

KEMENTERIAN PENDIDIKAN  
Jabatan Pendidikan Negeri Terengganu

# MPP 3

## SPM 2022

### PERATURAN PEMARKAHAN

MATEMATIK TAMBAHAN

**SKEMA PEMARKAHAN MATEMATIK TAMBAHAN KERTAS 1**  
**MPP3 TINGKATAN 5 2022**

No	Skema Pemarkahan	$\Sigma$ Markah
1	(a) { Suhana, Danial, Rohani, Hamimah} <b>N1</b> (b) Fungsi kerana setiap objek mempunyai hanya satu imej <b>N1N1</b>	3
2	(a) $p = 0.8, q = 0.2$ dan $P(X = n) = 0.1342$ $\left[ {}^n C_n (0.8)^n (0.2)^0 = 0.1342 \right]$ $n \log_{10}(0.8) = \log_{10} 0.1342$ $n = 9$ <b>K1</b> <b>K1</b> <b>N1</b>	6
	(b) $P(X < 3) = P(X = 0) + P(X = 1) + P(X = 2)$ <b>P1</b> ${}^0 C_0 (0.8)^0 (0.2)^0 + {}^1 C_1 (0.8)^1 (0.2)^1 + {}^2 C_2 (0.8)^2 (0.2)^1$ <b>K1</b> $0.0003139$ <b>N1</b>	
3	(a) $\lim_{\delta x \rightarrow 0} \frac{\delta y}{\delta x} = \frac{(x + \delta x)^2 - x^2}{\delta x}$ atau $\lim_{\delta x \rightarrow 0} \frac{(x + \delta x)^2 - x^2}{\delta x}$ <b>K1</b> $\frac{dy}{dx} = 2x$ <b>N1</b> (b) Selesaikan persamaan $2a(4) - \frac{b}{(4)^2} = 7$ dan $a(4)^2 + \frac{b}{4} = 5$ <b>K1</b> $a = \frac{11}{16}$ <b>N1</b> $b = -24$ <b>N1</b>	5

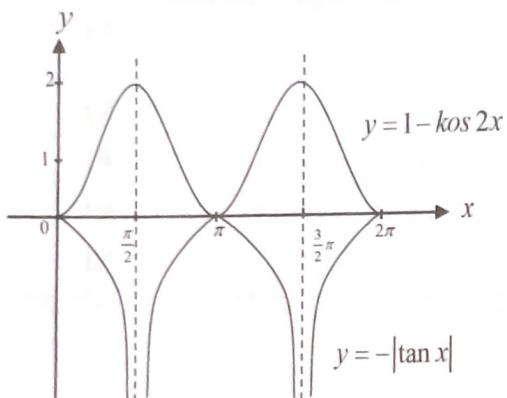
<b>4</b> (a) (i) $x = \frac{3}{2}$ (ii) $f(x) = \left(\frac{3}{2} + 3\right)\left(6 - \frac{3}{2}\right)$ atau kaedah lain $f(x) \leq \frac{81}{4}$	<b>N1</b> <b>K1</b> <b>N1</b>	
(b) 	Bentuk <b>P1</b> Modulus <b>P1</b> Semua betul <b>P1</b>	6
<b>5</b> $0.3p + 0.6q + 0.1r = 50$ @ $0.1p + 0.3q + 0.7r = 40$ @ $0.6p + 0.1q + 0.2r = 45$  Hapus anu pertama dengan kaedah penggantian @ penghapusan Hapus anu kedua dengan kaedah penggantian @ penghapusan $r = 27.5$ @ $q = 50$ @ $p = 57.5$ $q = 50$ @ $p = 57.5$ @ $r = 27.5$ $r = 27.5, q = 50, p = 57.5$	<b>P1</b> <b>K1</b> <b>K1</b> <b>N1</b> <b>N1</b> <b>N1</b>	6
<b>6</b> $y = \frac{x}{py} - \frac{q}{p^2}$ $\frac{1}{p} = 2$ atau $-\frac{q}{p^2} = -5$ $p = \frac{1}{2}, q = \frac{5}{4}$	<b>P1</b> <b>K1</b> <b>N1N1</b>	4

			<b>N1</b>	
7	(a) 1  (b) $\log_m a = 2 \log_m \left(\frac{b}{2}\right)$  $a = \frac{b^2}{4}$  $b = 2\sqrt{a}$		<b>K1</b>	4
8	(a) $\overrightarrow{TQ} = \overrightarrow{TP} + \overrightarrow{PQ}$ dan $6\vec{a} + 3\vec{b}$  $ \overrightarrow{TQ}  = \sqrt{12^2 + 3^2}$ dan $\sqrt{153}$  (b) $\overrightarrow{TR} = 6\vec{a} + 4\vec{b}$ dan $\overrightarrow{SQ} = -3\vec{a} + 6\vec{b}$  $\frac{9}{2}\vec{a} + 3\vec{b} = \lambda(6\vec{a} + 4\vec{b})$  $\overrightarrow{TU} = \frac{3}{4}\overrightarrow{TR}$ dan segaris		<b>K1</b>  <b>N1</b>  <b>K1</b>  <b>N1</b>	5
9	(a) (i) - 10  (ii) $\frac{1}{2}(-10)$ - 5  (b) $g(x) = \frac{3x^3}{3} - \frac{24x^2}{2} + 17x + c \text{ dan } 96 = \frac{3(1)^3}{3} - \frac{24(1)^2}{2} + 17(1) + c$ $g(x) = x^3 - 12x^2 + 17x + 90$		<b>N1</b>  <b>K1</b>  <b>N1</b>  <b>K1</b>  <b>N1</b>	5

10	(a) $BAKU = 4! = 24$	K1	7
	$BAKA = \frac{4!}{2!} = 12$	K1	
	Tidak sama kerana perkataan BAKA mempunyai objek secaman atau setara	N1	
	(b) (i) ${}^7P_5 = 2520$	N1	
	(ii) ${}^2P_1$ atau ${}^5P_1$ atau ${}^5P_3$	P1	
	${}^2P_1 \times {}^5P_1 \times {}^5P_3$	K1	
	600	N1	
11	$\tan \alpha = \frac{5}{6.5}$ atau $10^2 = (8.2006)^2 + (8.2006)^2 - 2(8.2006)(8.2006)\cos\theta$	K1	7
	$75.14^\circ @ 1.312^*$		
	$L_{sektor} = \frac{1}{2}(8.2006)^2(1.312^*)$ atau $L_{segitiga} = \frac{1}{2}(8.2006)^2 \sin 75.14^\circ$	K1	
	$\frac{1}{2}(8.2006)^2(1.312^*) - \frac{1}{2}(8.2006)^2 \sin 75.14^\circ$	K1	
	130 + 2(11.62)	K1	
	153.24	N1	
	Kos pembinaan = 13025.40	N1	
	Tidak, kerana kos pembinaan melebihi peruntukan.	N1	

- 12 (a) bentuk graf kos  
amplitud  
2 kala untuk  $0 \leq x \leq 2\pi$

P1  
P1  
P1



6

- (b) bentuk graf tan  
modulus  
3 penyelesaian

P1  
P1  
N1

13	<p>(a) (i) <math>T_1 = 2\pi r</math>,</p> $T_2 = 2\pi(r+1)$ , $T_3 = 2\pi(r+2), \dots$	<b>P1</b>	
	$2\pi r, 2\pi r + 2\pi, 2\pi r + 4\pi, \dots$ $T_2 - T_1 = 2\pi \text{ and } T_3 - T_2 = 2\pi$ Maka , lilitan bulatan ini membentuk suatu Janjang Aritmetik.	<b>K1</b>	
		<b>N1</b>	
	(ii) $\frac{10}{2} [2(2\pi r) + (10-1)(2\pi)] = m\pi$ $m = 20r + 90$	<b>K1</b>	8
	(b) $r = \frac{1}{2}$ $32 \left(\frac{1}{2}\right)^{n-1} = \frac{1}{2^8}$ $n = 14$	<b>P1</b>	
		<b>K1</b>	
		<b>N1</b>	

14	<p>(a) <math>5a - 1 = 2</math>    or    <math>\frac{3}{2(2)+b} = 1</math></p> $a = \frac{2}{5}, b = -1$	<b>K1</b>	<b>N1N1</b>
	<p>(b) (i) Let <math>y = \frac{3}{2x-1}</math></p> $g^{-1}(y) = \frac{y+3}{2y}, y \neq 0$	<b>N1</b>	
	<p>(ii) <math>g^{-1}\left(\frac{2}{5}x-1\right)</math></p> $\frac{\frac{2}{5}x-1+3}{2\left(\frac{2}{5}x-1\right)}$ $\frac{x+5}{2x-5}, x \neq \frac{5}{2}$	<b>K1</b>	<b>N1</b>
	<p>(iii) <math>\frac{x+5}{2x-5} = -1</math></p> $0$	<b>K1</b>	<b>N1</b>

15	(a) $(-1, 1)$ dan $m = -2$ $y - 1 = -2(x - (-1))$ atau $1 = -2(-1) + c$ $y = -2x - 1$	<b>P1</b> <b>K1</b> <b>N1</b>	
	(b) $Q(0, -1)$ $(-1, 1) = \left(\frac{0+x}{2}, \frac{-1+y}{2}\right)$ $-1 = \frac{0+x}{2}$ atau $1 = \frac{-1+y}{2}$ $S(-2, 3)$	<b>K1</b> <b>K1</b> <b>N1</b>	8
	(c) $A = \frac{1}{2}  ((3 \times 3) + (-2 \times -1) + (-5 \times -1) + (0 \times 3)) - ((-2 \times 3) + (-5 \times 3) + (0 \times -1) + (3 \times -1)) $ 20 unit <sup>2</sup>	<b>K1</b> <b>N1</b>	

**PEPERIKSAAN PERCUBAAN SPM TAHUN 2022**

Bil	Peraturan Pemarkahan	Jumlah
1	<p>(a) (i) <math>y = 60 - x</math> dan <math>A = x(60 - x)</math></p> $A = 60x - x^2$ <p>(ii) <math>60 - 2x = 0</math></p> $A = 60(30) - (30)^2$ $A = 900$ <p>(b) <math>\frac{dy}{dt} = (1 + 6(4)) \times \left(\frac{1}{5}\right)</math></p> $5$	<b>K1</b> <b>N1</b> <b>K1</b> <b>K1</b> <b>N1</b> <b>K1</b> <b>N1</b>
2	<p>(a) <math>f(x) = (0 - 4)^2 + p = 7</math></p> $p = -9$ $f(x) = (x - 4)^2 - 9$ <p><math>x^2 - 8x + 7 = 0</math> dan cari hasil tambah punca</p> $8 = \frac{-(q+10)}{-3}$ atau setara <p><math>q = 14</math></p> <p>(b) <math>g(x) = -3 \left[ x^2 - 8x + \left(\frac{-8}{2}\right)^2 - \left(\frac{-8}{2}\right)^2 + 7 \right]</math></p> $g(x) = -3(x - 4)^2 + 27$ $(4, 27)$	<b>K1</b> <b>N1</b> <b>K1</b> <b>K1</b> <b>N1</b> <b>K1</b> <b>N1</b>

Bil	Peraturan Pemarkahan	Jumlah
3	<p>(a) <math>9 - 2x = \frac{x-2}{2}</math> or <math>\frac{9-y}{2} = 2y + 2</math></p> <p>(b) <math>-2 \times \frac{1}{2} = -1</math></p> <p>berserenjang.</p> <p>(c) <math>\frac{12}{5} = \frac{0+4m}{m+n}</math> atau <math>\frac{1}{5} = \frac{-n+m}{m+n}</math></p> <p><math>m:n = 3:2</math></p> <p>(d) Pagar <math>(x,y)</math> dan Menara Telekomunikasi <math>(h,k)</math></p> $\sqrt{(x-h)^2 + (y-k)^2} = 1$ $x^2 + y^2 - 2hx - 2ky + h^2 + k^2 - 1 = 0$ $2h = 4 \text{ dan } 2k = 4$ <p>Koordinat Menara Telekomunikasi <math>(2,2)</math></p>	<p>K1</p> <p>N1</p> <p>K1</p> <p>N1</p> <p>K1</p> <p>N1</p> <p>K1</p> <p>K1</p> <p>N1</p>
4	$\angle LOK = \frac{\pi}{2} - \alpha$ $\angle LOJ_{major} = 2\pi - 2(\frac{\pi}{2} - \alpha)$ $14(\pi + 2\alpha) + 14 + 14$ $14\pi + 28\alpha + 28$	<p>P1</p> <p>K1</p> <p>K1</p> <p>N1</p>

Bil	Peraturan Pemarkahan	Jumlah
5	(a) $a + ar + ar^2 = 8(ar^3 + ar^4 + ar^5)$ $1 + r + r^2 = 8r^3(1 + r + r^2)$ dan selesaikan	K1 K1
	$r = \frac{1}{2}$	N1
	(b) (i) $a + ar + ar^2 - (ar^3 + ar^4 + ar^5) = 98$ $a + a\left(\frac{1}{2}\right) + a\left(\frac{1}{2}\right)^2 - \left(a\left(\frac{1}{2}\right)^3 + a\left(\frac{1}{2}\right)^4 + a\left(\frac{1}{2}\right)^5\right) = 98$	K1
	$a = 64$	N1
	(ii) $S_\infty = \frac{64}{1 - \frac{1}{2}}$ $= 128$	K1 N1

Bil	Peraturan Pemarkahan	Jumlah
6	(a) $(\sin x)\left(\frac{\sqrt{3}}{2}\right) + (\cos x)\left(\frac{1}{2}\right) = 2 \cos x$  $\tan x = 1.732$  $x = 60^\circ, 240^\circ$	K1  K1  N1
	(b) (i) $\frac{1}{1 - 2\left(\frac{15}{17}\right)^2}$  $= \frac{289}{161}$	K1  N1
	(ii) $\pm \sqrt{1 - \left(-\frac{7}{25}\right)}$  $= \frac{4}{5}$	K1  N1

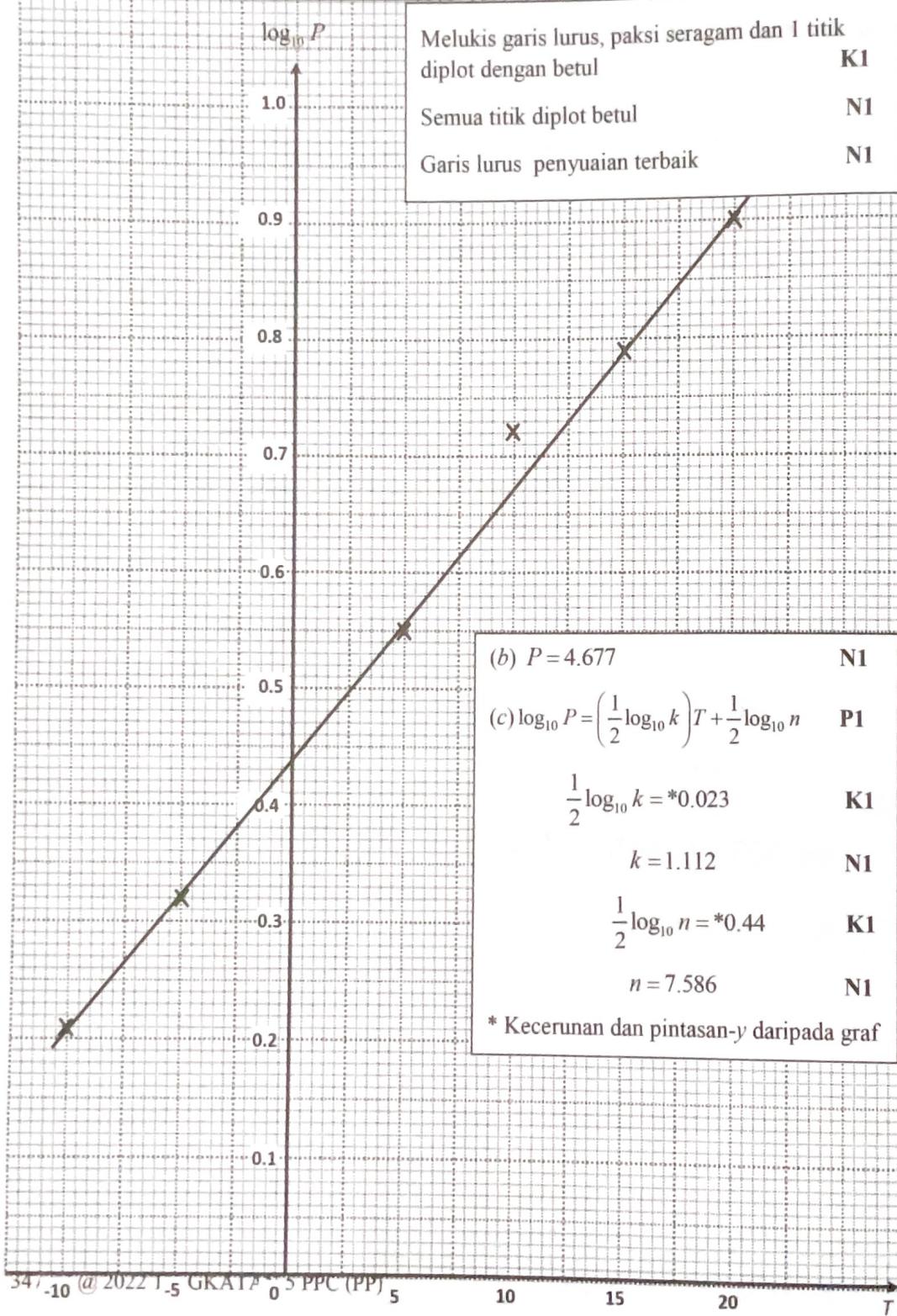
Bil	Peraturan Pemarkahan	Jumlah
7	<p>(a) <math>\frac{3}{\sqrt{3}-3} \times \frac{\sqrt{3}+3}{\sqrt{3}+3}</math> dan kembangkan <b>K1</b></p> $-\frac{\sqrt{3}+3}{2} \quad \textbf{N1}$ <p>(b) (i) <math>\frac{\log_a hk}{\log_a a^2}</math> <b>K1</b></p> $\frac{\log_a h + \log_a k}{2} \quad \textbf{K1}$ $\frac{1}{2} \log_a h + \frac{1}{2} \log_a k \quad \textbf{N1}$ <p>(ii) <math>\log_{a^2} 5q = 1</math> <b>K1</b></p> $5q = a^2 \quad \textbf{K1}$ $a = \sqrt{5q} \quad \textbf{N1}$	<b>8</b>

Bil	Peraturan Pemerkahan	Jumlah
8	(a) (i) $k(4) - 12 = 0$ $k = 3$	K1 N1
	(ii) $m_i \left( \frac{1}{3} \right) = -1$ atau $3x - 12 = -3$ $(3, -6)$	K1 N1
	(b) $y = \frac{3}{2}x^2 - 12x + c$ $-6 = \frac{3}{2}(3)^2 - 12(3) + c$ $y = \frac{3}{2}x^2 - 12x + \frac{33}{2}$	K1 N1
	(c) $y = \frac{3}{2}x^2 - \frac{15}{2}$ $V = \pi \int_{-7.5}^{-6} \left( \frac{2}{3}y + 5 \right) dy$ $\pi \left[ \frac{2y^2}{2(3)} + 5y \right]_{-7.5}^{-6}$ $\pi \left[ \left( \frac{2(-6)^2}{2(3)} + 5(-6) \right) - \left( \frac{2(-7.5)^2}{2(3)} + 5(-7.5) \right) \right]$ $0.75\pi$	P1 K1 K1 N1
		10

Bil	Peraturan Pemarkahan	Jumlah
9	(a) $\overrightarrow{BC} = \overrightarrow{BO} + \overrightarrow{OC}$ atau $\overrightarrow{OD} = \overrightarrow{OA} + \overrightarrow{AD}$ dan $\overrightarrow{BC} = -9\hat{y} + \frac{3}{4}(20\hat{x})$ atau $\overrightarrow{OD} = 20\hat{x} + \frac{1}{2}(-20\hat{x} + 9\hat{y})$ (i) $15\hat{x} - 9\hat{y}$ (ii) $10\hat{x} + \frac{9}{2}\hat{y}$	K1 N1 N1
	(b) $\overrightarrow{BE} = -9\hat{y} + n\left(10\hat{x} + \frac{9}{2}\hat{y}\right)$ $m(15\hat{x} - 9\hat{y}) = -9\hat{y} + n\left(10\hat{x} + \frac{9}{2}\hat{y}\right)$ $15m = 10n$ , $-9m = \frac{9}{2}n - 9$ dan selesaikan	K1 K1 K1
	$m = \frac{4}{7}, n = \frac{6}{7}$	N1 N1
	(c) $\frac{1}{2}(20 \times 2)h = 140$ $h = 7$	K1 N1

Bil	Peraturan Pemarkahan	Jumlah
10	(a) (i) $P(X=1) = {}^nC_1 \left(\frac{1}{8}\right)^1 \left(\frac{7}{8}\right)^{n-1}$ atau $P(X=0) = {}^nC_0 \left(\frac{1}{8}\right)^0 \left(\frac{7}{8}\right)^n$	K1
	$n\left(\frac{1}{8}\right)\left(\frac{7}{8}\right)^{n-1} = 15\left(\frac{7}{8}\right)^n$ selesaikan	K1
	$n\left(\frac{1}{8}\right) = 15\left(\frac{7}{8}\right)$	
	$n = 105$	N1
	(ii) sisisian piawai = $\sqrt{105\left(\frac{1}{8}\right)\left(\frac{7}{8}\right)}$	K1
	$= 3.389$	N1
	(b) (i) 0.58 dilihat	P1
	$\frac{V - 990}{15} = 0.58$	K1
	$V = 998.7$	N1
	(ii) $P(970 < X < 1015) = P\left(\frac{970 - 990}{15} < Z < \frac{1015 - 990}{15}\right)$	K1
	$= 0.8609 // 0.8610$	N1

$T$	-10	-5	5	10	15	20	N1
$\log_{10} P$	0.21	0.33	0.55	0.72	0.79	0.90	



Bil	Peraturan Pemarkahan	Jumlah
12	(a) $v = 8$ <b>N1</b>	
	(b) $2 - 2t = 0$ <b>K1</b>	
	$t = 1$	
	$v = 8 + 2(1) - (1)^2$ <b>K1</b>	
	$= 9$ <b>N1</b>	
	(c) $8 + 2t - t^2 = 0$ dan selesaikan pers. kuadratik <b>K1</b>	
	$t = 4$ <b>N1</b>	
	(d) $s = \int (8 + 2t - t^2) dt$ <b>K1</b>	10
	$s = 8t + t^2 - \frac{t^3}{3} + c$ <b>K1</b>	
	$s = 8(4) + (4)^2 - \frac{(4)^3}{3}$ atau $s = 8(6) + (6)^2 - \frac{(6)^3}{3}$ <b>K1</b>	
	Jumlah jarak = $\frac{80}{3} + [8(4) + (4)^2 - \frac{(4)^3}{3} - [8(6) + (6)^2 - \frac{(6)^3}{3}]]$ <b>K1</b>	
	$= \frac{124}{3}$ <b>N1</b>	

Bil	Peraturan Pemarkahan	Jumlah
13	(a) $\frac{125}{\sin \angle BAC} = \frac{96}{0.7}$ <b>K1</b>  $\angle BAC = 65.71^\circ$ <b>N1</b>  $\angle ABC = 69.86^\circ$ <b>P1</b>  $\frac{AC}{\sin 69.86^\circ} = \frac{96}{\sin 44.43^\circ}$ atau setara $AC = 128.75$ <b>N1</b>	
	(b) (i) $128.75^2 = 55^2 + 99^2 - 2(55)(99)\cos\angle ADC$ <b>K1</b>  $\angle ADC = 110.15^\circ$ <b>N1</b>	10
	(ii) $\frac{1}{2}(55)(99)\sin 110.15^\circ$ <b>K1</b>  2555.87 <b>N1</b>	
	(c) $\frac{1}{2} \times d \times 128.75 = 2555.87$ <b>K1</b>  39.70 <b>N1</b>	

Bil	Peraturan Pemarkahan	Jumlah
14	(a) $175 = \frac{7}{x} \times 100$ atau $y = \frac{55}{40} \times 100$  $x = 4.00$  $y = 137.50$	K1  N1  N1
	(b) $\frac{175(15) + 125(30) + *137.50(24) + 150(33) + 120(12)}{15 + 30 + 24 + 33 + 12}$  140.92	K1  N1
	(c) $\frac{P_{2022}}{4560} \times 100 = 140.92$ dan $6425.95$  917.99 // 918  Cukup kerana RM 1000 melebihi RM 917.99 //RM 918	K1  N1  N1
	(d) $\frac{140.92 \times 120}{100}$  169.10	K1  N1

