^3$

$\frac{dV}{dr} = 6r - r^2$ ✓ K1

$r = 2$

$= 6(2) - (2)^2$

$= 8$

$\frac{dV}{dt} = \frac{dV}{dr} \times \frac{dr}{dt}$

$= 8 \times 0.05$ ✓ K1

$= 0.4$ ✓ N1

#

ii) $\delta r = 1.98 - 2$

$= -0.02$

$\frac{\delta V}{\delta r} = \frac{dV}{dr}$

$\frac{\delta V}{-0.02} = 8$ ✓ K1

$\delta V = -0.16$ ✓ N1

$V = 3(2)^2 - \frac{1}{3}(2)^3$

$= \frac{28}{3}$

Peratus perubahan :

$\frac{\delta V}{V} \times 100$

$= \frac{-0.16}{(\frac{28}{3})} \times 100$ ✓ N1

$= -1.714\%$ ✓ N

#

$= \frac{-0.16}{(\frac{28}{3})} \times 100$

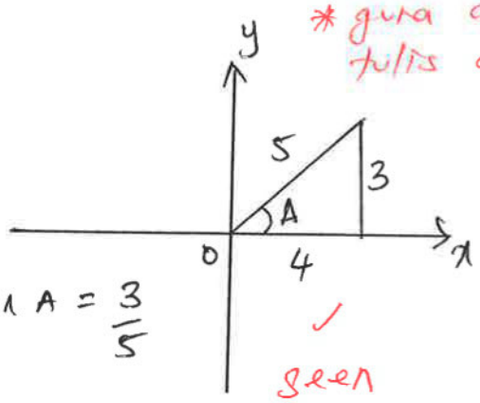
$= -1.714\%$ ✓

#

MATEMATIK TAMBAHAN KERTAS 2 **NO SOALAN : 4**

Jawapan / *Answer*:

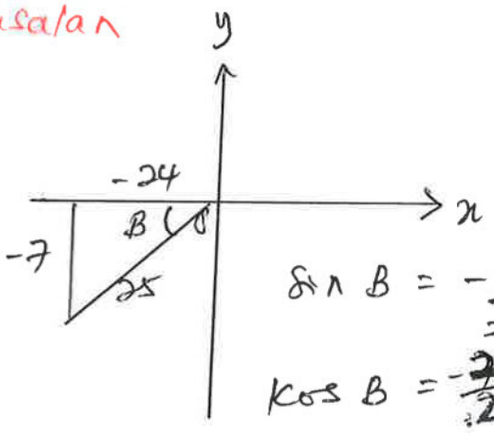
(a) (i) * guna alat tepi lurus dan tulis asalan



$\sin A = \frac{3}{5}$ ✓ seen

$\cos A = \frac{4}{5}$

$\tan A = \frac{3}{4}$



$\sin B = -\frac{7}{25}$

$\cos B = -\frac{24}{25}$

$\tan B = \frac{7}{24}$

(i) $\frac{1}{\cot A} = \tan A$

$= \frac{3}{4}$ ✓ N1

ii) $\cos(B - A)$

$= \cos B \cos A + \sin A \sin B$

$= \left(-\frac{24}{25}\right)\left(\frac{4}{5}\right) + \left(\frac{3}{5}\right)\left(-\frac{7}{25}\right)$ ✓ K1

$= -\frac{117}{125}$ ✓ N1

(b) $2\cos^2 x - 3\cos x - 2 = 0$

$(\cos x - 2)(2\cos x + 1) = 0$ ✓ K1

$\cos x = 2$, $\cos x = -\frac{1}{2}$ ✓ N1 (Sudut Rujukan)

abaikan

$x = 60, 120, 240$ ✓ N1

/6

MATEMATIK TAMBAHAN KERTAS 2. **NO SOALAN : 5**

Jawapan / *Answer*:

a) i) $\overrightarrow{SB} = \overrightarrow{SP} + \overrightarrow{PB}$ ✓ either P1

$\overrightarrow{SB} = \underset{\sim}{v} + 6\underset{\sim}{u}$ ✓ N1 @ (Hukum Segitiga)

ii) $\overrightarrow{AQ} = \overrightarrow{AR} + \overrightarrow{RQ}$ ✓

$\overrightarrow{AQ} = 2\underset{\sim}{u} + \underset{\sim}{v}$ ✓ N1

$\overrightarrow{SB} = 2\overrightarrow{BC}$

$\overrightarrow{BC} = \frac{1}{2}(\underset{\sim}{v} + 6\underset{\sim}{u})$

$\overrightarrow{BC} = \frac{1}{2}\underset{\sim}{v} + 3\underset{\sim}{u}$

$\overrightarrow{SC} = \overrightarrow{SB} + \overrightarrow{BC}$

$= \underset{\sim}{v} + 6\underset{\sim}{u} + \frac{1}{2}\underset{\sim}{v} + 3\underset{\sim}{u}$ ✓ K1

$\overrightarrow{SC} = \frac{3}{2}\underset{\sim}{v} + 9\underset{\sim}{u}$

$\overrightarrow{AQ} = \lambda \overrightarrow{AC}$

$2\underset{\sim}{u} + \underset{\sim}{v} = \lambda(\overrightarrow{AS} + \overrightarrow{SC})$

$2\underset{\sim}{u} + \underset{\sim}{v} = \lambda(-6\underset{\sim}{u} + \frac{3}{2}\underset{\sim}{v} + 9\underset{\sim}{u})$

$2\underset{\sim}{u} + \underset{\sim}{v} = 3\lambda\underset{\sim}{u} + \frac{3}{2}\lambda\underset{\sim}{v}$

$1 = \frac{3}{2}\lambda$ $\quad 2 = 3\lambda$ ✓ K1

$\frac{2}{3} = \lambda$ $\quad \frac{2}{3} = \lambda$

$\overrightarrow{AQ} = \frac{2}{3}\overrightarrow{AC}$ ✓ N1

A, Q, C adalah segaris.

$\frac{\overrightarrow{AR}}{\overrightarrow{SR}} = \frac{1}{3}$

$\frac{\overrightarrow{AR}}{6\underset{\sim}{u}} = \frac{1}{3}$

$\overrightarrow{AR} = \frac{1}{3}(6\underset{\sim}{u})$

$\overrightarrow{AR} = 2\underset{\sim}{u}$

b) $|\overrightarrow{AQ}| = 2\underset{\sim}{u} + \underset{\sim}{v}$

$= 2(3\underset{\sim}{i}) + (2\underset{\sim}{i} + 5\underset{\sim}{j})$ ✓ K1

$= 6\underset{\sim}{i} + 2\underset{\sim}{i} + 5\underset{\sim}{j}$

$= 8\underset{\sim}{i} + 5\underset{\sim}{j}$

$|\overrightarrow{AQ}| = \sqrt{8^2 + 5^2}$

$= \sqrt{89}$ ✓ N1

/8

MATEMATIK TAMBAHAN KERTAS 2 **NO SOALAN : 6**

a) Jawapan / *Answer*:

$SOR = \alpha + \beta = -\left(\frac{-5}{2}\right) = \frac{5}{2}$ @ K1 $POR = \alpha\beta = \frac{6}{2} = 3$

NEW ROOT (S) SOR'

$$\left(\beta + \frac{1}{\alpha}\right) + \left(\alpha + \frac{1}{\beta}\right) = \beta + \alpha + \frac{1}{\alpha} + \frac{1}{\beta}$$

$$= (\beta + \alpha) + \frac{(\beta + \alpha)}{(\alpha\beta)}$$

$$= \frac{5}{2} + \frac{\frac{5}{2}}{3}$$

$$= \frac{5}{2} + \frac{5}{6} = \frac{10}{3}$$

@ K1

POR'

$$\left(\beta + \frac{1}{\alpha}\right)\left(\alpha + \frac{1}{\beta}\right) = \alpha\beta + 1 + 1 + \frac{1}{\alpha\beta}$$

$$= 3 + 2 + \frac{1}{3}$$

$$= \frac{16}{3}$$

NEW EQ,

$$x^2 - SOR(x) + POR = 0$$

$$x^2 - \frac{10}{3}x + \frac{16}{3} = 0 \quad / \text{N1}$$

atau $3x^2 - 10x + 16 = 0$

/3

MATEMATIK TAMBAHAN KERTAS 2 **NO SOALAN : 6**

Jawapan / *Answer*:

(b)

$b^2 - 4ac < 0$

$k - x = -2x^2 + 8x - 3$ ✓ K1

$-2x^2 + 8x - 3 - k + x = 0$

$-2x^2 + 8x + x - 3 - k = 0$

$-2x^2 + 9x - 3 - k = 0$

$a = -2$

$b = 9$

$c = -3 - k$

$b^2 - 4ac < 0$

$(9)^2 - 4(-2)(-3-k) < 0$ ✓ K1

$81 - 4(6 + 2k) < 0$

$81 - 24 - 8k < 0$

$-8k < -57$

$k > \frac{57}{8}$ * ✓ N1

/3

Jawapan / *Answer*:

$2x - y + 3z = 1$ — (1)

$3x + 2y - z = 9$ — (2)

$x + 3y - 2z = 4$ — (3)

dari (3)

$x + 3y - 2z = 4$

$x = 4 - 3y + 2z$ — (4)

Masukkan (4) dlm (1)

$2(4 - 3y + 2z) - y + 3z = 1$

$8 - 6y + 4z - y + 3z = 1$

$7z - 7y = -7$

$z - y = -1$ — (5)

Masukkan (4) dlm (2) K1

$3(4 - 3y + 2z) + 2y - z = 9$

$12 - 9y + 6z + 2y - z = 9$

$5z - 7y = -3$ — (6)

Dari (5)

$z = y - 1$ — (7)

Masukkan 7 dlm (6)

$5(y - 1) - 7y = -3$ ✓K1

$5y - 5 - 7y = -3$

$-2y = 2$

$y = -1$ ✓N1

Dari (7)

$z = y - 1$

$= -1 - 1$

$z = -2$ ✓M1

Dari (4)

$x = 4 - 3y + 2z$

$x = 4 - 3(-1) + 2(-2)$

$x = 4 + 3 - 4$

$x = 3$ ✓N1

/5

MATEMATIK TAMBAHAN KERTAS 2. **NO SOALAN : 7(b)**

Jawapan / *Answer*:

$T_3 = 60$

$\frac{3}{2}[2a + (3-1)d] = 60$

$3a + 3d = 60$ — ①

$T_n = 148$

$a + (18-1)d = 148$

$a + 17d = 148$ — ② × 3

@ K1 — Salah satu persamaan betul

Selesaikan pers. Serentak

$3a + 51d = 444$ — ③

③ − ① : $48d = 384$ — K1

$d = 8$ ✓

$3a + 3(8) = 60$ @ N1

$a = 12$

$S_{18} = \frac{18}{2}[2(12) + (18-1)8]$ ✓ K1 * (guna a, d)

$= 1440$ ✓ N1

/5

Jawapan / *Answer*:

(a) $\frac{dx}{dy} = \frac{2}{3}y$

$\int dx = \int \frac{2}{3} y \, dy$

$= \frac{2}{3}\int y \, dy$

$x = \frac{2}{3}\left(\frac{y^2}{2}\right) + c$

atau

$x = \int \frac{2}{3} y \, dy$

$x = \frac{\frac{2y^2}{3}}{2} + C$ — K1

$x = \frac{1}{3}y^2 + c$ ... from point $(1, 0)$ $x = 1$, $y = 0$

$(1) = \frac{1}{3}(0)^2 + c$

$\therefore c = 1$

$x = \frac{1}{3}y^2 + 1$ — N1

(b) Luas permukaan.

Had pada paksi $-y$ = $\int_{-3}^{3}$

Luas $\square$ = $(4-1) \times (3-(-3))$

$= 3 \times 6$ — K1

$= 18$

Luas dibawah lengkung (terhadap $-y$)

$L = \int_{-3}^{3} \left[\frac{1}{3}y^2 + 1\right] dy$

$= \left[\frac{1}{3}\left[\frac{y^3}{3}\right] + y\right]_{-3}^{3}$

$= \left[\frac{y^3}{9} + y\right]_{-3}^{3}$

MATEMATIK TAMBAHAN KERTAS 2 **NO SOALAN : 8**

Jawapan / *Answer*:

$$= \left[\frac{(3)^3}{9} + 3\right] - \left[\frac{(-3)^3}{9} + (-3)\right] \quad \text{— K1}$$

[kamir dan masukkan nilai]

$$= 6 - (-6)$$

$$= 12.$$

$\therefore$ Luas kawasan berlorek,

$$= 18 - 12 \quad \text{— K1}$$

$$= 6 \text{ unit}^2. \quad \text{— N1}$$

Jawapan / *Answer*:

c) $V_{glass} = V_{silinder} - V_{kanta}$.

$V_{silinder} = \pi r^2 h$

$= \pi (4)^2 (6)$ — K1

$= 96\pi$

$V_{kanta} = \pi \int_{-3}^{3} \left[\left(\frac{1}{3}\right) y^2 + 1 \right]^2 dy$

$= \pi \int_{-3}^{3} \left[\left(\frac{1}{3} y^2 + 1\right)\left(\frac{1}{3} y^2 + 1\right) \right] dy$

$= \pi \int_{-3}^{3} \left[\frac{y^4}{9} + \frac{2}{3} y^2 + 1 \right] dy$

$= \pi \left[\frac{y^5}{45} + \frac{2y^3}{9} + y \right]_{-3}^{3}$

$= \pi \left[\left(\frac{(3)^5}{45} + \frac{2(3)^3}{9} + 3 \right) - \left(\frac{(-3)^5}{45} + \frac{2(-3)^3}{9} + (-3) \right) \right]$ K1 [kamir dan masukkan nilai]

$= \frac{144}{5}\pi$

$V_{glass} = 96\pi - \frac{144}{5}\pi = 67.2 - \frac{144}{5}\pi = 67.$ K1

MATEMATIK TAMBAHAN KERTAS 2. **NO SOALAN : 9**

Jawapan / *Answer*:

a)

$x\sqrt{x}$	0.03	0.16	0.35	0.59	0.85
$y\sqrt{x}$	-1.75	-0.68	0.83	2.69	4.83

* graf → seperti lampiran P1

b) i. $\sqrt{x}\left(y = ax + \frac{b}{\sqrt{x}}\right)$

$y\sqrt{x} = ax\sqrt{x} + b$ P1

$a = \frac{4.83 - 0.83}{0.85 - 0.35}$ K1 [semak titik pada garis]

$a = 8$ N1 (kiraan jawapan murid)

ii. -2 (rujuk graf) N1 $[-1.9 \leq c \leq -2.1]$

iii. $y\sqrt{x} = 2$

$x\sqrt{x} = 0.495$; $x^{\frac{3}{2}} = 0.495$ K1

Alternatif 1

$x = 0.495^{\frac{2}{3}}$

$= 0.6258$ N1

Terima

$u\sqrt{u} = 0.5$

$u^{\frac{3}{2}} = 0.5$

$u = 0.5^{\frac{2}{3}} = 0.6300$

Alternatif 2

$\frac{3}{2}\log_{10} x = \log_{10} 0.495$

$\log_{10} x = \frac{2}{3}\log 0.495$

$x = 0.6258$ N1

atau atau

/10

$y\sqrt{x}$

9

Name : .....

Date : .....

K1 • 1 plot titik betul dan skala seragam

N1 • 5 plot di titik betul

N1 • Best fit line

(0.85, 4.83)

K1

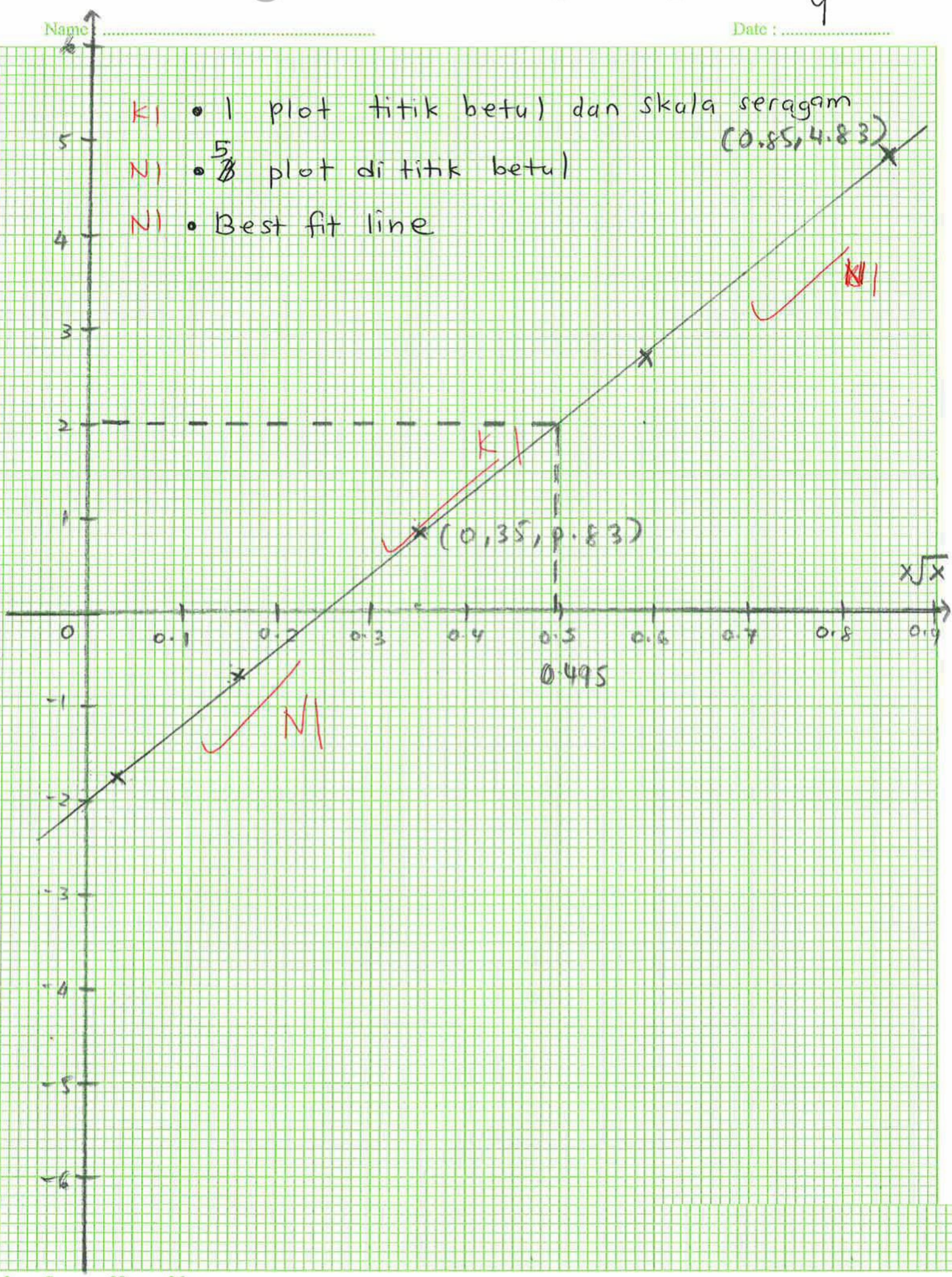
N1

(0.35, 1.83)

0.495

M1

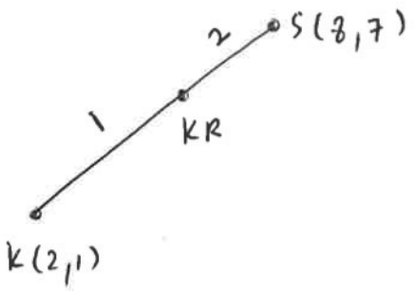
$x\sqrt{x}$



MATEMATIK TAMBAHAN KERTAS 2. **NO SOALAN : 10**

Jawapan / *Answer*:

a)



Kedai Runcit $= \left(\frac{1(8)+2(2)}{1+2}, \frac{1(7)+2(1)}{1+2}\right)$ ✓K1

$= (4, 3)$ ✓N1

b) $m_1 = \frac{5-3}{-2-4}$ $(-2,5)$ $(4,3)$

$= -\frac{1}{3}$

* $-\frac{1}{3} \times m_2 = -1$ ✓K1 (tecerunaan rumus)

$m_2 = 3$

$(8,7)$

$y - 7 = 3(x - 8)$ ✓K1

$y = 3x - 24 + 7$

$y = 3x - 17$ ✓N1

MATEMATIK TAMBAHAN KERTAS 2. **NO SOALAN : 10**

Jawapan / *Answer*:

c) $L(x,y)$ $K(-2,5)$ $S(8,7)$

$LS : LK = 3 : 2$

$\frac{LS}{LK} = \frac{3}{2}$

$2LS = 3LK$

$\left(2\sqrt{(x-8)^2+(y-7)^2} \checkmark K1 = 3\sqrt{(x-(-2))^2+(y-5)^2} \right)^2$ ✓ K1

Nota:
K1 - guna dalam rumus jarak
K1 - guna nisbah dan samakan persamaan

$4\left[x^2-16x+64+y^2-14y+49\right] = 9\left[x^2+4x+4+y^2-10y+25\right]$

$4x^2-64x+256+4y^2m-56y+196 = 9x^2+36x+36+9y^2-90y+225$

$5x^2+5y^2+100x-34y-191 = 0$

d) Gantikan $(2,1)$

$5(2)^2+5(1)^2+100(2)-34(1)-191 = 0$ ✓ K1

$0 = 0$

$0=0$, maka klinik termasuk dalam liputan 'drone' Azim. ✓ N1

/10

Jawapan / *Answer*:

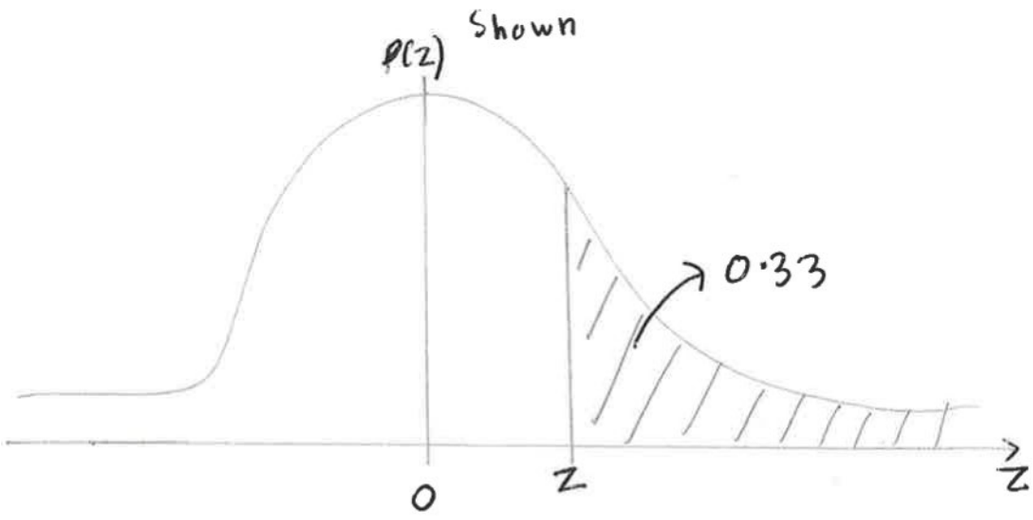
$P(x > 300) = 0.33$

$P\left(z > \frac{300 - \mu}{120}\right) = 0.33$

$z = 0.44$ — N1

$\frac{300 - \mu}{120} = 0.44$ — K1

$\mu = 247.2$ — N1

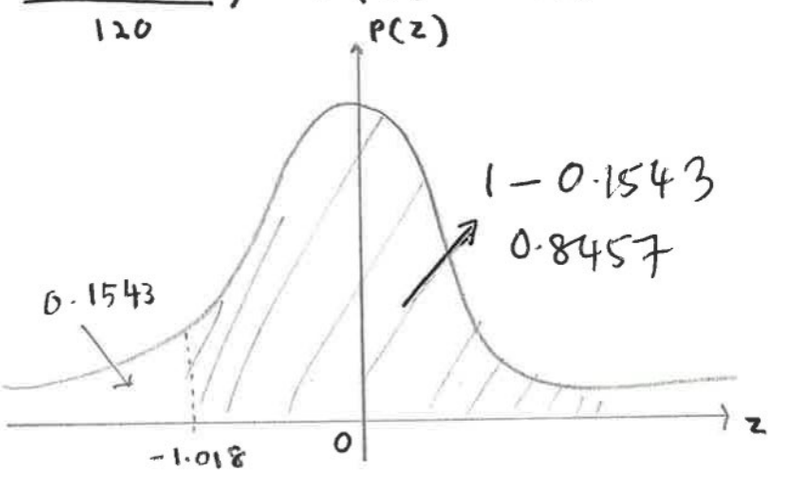


MATEMATIK TAMBAHAN KERTAS 2. **NO SOALAN : 11(b)**

Jawapan / *Answer*:

$P(X > 125)$

$P\left(Z > \frac{125 - 247.2}{120}\right) = P(Z > -1.018)$ ✓ K1



$P(Z > -1.018) = 1 - P(Z \leq -1.018)$ ✓ or seen at graph

$= 0.8457$ ✓ N1

MATEMATIK TAMBAHAN KERTAS 2. **NO SOALAN : 11 (c).**

Jawapan / *Answer*:

C(i) $P(X=6) = {}^{10}C_6 (0.33)^6 (0.67)^{10-6}$ — K1

$= 0.0547$ — N1

(ii) $P(X \leq 2) = P(X=0) + P(X=1) + P(X=2)$

$= {}^{10}C_0 (0.33)^0 (0.67)^{10} + {}^{10}C_1 (0.33)^1 (0.67)^9 +$

${}^{10}C_2 (0.33)^2 (0.67)^8$ — K1K1

$= 0.0182 + 0.0898 + 0.1990$

$= 0.3070$ — N1

masukkan nilai dlm rumus salah sah betul

Semua betul (kehga-tiga)

/10

MATEMATIK TAMBAHAN KERTAS 2. **NO SOALAN : 12.**

Jawapan / *Answer*:

a) i) $v = -t^2 + ht - 4 \quad , t = 0$

$v = -(0)^2 + h(0) - 4$

$v = -4$ ✓ N1

ii) $0 = -(1)^2 + h(1) - 4$ *

$0 = -1 + h - 4$

$h = 5$ ✓ N1

@ K1

$0 = -(k)^2 + h(k) - 4$ *

$0 = -k^2 + hk - 4$

$k^2 - hk + 4 = 0$

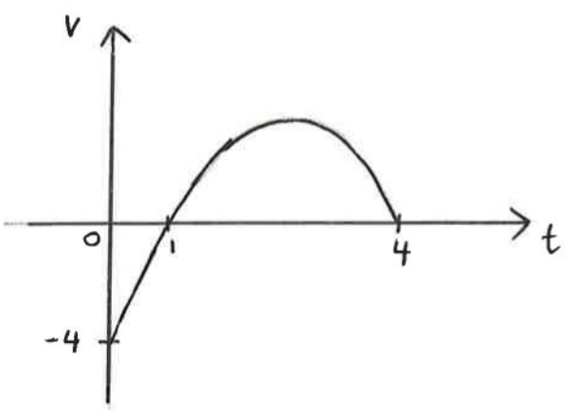
$k^2 - 5k + 4 = 0$

$(k-4)(k-1) = 0$

$k = 4 \quad , \quad k = 1$

$k = 4$ ✓ N1

b) $v = -t^2 + 5t - 4$



Graf : i) Guna alat tepi lurus, paksi - x & y & asalan & bentuk graf ∩ (N1)

ii) pintasan - x & y (N1)

c) $\int_1^4 -t^2 + 5t - 4 \, dt$

$= \left[-\frac{t^3}{3} + \frac{5t^2}{2} - 4t \right]_1^4$ ✓ K1

$= \left[-\frac{(4)^3}{3} + \frac{5(4)^2}{2} - 4(4) \right] - \left[-\frac{(1)^3}{3} + \frac{5(1)^2}{2} - 4(1) \right]$ ✓ K1 ✓ K1

$= \frac{9}{2}$ ✓ N1

/10

MATEMATIK TAMBAHAN KERTAS 2. **NO SOALAN : 13**

Jawapan / *Answer*:

a) $x + y \leq 80$ ✓ N1

$y \leq 3x$ ✓ N1

$100x + 120y \geq 5000$

$5x + 6y \geq 250$] @ N1

b) Satu garis betul ✓ K1

Semua garis betul ✓ N1

Rantau ✓ N1

Jika No pada graf, semua jawapan selepas juga salah No

c) nilai maksimum : (20, 60)

Pakej Elit = 60 ✓ N1

d) $k = 20x + 30y$ (11, 33) titik min ✓ N1

kateran $k \leq 600$

$20x + 30y = 600$

x	0	30
y	20	0

$k = 20(11) + 30(33)$ ✓K1

$k = 1210$ ✓N1

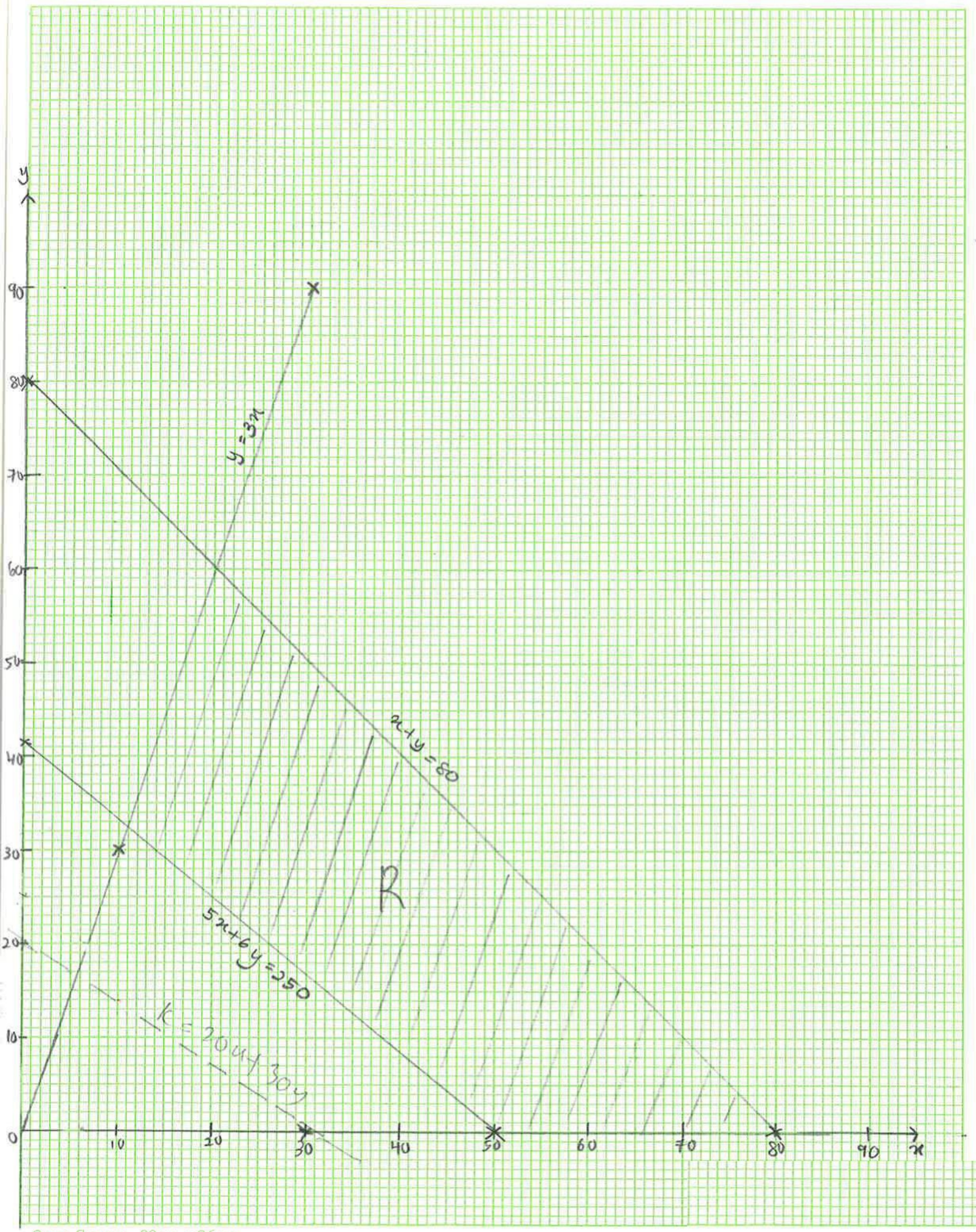
[seen fungsi guna objektif]

/10

B

Name : .....

Date : .....



2mm Square - 20cm x 26cm

MATEMATIK TAMBAHAN KERTAS 2. **NO SOALAN : 14**

Jawapan / *Answer*:

Panjang SU

a) $\frac{SU}{\sin 105} = \frac{12.5}{\sin 31}$ / K1

$SU = 23.4431$ / N1

Panjang TU

b) $TU^2 = (5.4)^2 + 23.4431^2 - 2(5.4)(23.4431)\cos 44$ / K1

$TU^2 = 396.6125$

$TU = 19.9151$ / N1 (4 9.5) terima

c) Sudut STU

$23.4431^2 = SU^2 + 19.9151^2 - 2(5.4)(19.9151)\cos STU$ / K1

$\angle STU = 125.14^\circ$ / N1

atau

$\frac{\sin STU}{23.4431} = \frac{\sin 44}{19.9151}$ / K1

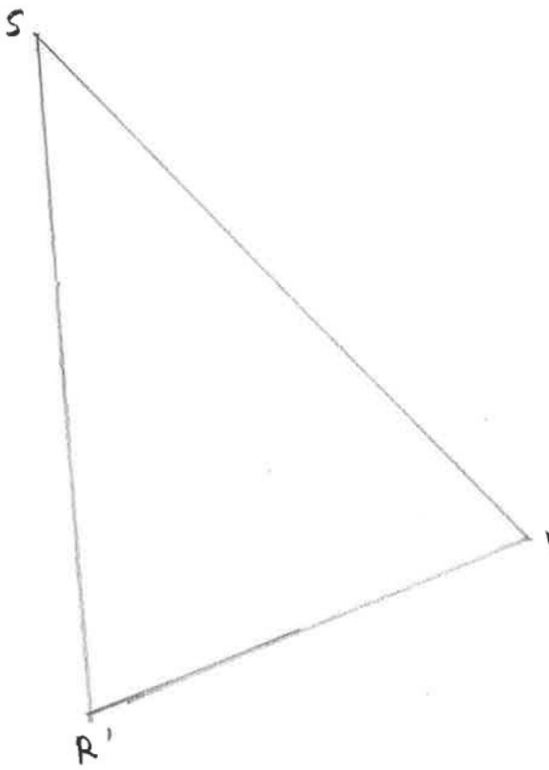
$\angle STU = 54.86$

$\angle SUT = 180 - 54.86$

$= 125.14^\circ$ / N1

MATEMATIK TAMBAHAN KERTAS 2. **NO SOALAN : 14 (d)**

Jawapan / *Answer*:



N1

$\angle SUR' = 74^\circ$ P1

$\therefore$

Area $= \frac{1}{2}(23.4431)(12.5)\sin 74^\circ$ K1

$= 140.84$ N1

/10

MATEMATIK TAMBAHAN KERTAS 2. **NO SOALAN : 15**

Jawapan / *Answer*:

(a). $130 = \frac{x}{75} \times 100$ ✓K1 @ $135 = \frac{81}{y} \times 100$

$x = \frac{130(75)}{100}$ $y = \frac{81}{135} \times 100$

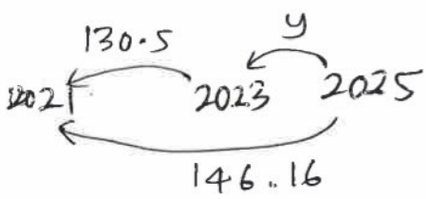
$= 97.5$ ✓N1 $= 60$ ✓N1

(b). $I_{23/21} = \frac{120(144) + 130(108) + 150(72) + 135(36)}{144 + 108 + 72 + 36}$ ✓K1

$= \frac{46980}{360}$

$= 130.5$ ✓N1

(c).



$146.16 = \frac{130.5\,y}{100}$ ✓K1

$y = \frac{146.16(100)}{130.5}$

$I_1 = 112$

$p = 112 - 100$

$= 12$ ✓N1

[Terima kasih sebab sefera]

(d). $112 = \frac{Q_1}{600} \times 100$

$Q_1 = \frac{112(600)}{100}$ ✓K1

$= 672$

@ $\frac{27}{100} \times 672 = RM\ 181.44$

$672 + 181.44$ ✓K1

$= RM\ 853.44$ ✓N1

$\frac{127}{100} \times 672$ ✓K1 $= RM\ 853.44$ ✓N1

/10