i-MODUL KECEMERLANGAN SPM SMKA DAN SABK 2022

PEPERIKSAAN PERCUBAAN SPM 2022

MATEMATIK TAMBAHAN

Kertas 2

PERATURAN PEMARKAHAN

UNTUK KEGUNAAN PEMERIKSA SAHAJA

Peraturan pemarkahan ini mengandungi **13** halaman bercetak

CADANGAN PERATURAN PEMARKAHAN (SKEMA)
KERTAS 2
BAHAGIAN A

Soalan	Skema Pemarkahan	Sub Markah	Markah Penuh
1(a)	Sebutan $n, T_n = a + (n-1)d$ $T_1 + T_3 + T_5 + T_7 + T_9 + T_{11} = 114$ $6a + 30d = 114$ $T_2 + T_4 + T_6 + T_8 + T_{10} + T_{12} = 132$ $6a + 36d = 132$ $d = 3$	K1 K1 NI	**5**
1(b)	$a = \frac{114 - 90}{6}$ $a = 4$	K1 N1	
2 (a)	$hk(x) = \frac{3 + 2\left(\frac{5x-3}{2}\right)}{5}$ $= \frac{3 + 5x - 3}{5}$ $= x$ $kh(x) = \frac{5\left(\frac{3+2x}{5}\right) - 3}{2}$ $= \frac{3 + 2x - 3}{2}$ $= x$	K1 N1 K1 NI	**4**
2 (b)	Oleh sebab $hk(x) = kh(x) = x$, maka $k(x) = \frac{5x-3}{2}$ ialah fungsi songsang bagi $h(x) = \frac{3+2x}{5}$	N1 N1	**2**

Soalan	Skema Pemarkahan	Sub Markah	Markah Penuh
3	$2x+3y=36$	P1	**7**
	$xy=54$	P1	
	$y=\frac{54}{x}$	K1	
	$2x+3\left(\frac{54}{x}\right)=36$	K1	
	$x^2-18x+81=0$	K1	
	$x=\frac{-(-18)\pm\sqrt{(-18)^2-4(1)(81)}}{2(1)}$	N1,N1	
	$x=9 \quad , y=6$		
4(a)	$\frac{m(7)+n(-3)}{m+n}=3$	K1	**7**
	$4m=6n$		
	or		
	$\frac{m}{n}=\frac{6}{4}$	K1	
	$m:n=3:2$	NI	
4 (b)	$\frac{3(6)+2(p)}{5}=4$	K1	
	$18+2p=20$		
	$p=1$	N1	
4 (c)	$\frac{1}{2}\lvert[(0)(1)+(-3)(6)+(7)(9)]-[(-3)(9)+(7)(1)+(0)(6)]\rvert$		
	$\frac{1}{2}\lvert45-(-20)\rvert$	K1	
	$\frac{1}{2}\lvert65\rvert$		
	$32.5 \,\|\|\, 32\frac{1}{2} \,\|\|\, \frac{65}{2} units^2$	N1	

<table>
<tr><th>Soalan</th><th>Skema Pemarkahan</th><th>Sub Markah</th><th>Markah Penuh</th></tr>
<tr>
<td>5(a)</td>
<td>
$y = x^4 - 4x^3 + 1$
$\frac{dy}{dx} = 4x^3 - 12x^2$
$\frac{dy}{dx} = 4x^2(x-3)$
Untuk titik pegun / For stationary points
$\frac{dy}{dx} = 0$
$4x^2(x-3) = 0$
$x = 0 \text{ atau } x = 3$
Apabila /when
$x = 0, \quad y = 0^4 - 4(0)^3 + 1 = 1$
$x = 3, \quad y = 3^4 - 4(3)^3 + 1 = -26$
Maka, titik pegun ialah / The stationary points are
(0,1) dan (3,-26)
</td>
<td>K1

KI

N1</td>
<td></td>
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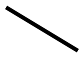
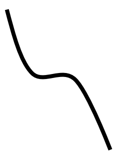
<tr>
<td>5(b)</td>
<td>
$\frac{d^2y}{dx^2} = 12x^2 - 24x$
$Apabila\ x = 0, \frac{d^2y}{dx^2} = 12(0)^2 - 24(0) = 0$
<table>
<tr><th>x</th><th>-0.1</th><th>0</th><th>0.1</th></tr>
<tr><td>$\frac{dy}{dx}$</td><td>-0.124</td><td>0</td><td>-0.116</td></tr>
<tr><td>$tanda\ bagi\ \frac{dy}{dx}$</td><td>-</td><td>0</td><td>-</td></tr>
<tr><td>Lakaran tangen</td><td>  </td><td></td><td>  </td></tr>
<tr><td>Lakaran graf</td><td colspan="3">  </td></tr>
</table>
Maka, titik (0,1) ialah titik lengkok balas.
$Apabila\ x = 3, \frac{d^2y}{dx^2} = 12(3)^2 - 24(3) = 36 > 0$
Maka, (3,-26) ialah titik minimum.
</td>
<td>K1

K1

K1

K1

K1

N1</td>
<td>9</td>
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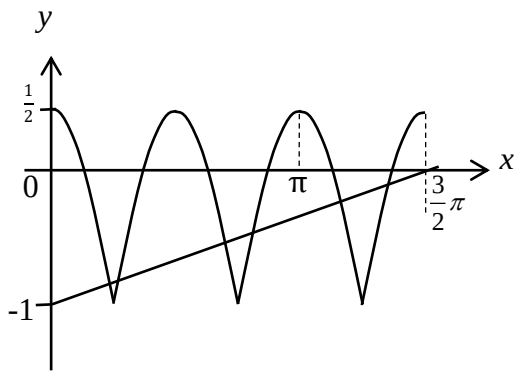
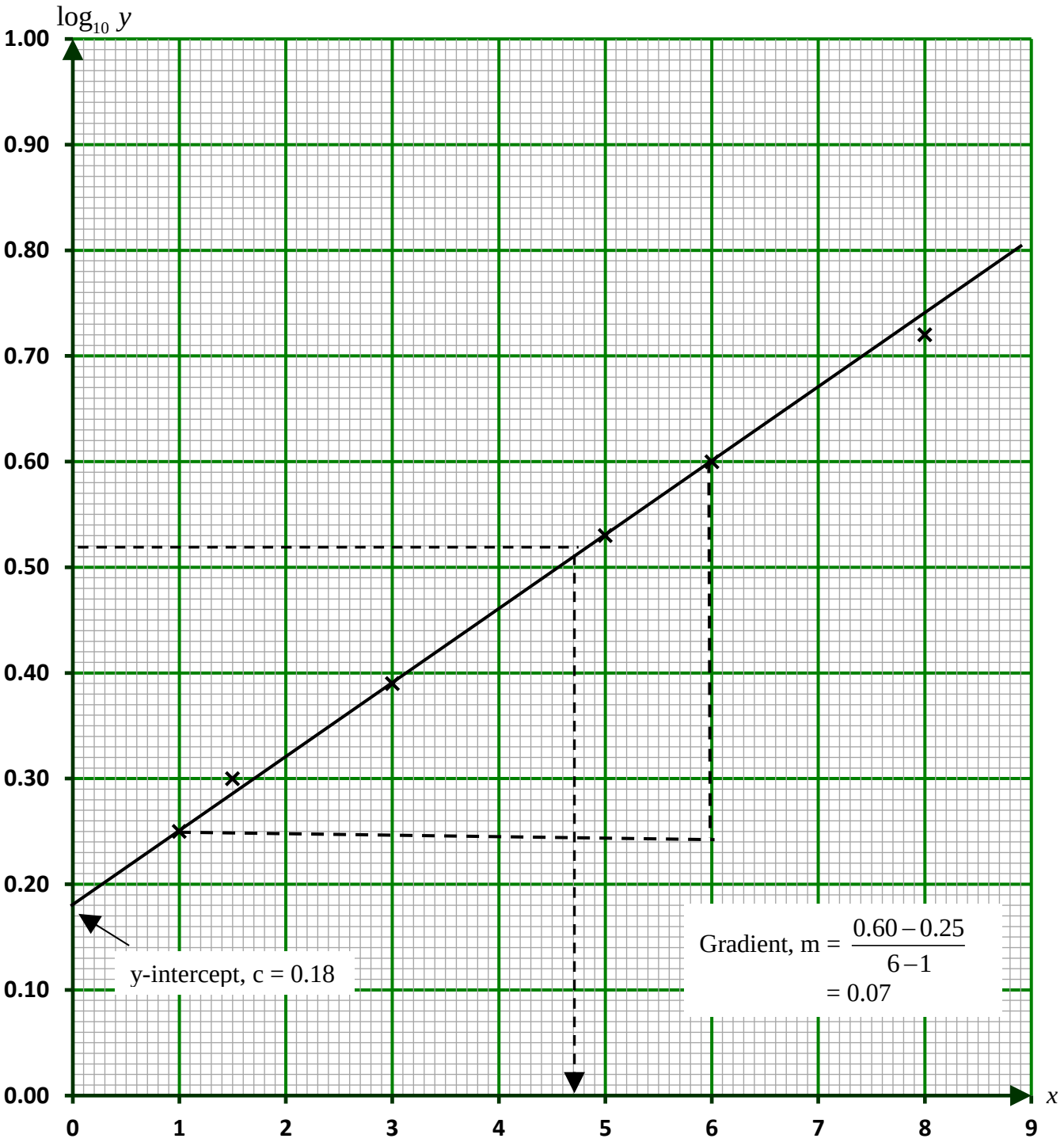
Soalan	Skema Pemarkahan	Sub Markah	Markah Penuh
6 (a)	Panjang lengkok $s = r\theta$ $s = 6 \times \frac{2}{3}\pi$ $s = 4\pi @ 12.567$ Perimeter $= 4\pi + 6 + 6$ $= 12 + 4\pi @ 24.567$ Luas $= \frac{1}{2}(6)^2\left(\frac{2\pi}{3}\right)$ $= 12\pi @ 37.7$	N1 N1 K1 N1	**8**
6 (b)	$a^2 = b^2 + c^2 - 2bc\cos A$ $a^2 = 6^2 + 6^2 - 2(6)(6)\cos 120°$ $a = \sqrt{108}$ $= \sqrt{36 \times 3}$ $= 6\sqrt{3}$	K1 K1 N1 N1	
7 (a)	Graf kosinus/ *Cosinus graph* $1\frac{1}{2}$ kitaran / *cycle* Amplitud = $1\frac{1}{2}$ (Maksimum ; $\frac{1}{2}$, Minimum ; -1) Mutlak **DAN** anjakan 1 unit ke bawah *Absolute **AND** move 1 unit down*  	P1 P1 P1 P1	**8**
7 (b)	$3(y+1) - 4x = -2x$ Garis lurus / *Straight line* 6 bilangan penyelesaian / *6 no of solution*	K2 K1 N1	

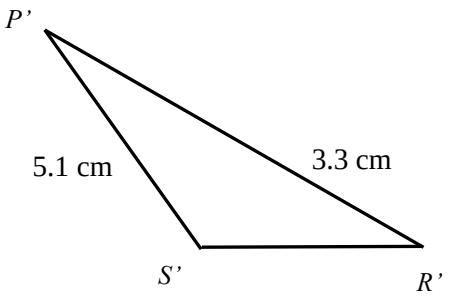
Soalan	Skema Pemarkahan	Sub Markah	Markah Penuh
8(a)	<table><tr><td>x</td><td>1</td><td>1.5</td><td>3</td><td>5</td><td>6</td><td>8</td></tr><tr><td>$\log_{10} y$</td><td>0.25</td><td>0.30</td><td>0.39</td><td>0.53</td><td>0.60</td><td>0.72</td></tr></table>	N1	
8(b)	Rujuk pada graf / *Refer to graph* Garis lurus dan 6 titik diplot betul Garis lurus penyuaian terbaik	K1 NINI	
8 (c)	$\log_{10} y = \log_{10} ab^{3x}$ $\log_{10} y = \log_{10} a + \log_{10} b^{3x}$ $\log_{10} y = \log_{10} a + (3x)\log_{10} b$ $\log_{10} y = (3\log_{10} b)x + \log_{10} a$	NI N1	
(i)	Apabila / *When* $y = 3.2$, $\log_{10} y = \log_{10} 3.2 = 0.51$ Daripada graf / *from the graph* $\log_{10} 3.2 = 0.51 \rightarrow x = 4.7$	K1	**10**
(ii)	$m = 3\log_{10} b$ $0.07 = 3\log_{10} b$ $\frac{0.07}{3} = \log_{10} b$ $b = 1.06$	N1 K1 N1	
(iii)	$c = \log_{10} a$ $0.18 \leftrightarrow 0.19 = \log_{10} a$ $1.515 \leftrightarrow 1.550 = a$		


log10 y
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0
1
2
3
4
5
6
7
8
9
x
y-intercept, c = 0.18
Gradient, m = 0.60 – 0.25 / 6 – 1
= 0.07

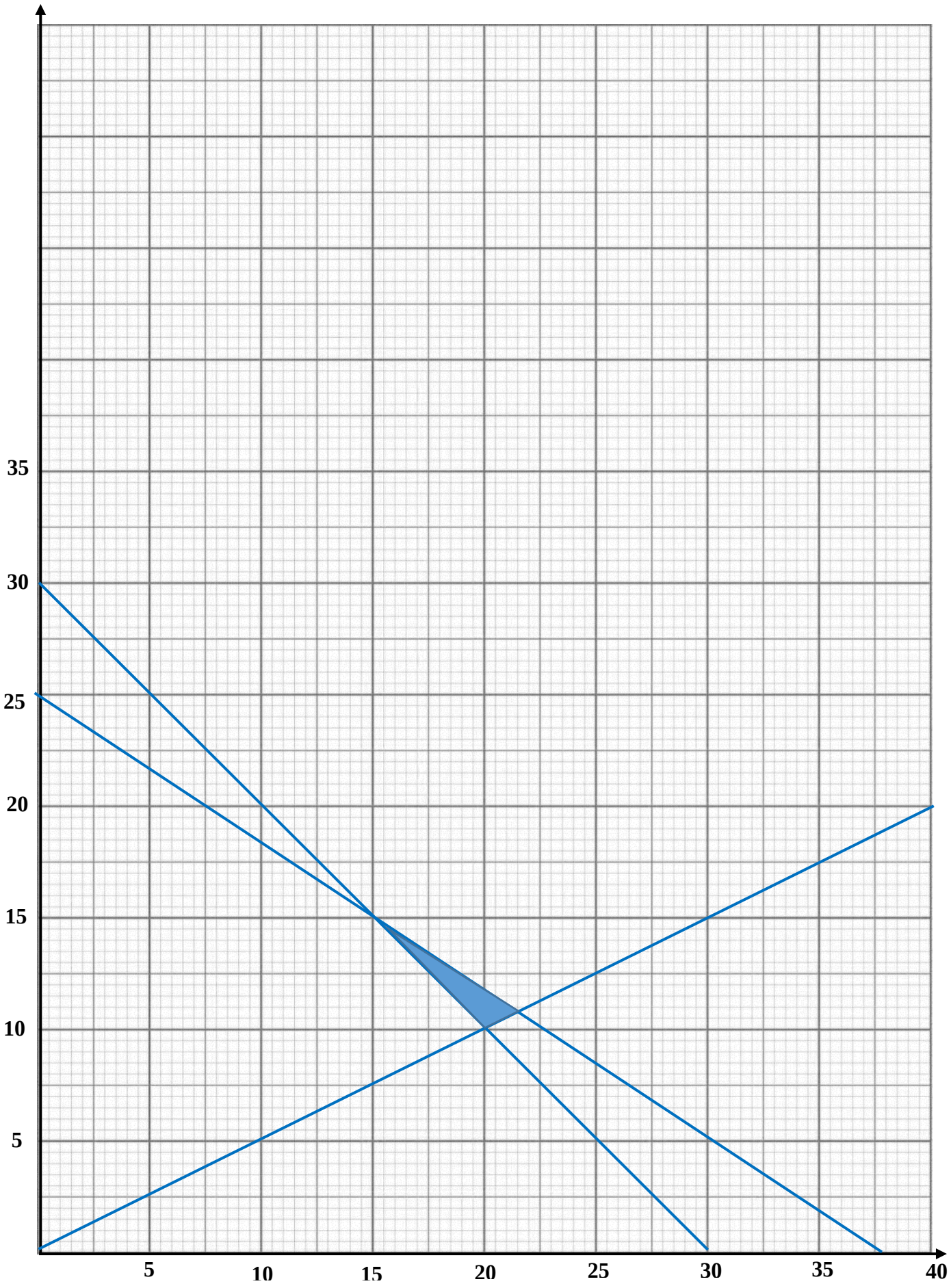
Soalan	Skema Pemarkahan	Sub Markah	Markah Penuh
9 (a)	Cari had / punca **DAN** pemfaktoran *Find the limits / roots **AND** factorisation* $f(x)=(-x-2)(x+5)$ Pengamiran mana-mana dua luas *Integration any two areas* $\left\|\int_{-7}^{-5}-x^2-7x-10\,dx\right\|=\left\|\left[-\frac{x^3}{3}-\frac{7x^2}{2}-10x\right]_{-7}^{-5}\right\|$ @ $\left\|\int_{-5}^{-2}-x^2-7x-10\,dx\right\|=\left\|\left[-\frac{x^3}{3}-\frac{7x^2}{2}-10x\right]_{-5}^{-2}\right\|$ @ $\left\|\int_{-2}^{0}-x^2-7x-10\,dx\right\|=\left\|\left[-\frac{x^3}{3}-\frac{7x^2}{2}-10x\right]_{-2}^{0}\right\|$ Ganti had ke dalam mana-mana fungsi *Substitute limit to any functions* $\left(-\frac{(-5)^3}{3}-\frac{7(-5)^2}{2}-10(-5)\right)-\left(-\frac{(-7)^3}{3}-\frac{7(-7)^2}{2}-10(-7)\right)=\frac{26}{3}$ @ $\left(-\frac{(-2)^3}{3}-\frac{7(-2)^2}{2}-10(-2)\right)-\left(-\frac{(-5)^3}{3}-\frac{7(-5)^2}{2}-10(-5)\right)=\frac{9}{2}$ @ $\left(-\frac{(0)^3}{3}-\frac{7(0)^2}{2}-10(0)\right)-\left(-\frac{(-2)^3}{3}-\frac{7(-2)^2}{2}-10(-2)\right)=\frac{26}{3}$ Jumlah luas / *Total area* $=\frac{26}{3}+\frac{9}{2}+\frac{26}{3}$ $=\frac{131}{6}$	K1 K1 K1 K1 N1	**6**

Soalan	Skema Pemarkahan	Sub Markah	Markah Penuh
9 (b)	$= \pi \left\| \int_{-5}^{-2} \left(-x^2 - 7x - 10\right)^2 dx \right\|$		
	$= \pi \left\| \int_{-5}^{-2} x^4 + 14x^3 + 59x^2 + 150x + 100 \, dx \right\|$	K1	
	Pengamiran / *Integration*		
	$= \pi \left(\frac{x^5}{5} + \frac{7x^4}{2} + \frac{59x^3}{3} + 75x^2 + 100x \right)_{-5}^{-2}$	K1	**4**
	Ganti had / *Substitute limits*		
	$= \pi \left[\left(\frac{(-2)^5}{5} + \frac{7(-2)^4}{2} + \frac{59(-2)^3}{3} + 75(-2)^2 + 100(-2) \right) - \left(\frac{(-5)^5}{5} + \frac{7(-5)^4}{2} + \frac{59(-5)^3}{3} + 75(-5)^2 + 100(-5) \right) \right]$	K1	
	$= \frac{81}{10}\pi$	N1	
10(a)(i)	$\overrightarrow{SQ} = -6\underset{\sim}{x} + 3\underset{\sim}{y}$	N1	
(ii)	$\overrightarrow{PL} = 3\underset{\sim}{y} + \frac{1}{3}(6\underset{\sim}{x} - 3\underset{\sim}{y})$	K1	
	$\overrightarrow{PL} = 2\underset{\sim}{x} + 2\underset{\sim}{y}$	N1	**5**
10	$\overrightarrow{PR} = \frac{1}{b}(2\underset{\sim}{x} + 2\underset{\sim}{y})$	K1	
(b)(i)	$\overrightarrow{PR} = \frac{2}{b}\underset{\sim}{x} + \frac{2}{b}\underset{\sim}{y}$		
	$\overrightarrow{SR} = \overrightarrow{SP} + \overrightarrow{PR}$		
	$\overrightarrow{SR} = (-6 + \frac{2}{b})\underset{\sim}{x} + \frac{2}{b}\underset{\sim}{y}$	N1	

Soalan	Skema Pemarkahan	Sub Markah	Markah Penuh
10(b)(ii)	Perbandingan & menyelesaikan persamaan serentak *Comparison & solving using simultaneous equation*		
	$-6+\frac{2}{b}=-2$ or $2a=\frac{2}{b}$	K1	
	$a=2$	N1	**5**
	$b=\frac{1}{2}$	N1	
10 (c)	$\frac{1}{2}(6\lvert\underset{\sim}{x}\rvert)(5)=120$	K1	
	$\lvert\underset{\sim}{x}\rvert=8\,unit$	N1	
11 (a)(i)	$P(X=3) = {}^5C_3(0.6)^3(0.4)^2$	K1	
	0.3456	N1	
(a)(ii)	P(X=4)+P(X=5)	P1	
	${}^5C_4(0.6)^4(0.4)^1 + {}^5C_5(0.6)^5(0.4)^0$	K1	
	(menggunakan rumus Taburan Binomial)		
	0.3370	N1	**10**
(b)(i)	$P(\frac{110-130}{16}<Z<\frac{152-130}{16})$	K1	
	1 – 0.1056 – 0.0845	N1	
	0.8099		
(b)(ii)	$P(X>150) = P(Z>\frac{150-130}{16})$	K1	
	0.1056//0.1057	N1	
	1163//1164//1165	N1	

Soalan	Skema Pemarkahan	Sub Markah	Markah Penuh
12 (a)	$0 = 6t - 15$	K1	
	$t = \frac{5}{2}$ / /2.5 s	N1	
	$v = -\frac{3}{4}$ / / -0.75 m s^{-1}	N1	
12 (b)(i)	$s = t^3 - \frac{15}{2}t^2 + 18t$ / / $s = 22t - \frac{15}{2}t^2$	K1	**10**
	$t(t-2)(t+2) = 0$		
	$t = 2$ s	K1	
	$0 = 3(t-3)(t-2)$	N1	
12 (b)(ii)	$\int_0^2 t^3 - \frac{15}{2}t^2 + 18t dt + \left\| \int_2^3 t^3 - \frac{15}{2}t^2 + 18t dt \right\| + \int_3^4 t^3 - \frac{15}{2}t^2 + 18t dt$	K1,K1	
	$\left(14 + \frac{1}{2} + \frac{5}{2}\right)$m	K1	
	17 m	N1	
13(a)(i)	$7.7^2 = 5.6^2 + 3.3^2 - 2(5.6)(3.3)\cos\angle STR$	K1	
	$\angle STR = \angle PTQ = 117.45$	N1	
13(a)(ii)	$\frac{\sin\angle SPT}{5.6} = \frac{\sin 62.55}{5.1}$	K1	
	$\angle SPT = 77.01$		
	$\frac{PT}{\sin 40.44} = \frac{5.1}{\sin 62.55}$	K1	
	$PT = 3.728$	N1	**10**
13(a)(iii)	$\frac{PQ}{\sin 40.44} = \frac{5.1}{\sin 31.275}$ *or* $\frac{PQ}{\sin 40.44} = \frac{5.1}{\sin 31.28}$	K1	
	$PQ = 6.372 / 6.371$	N1	
13(b)(i)		N1	
13(b)(ii)	$\frac{\sin\angle PSR}{7.028} = \frac{\sin 77.01}{7.7}$	N1	
	$\angle P'S'R' = 180 - 62.79 = 117.21$	N1	

Soalan	Skema Pemarkahan	Sub Markah	Markah Penuh
14(a)	guna rumus $I = \frac{Q_{22}}{Q_{19}} \times 100$	K1	
	a = 130, b = RM4.50, c = RM7.26	N1,N1	
	kesemua betul		
	2 betul		
14(b)	seen 740	P1	**10**
	$\frac{114(740) + {}^{*}130(80) + 150(40) + 113(140)}{1000}$	K1	
	116.58	N1	
14(c)	$\frac{120}{100} \times m = 11.50$	K1	
	$m = 9.58$		
	$\frac{P_{22}}{9.58} \times 100 = 116.58$		
	$P_{22} = 11.17$	N1	
	$\frac{125}{100} \times 11.17$	K1	
	5.56	N1	
15 (a)	$0.4x + 0.6y \le 15$ @ $4x + 6y \le 150$	N1	
	$x + y \ge 30$	N1	
	$2y \ge x$	N1	
15(b)	Rujuk pada graf / *Refer to graf*	K1,N1,N1	
15(c)	$0.1x + 0.2y$	K1	
	$x = 15$, $y = 15$	N1, N1	**10**
	Keuntungan = RM 4.50	N1	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