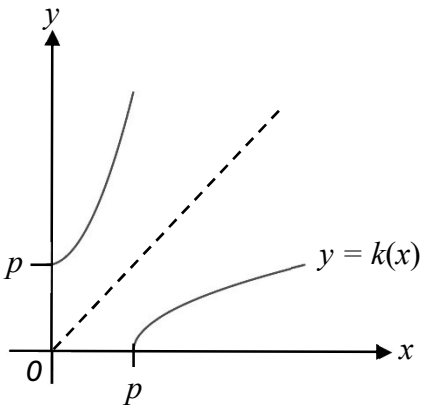
Matematik Tambahan Kertas 2

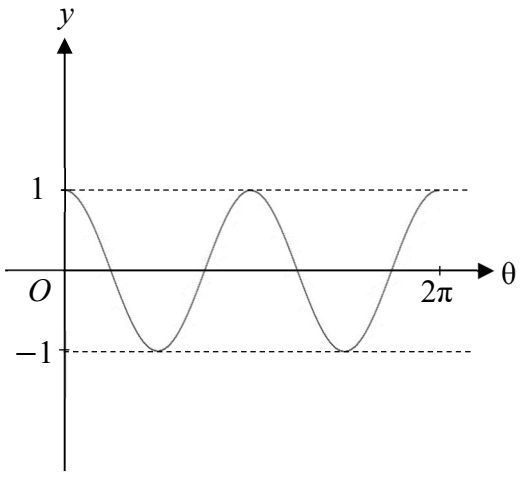
SPMRSM 2024

SKEMA JAWAPAN

No.	Skema Pemarkahan	Sub Markah	Jumlah Markah
1(*a*)	$gf(10) = \frac{2}{10-6}$ @ $g(5) = \frac{2}{5-1}$	1	
	$\frac{1}{2}$	1	
(*b*)(i)	 Lengkung yang betul	1	**7**
	Pintasan-$y = p$	1	
	$x \geq 0$	1	
(*b*)(ii)	$a^2 + b = 8$	1	
	$a = \sqrt{8-b}$	1	

No.	Skema Pemarkahan	Sub Markah	Jumlah Markah
2(*a*)	$\{AB : BC =\}14 : 21$ atau setara	1	
	$\frac{21(8)+14x}{21+14} = 4$ @ $\frac{21(-5)+14y}{21+14} = -1$	1	
	$(-2,5)$	1	
(*b*)	$\frac{-5-(-1)}{8-4} = \frac{-2-0}{h-9}$	1	**7**
	$-1 = \frac{-2}{h-9}$, $h = 11$	1	
	$m_2 = \frac{-5-(-2)}{8-*11} = 1$	1	
	$-1\times *1 = -1$ **DAN** ya	1	
3(*a*)	$\alpha+\beta = -\frac{7}{2}$ **DAN** $\alpha\beta = -\frac{5}{2}$	1	
	$*\left(-\frac{7}{2}\right)+6$ @ $*\left(-\frac{5}{2}\right)+3*\left(-\frac{7}{2}\right)+9$	1	
	$2x^2-5x-8=0$	1	**6**
(*b*)	$9x^2-6x+m+n=0$ atau setara	1	
	$*(-6)-4*(9)*(m+n)=0$	1	
	$m = 1-n$	1	

No.	Skema Pemarkahan	Sub Markah	Jumlah Markah
4(a)	$r = 3$	1	
	$\frac{a(*3^4 - 1)}{*3 - 1}$ **DAN** $\frac{a(*3^2 - 1)}{*3 - 1}$ @ $a + 3a + 9a + 27a$ **DAN** $a + 3a$	1	
	$40a = 10(4a)$ $S_4 = 10S_2$	1	
(b)(i)	$a = 1125$	1	**7**
	$r = \frac{1}{4}$	1	
(ii)	$\frac{*1125}{1 - *\left(\frac{1}{4}\right)}$	1	
	1500	1	
5	$y = -2x - 2$ @ $x = \frac{-2 - y}{2}$	1	
	$-2x - 2 = x^2 + x - 12$@ $y = \left(\frac{-2 - y}{2}\right)^2 + \left(\frac{-2 - y}{2}\right) - 12$	1	
	$(x + 5)(x - 2) = 0$ @ $(y + 6)(y - 8) = 0$	1	**6**
	$x = -5, x = 2$@ $y = -6, y = 8$	1	
	$Q(-5, 8)$	1	
	$R(2, -6)$	1	

No.	Skema Pemarkahan	Sub Markah	Jumlah Markah
6(*a*)	$1-\sin^2\theta = \cos^2\theta$ LHS = RHS	1 1	7
(*b*)(i)	 Bentuk graf kosinus 2 kitaran untuk $0 \le \theta \le 2\pi$ Amplitud =1 (Mak = 1, min = -1)	1 1 1	
(ii)	$m(\pi)-1 > *1 \ @ \ m > \dfrac{*1-(-1)}{\pi-0}$ $m > \dfrac{2}{\pi}$ **DAN** $m < 0$	1 1	

No.	Skema Pemarkahan	Sub Markah	Jumlah Markah
7*a*)(i)	$-\frac{70(t+1)^{-1}}{-1(1)}+c$	1	
	$180=\frac{70}{(0+1)}+c$	1	
	$T=\frac{70}{t+1}+110$	1	
(ii)	$\frac{70}{t+1}+110\le 113$	1	
	$22\frac{1}{3}\,//\,\frac{67}{3}\,//\,22.33$	1	
(*b*)	$P(x)=100x-\left(100\,000+50x+0.0025x^2\right)$	1	**10**
	$\frac{d*P}{dx}=50-0.005x$	1	
	$50-0.005x=0$	1	
	$P(x)=-0.0025(10000)^2+50(10000)-10000$	1	
	Tidak kerana 150 000 < 200 000	1	

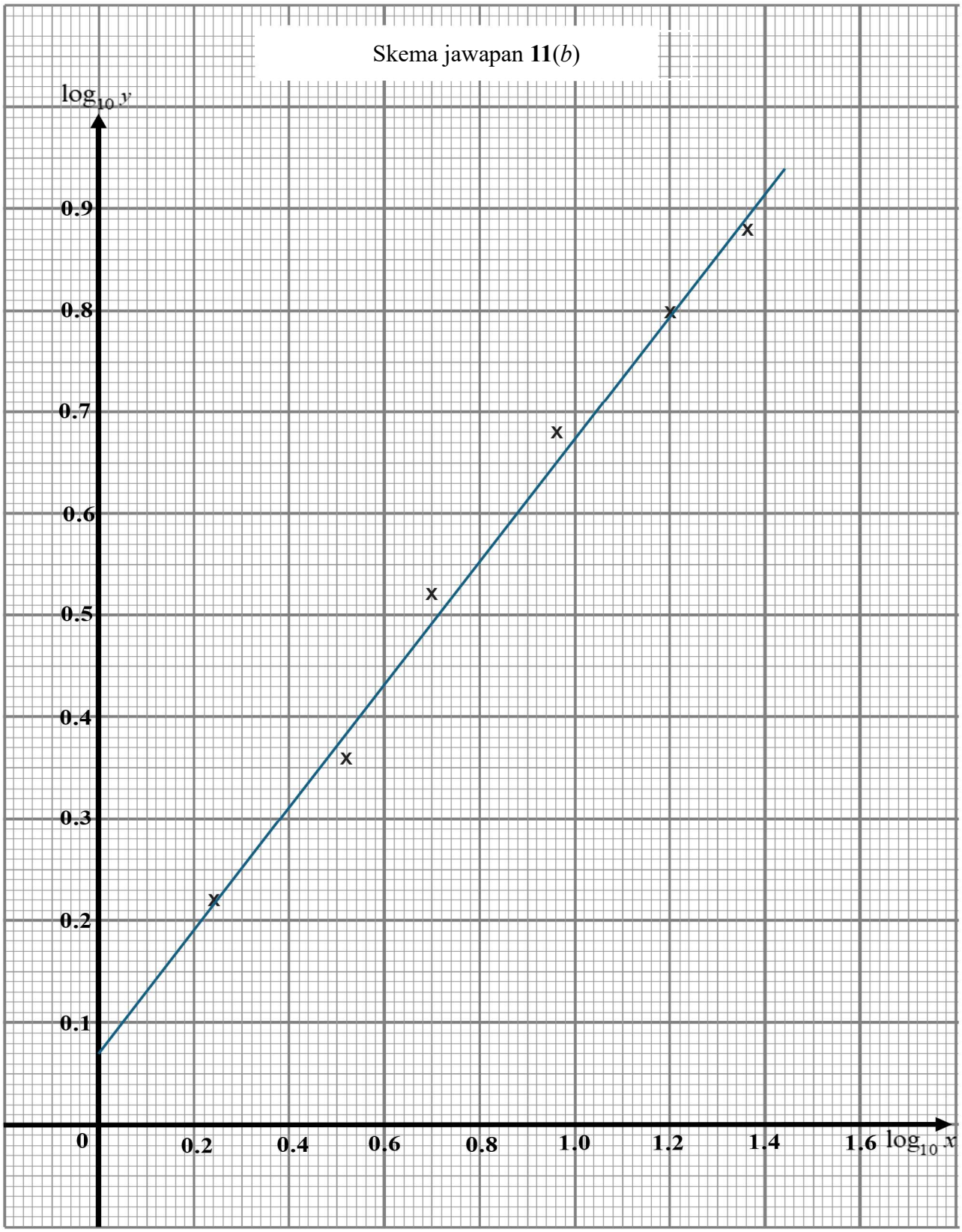
No.	Skema Pemarkahan	Sub Markah	Jumlah Markah
8(*a*)(i)	Tulis dan guna hukum segitiga bagi $\overrightarrow{QT} = \overrightarrow{QP} + \overrightarrow{PT}$ @ $\overrightarrow{PR} = \overrightarrow{PS} + \overrightarrow{SR}$ @ $\overrightarrow{PW} = \overrightarrow{PQ} + \overrightarrow{QW}$ @ $\overrightarrow{PW} = \overrightarrow{PT} + \overrightarrow{TW}$ @ $\overrightarrow{QW} = \overrightarrow{QP} + \overrightarrow{PW}$	1	
	$-9\underset{\sim}{u} + 6\underset{\sim}{v}$	1	
(ii)	$6\underset{\sim}{u} + 12\underset{\sim}{v}$	1	
(*b*)	$\overrightarrow{PW} = 6k\underset{\sim}{u} + 12k\underset{\sim}{v}$ @ $\overrightarrow{QW} = -9h\underset{\sim}{u} + 6h\underset{\sim}{v}$	1	
	$\overrightarrow{PW} = (9-9h)\underset{\sim}{u} + 6h\underset{\sim}{v}$ @ $\overrightarrow{QW} = (6k-9)\underset{\sim}{u} + 12k\underset{\sim}{v}$	1	
(*c*)	$6k = 9 - 9h$ DAN $12k = 6h$	1	**10**
	$h = 2k$, $6k = 9 - 9(2k)$	1	
	$k = \frac{3}{8}, h = \frac{3}{4}$	1	
	$135 = \frac{1}{2} \times 45 \times t$	1	
	6	1	

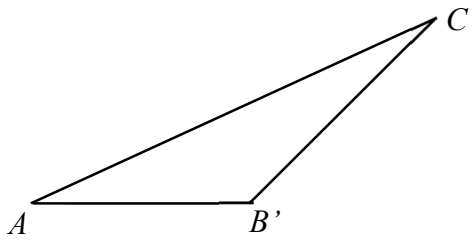
No.	Skema Pemarkahan	Sub Markah	Jumlah Markah
9(*a*)(i)	$P\left(Z \geq \frac{1.68-m}{0.12}\right) = 0.0082$	1	
	$\frac{1.68-m}{0.12} = 2.40$	1	
	1.392	1	
(ii)	$1-0.0082-P\left(Z < \frac{1.26-*1.392}{0.12}\right)$	1	
	0.8561	1	
(iii)	431//432	1	
9(*b*)(i)	${}^{n}C_0\left(\frac{2}{5}\right)^0\left(\frac{3}{5}\right)^{n-0} = \frac{729}{15625}$	1	**10**
	6	1	
(ii)	$1-{}^{*6}C_0\left(\frac{3}{5}\right)^0\left(\frac{2}{5}\right)^{*6} - {}^{*6}C_1\left(\frac{3}{5}\right)^1\left(\frac{2}{5}\right)^{*6-1}$ @ ${}^{*6}C_2\left(\frac{3}{5}\right)^2\left(\frac{2}{5}\right)^{*6-2} + {}^{*6}C_3\left(\frac{3}{5}\right)^3\left(\frac{2}{5}\right)^{*6-3} + {}^{*6}C_4\left(\frac{3}{5}\right)^4\left(\frac{2}{5}\right)^{*6-4} + {}^{*6}C_5\left(\frac{3}{5}\right)^5\left(\frac{2}{5}\right)^{*6-5} + {}^{*6}C_6\left(\frac{3}{5}\right)^6\left(\frac{2}{5}\right)^{*6-6}$ @ $1-{}^{6}C_5\left(\frac{2}{5}\right)^5\left(\frac{3}{5}\right)^{6-5} - {}^{6}C_6\left(\frac{2}{5}\right)^6\left(\frac{3}{5}\right)^{6-6}$ @ ${}^{*6}C_0\left(\frac{2}{5}\right)^0\left(\frac{3}{5}\right)^{*6-0} + {}^{*6}C_1\left(\frac{2}{5}\right)^1\left(\frac{3}{5}\right)^{*6-1} + {}^{*6}C_2\left(\frac{2}{5}\right)^2\left(\frac{3}{5}\right)^{*6-2} + {}^{*6}C_3\left(\frac{2}{5}\right)^3\left(\frac{3}{5}\right)^{*6-3} + {}^{*6}C_4\left(\frac{2}{5}\right)^4\left(\frac{3}{5}\right)^{*6-4}$	1	
	$\frac{2997}{3125}$ // 0.9590	1	

No.	Skema Pemarkahan	Sub Markah	Jumlah Markah
10(*a*)	$\frac{dy}{dx} = 6 - 2(0)$	1	**10**
	$y - 0 = 6(x - 0)$ **DAN** $y = 6(3)$	1	
	$N(3,18)$	1	
(*b*)	$\left[\frac{6x^2}{2} - \frac{x^3}{3}\right]_0^6$	1	
	$\left[\left(\frac{6(6)^2}{2} - \frac{(6)^3}{3}\right) - \left(\frac{6(0)^2}{2} - \frac{(0)^3}{3}\right)\right]$	1	
	36	1	
(*c*)	$\pi\left[\frac{(-6(6)+36)^3}{-18} - \frac{(-6(3)+36)^3}{-18}\right]$	1	
	$\pi\left[\left(12(6)^3 - 3(6)^4 + \frac{6^5}{5}\right) - \left(12(3)^3 - 3(3)^4 + \frac{3^5}{5}\right)\right]$	1	
	$324\pi - \frac{648}{5}\pi$	1	
	194.4π @ $194\frac{2}{5}\pi$	1	

No.	Skema Pemarkahan	Sub Markah	Jumlah Markah
11 (*a*)	$\log_{10} x$: 0.24, 0.52, 0.70, 0.96, 1.20, 1.36 $\log_{10} y$: 0.22, 0.36, 0.52, 0.68, 0.80, 0.88	1 1	
(*b*)	Graf garis lurus $\log_{10} y$ melawan $\log_{10} x$ dilukis		
	[- Paksi-paksi betul dan skala seragam dari titik pertama sehingga titik terakhir - Sekurang-kurangnya satu *titik diplot betul]	1	
	Garis lurus penyuaian terbaik [Sekurang-kurangnya 5 *titik diplot]	1 1	**10**
(*c*)	$\log_{10} y = k \log_{10} x + \log_{10} a$	1	
	Cari $*m = k$ (2 titik pada *garis)	1	
	$k = 0.6042$	1	
	$*c = \log_{10} a$	1	
	$a = 1.20$ Syarat: $0.06 \leq c \leq 0.08$	1	

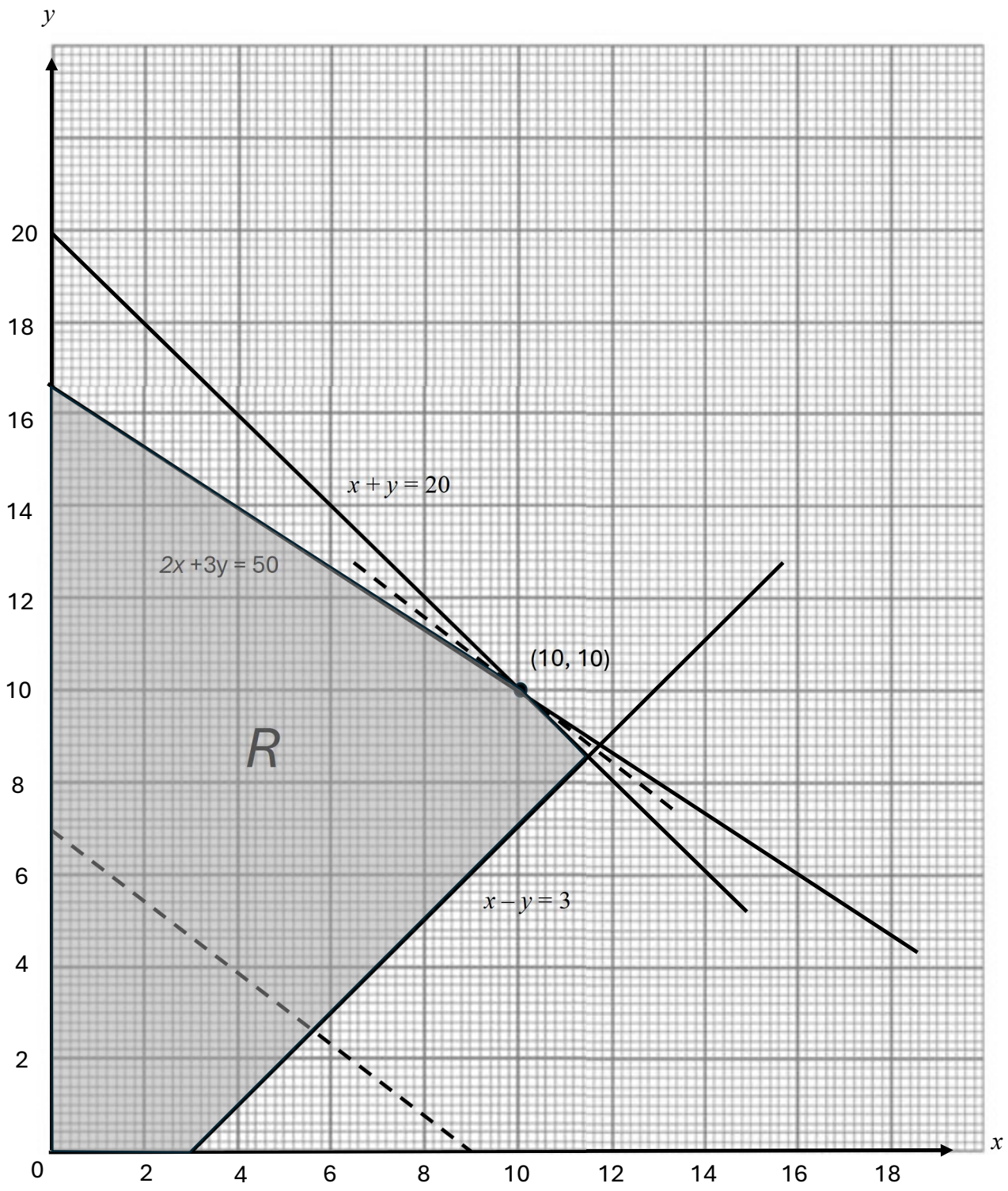
Skema jawapan **11**(*b*)



No.	Skema Pemarkahan	Sub Markah	Jumlah Markah
12(*a*)	$\overset{\frown}{BD}$ = 6.6	1	
	$AD^2 = 9.12^2 + *6.6^2 - 2(9.12)(*6.6)\text{kos}48.3°$	1	
	6.830	1	
(*b*)(i)	$\frac{\sin \angle BAE}{4.3} = \frac{\sin 83.3°}{9.12}$	1	
	27.92°	1	
(ii)		**1**	**10**
	20.38°	**1**	
(c)	$\frac{*6.6 + 9.12 + *6.83}{2}$	1	
	$\sqrt{*11.28(*11.28 - *6.6)(*11.28 - 9.12)(*11.28 - *6.83)}$	1	
	22.53 // 22.47	1	

No.	Skema Pemarkahan	Sub Markah	Jumlah Markah
13(*a*)	$x + y \le 20$ atau setara	1	
	$10x + 15y \le 250$ atau setara	1	
(*b*)	$x - y \le 3$ atau setara	1	
	Bilangan jam kelas tarian melebihi kelas renang selebih-lebihnya 3 jam	1	
(*c*)	Lukis dengan betul sekurang-kurangnya satu garis lurus dan *ketaksamaan yang melibatkan *x* dan *y*	1	
	Lukis dengan betul (**SEMUA**)*garis lurus dan *ketaksamaan yang melibatkan *x* dan/atau *y* Nota : Terima garis putus-putus dan garis padu	1	
	Rantau dilabel R dengan betul	1	**10**
(*d*)	Melukis fungsi objektif $K = 350x + 450y$ dengan betul	1	
	$K = 350(10) + 450(10)$	1	
	8000	1	

Soalan **13**(*c*)


y
20
18
16
14
12
10
8
6
4
2
0
2
4
6
8
10
12
14
16
18
x
x + y = 20
2x +3y = 50
(10, 10)
R
x – y = 3

No.	Skema Pemarkahan	Sub Markah	Jumlah Markah
14(*a*) (i)(ii)	$\frac{12.10}{P_{2018}}\times 100 = 121$ atau $\frac{P_{2022}}{15.00}\times 100 = 90$	1	
	10 00	1	
	13.50	1	
(*b*)	$100 + 3m = \frac{130\times 130}{100}$	1	
	23	1	
(*c*) (i)	110, 130, 100, 90	**1**	**10**
	$\frac{110(7)+130(7)+100(2)+90(4)}{7+7+2+4}$	**1**	
	112	1	
(ii)	$\left(40-\left(\frac{112}{100}\times 30\right)\right)\times\left(\frac{26322.40}{\frac{112}{100}\times 30}\right)$ atau setara	**1**	
	Tercapai kerana keuntungan yang diperoleh 50 137.60 > 40 000	1	

No	Skema Pemarkahan	Sub Markah	Jumlah Markah
15(a)	$(3t-2)(t-4)=0$	1	
	$\frac{2}{3}, 4$	1	
(b)(i)	$a=6(0)-14$	1	
	-14	1	
(ii)	$3*\left(\frac{7}{3}\right)^2-14*\left(\frac{7}{3}\right)+8$	**1**	
	$-\frac{25}{3}$	**1**	**10**
15(c)	$s=t^3-7t^2+8t$	**1**	
	$S_4=*(4)^3-7*(4)^2+8*(4)\ @\ S_{\frac{2}{3}}=*\left(\frac{2}{3}\right)^3-7*\left(\frac{2}{3}\right)^2+8*\left(\frac{2}{3}\right)$	**1**	
	$2S_{*\frac{2}{3}}+\lvert S_{*4}\rvert\ @$ $\left\lvert S_{*\frac{2}{3}}-S_{*0}\right\rvert+\left\lvert S_{*4}-S_{*\frac{2}{3}}\right\rvert$ $@\ \int_0^{*\frac{2}{3}} v\ dt+\left\lvert\int_{*\frac{2}{3}}^{*4} v\ dt\right\rvert$	**1**	
	$\frac{568}{27}$ // 21.04	**1**	