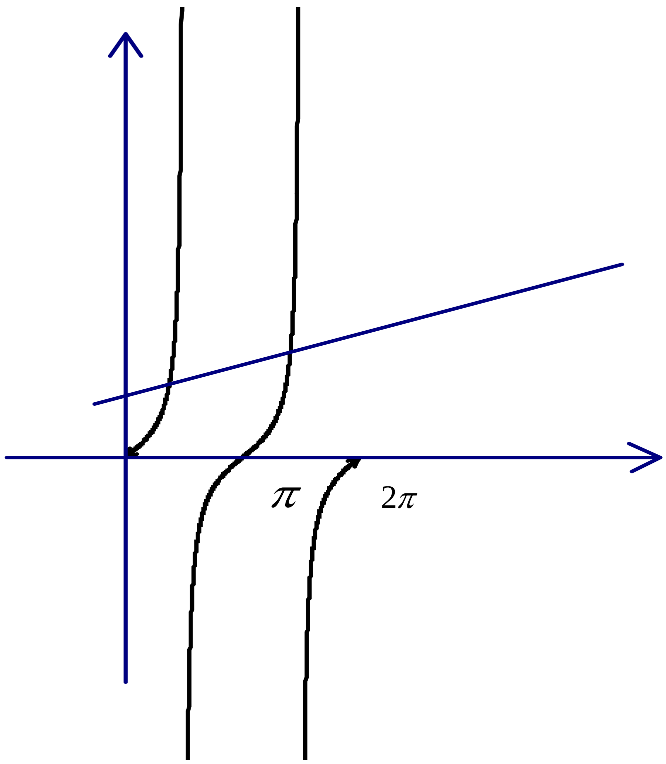
No	Solution and Mark Scheme	Sub Marks	Total Marks
1	$4y^2+xy-x+3=3 \qquad x+2y=3$		5
	$x=3-2y \qquad\qquad y=\frac{3-x}{2}$	1	
	$4y^2+xy-x=0 \qquad\qquad 4y^2+xy-x=0$		
	$4y^2+y(3-2y)-(3-2y)=0 \qquad\qquad 4\left(\frac{3-x}{2}\right)^2+x\left(\frac{3-x}{2}\right)-x=0$	1	
	$(2y-1)(y+3)=0 \qquad\qquad (x-2)(x-9)=0$	1	
	$y=\frac{1}{2}@-3 \qquad\qquad x=2@9$	1	
	$x=2@9 \qquad\qquad y=\frac{1}{2}@-3$	1	
2(a)			7
	$81^{2x}=27^{x+2}$	1	
	$3^{4(2x)}=3^{3(x+2)}$		
	$8x=3x+6$	1	
	$x=\frac{6}{5}$	1	

(b)	$\log_2 x^2 - \dfrac{\log_2 16x}{\log_2 2^2} = 1$	1	
	$\log_2\left[\dfrac{x^4}{16x}\right] = 2$	1	
	$\dfrac{x^3}{16} = 2^2$	1	
	$x^3 = 64$	1	
	$x = 4$		
3(a)	$T_3 = ar^2$		
	$220500 = a(1.05)^2$	2	7
	$a = 200000$		
(b)	$T_n > 400000$	5	
	$200000(1.05)^{n-1} > 400000$		
	$(1.05)^{n-1} > 2$		
	$(n-1)\log 1.05 > \log 2$		
	$n-1 > 14.21$		
	$n > 15.21$		
	$n = 16$		
(ii)	$a = 415 \qquad r = 1.01 \qquad$ *or*		
	$S_7 = \dfrac{415(1.01^7 - 1)}{1.01 - 1}$		
	$= 2993.62$		

2008	415
2009	419.5
2010	423.34
2011	427.57
2012	431.85
2013	436.17
2014	440.53
	2993.62

<table>
<tr>
<td>4(a)</td>
<td>$= \dfrac{\sin x + 2\sin x \cos x}{1 + \cos x + 2\cos^2 x - 1}$
$= \dfrac{\sin x(1 + 2\cos x)}{\cos x(1 + 2\cos x)}$
$= \tan x$
Proven / Terbukti</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>(b)</td>
<td>

Bentuk tan x (di graf) P1
Period (di graf) P1

Straight Line (di graf) P1
$y = 1 + \dfrac{x}{\pi}$ P1
No Of Solution = 2 N1</td>
<td>5</td>
<td></td>
</tr>
</table>

<table>
<tr><td>5(a)

(b)</td><td>$y = x(x^2 - 3)$
$y = x^3 - 3x$

$\frac{dy}{dx} = 3x^2 - 3 = 0$
$x^2 - 1 = 0$
$x = \pm 1$
$x = 1, y = -2$
$x = -1, y = 2$

$\frac{d^2y}{dx^2} = 6x$
$x = 1, \frac{dy}{dx} = 6(\min imum)$
$x = -1, \frac{dy}{dx} = -6(\max imum)$

Maximum point is $(-1, 2)$

$\delta x = 0.02$

$x = 2, \frac{dy}{dx} = 3(2^2) - 3 = 9$

$\delta y = 9 \times 0.02$
$\delta y = 0.18$</td><td>4

3</td><td>7</td></tr>
<tr><td>6(a)</td><td>Find the coordinates of $B(6,0)$ or coordinates $C(0,4)$ N1
Find midpoint of BC $(3,2)$

Gradient of BC = $-\frac{2}{3}$.
Gradient of the line perpendicular to BC = $m_2 = \frac{3}{2}$ N1

The equation of perpendicular bisector to BC is :

$y - 2 = \frac{3}{2}(x - 3)$ K1
$y = \frac{3}{2}x - \frac{5}{2}$
or
$2y = 3x - 5$ N1</td><td>7</td><td>7</td></tr>
</table>

No	Solution and Mark Scheme	Sub Marks	Total Marks
(b)	Area of triangle ABC $area = \frac{1}{2}\left|\left(-4(0)+6(4)+0(-2)\right)-\left(-2(6)+0+4(-4)\right)\right|$ K1 $= \frac{1}{2}\left|(24)-(-28)\right|$ K1 $= 26\ unit^2$ N1		
No	Solution and Mark Scheme	Sub Marks	Total Marks
7(a)	see table below N1		
(b)	Graf = Rujuk Lampiran Plot $\log_{10} y$ against x and correct axes and uniform scales. K1 6 points plotted correctly N1 Line of best fit N1 * If table not shown but all points are correctly plotted , award N1 mark.		
(c)	$\log_{10} y = (3\log_{10} k)x + \log_{10} p$ (Can be implied) P1 (i) $3\log_{10} k = -0.56$ K1 $k = 0.65$ N1		

Table for 7(a):

x	1	1.5	2	2.5	3	3.5
$log_{10}\, y$	1.50	1.22	0.93	0.66	0.34	0.10

	(ii) $\log_{10} p = 2.04$ (K1) $p = 109.65$ (N1) (iii) $loy_{10} y = 1.38$ $y = 23.99$ (N1)		
8(a) (b) (c)	$\tan\theta = \frac{10}{6}$ $\theta = 59.04$ $\theta = 1.031$ $CD = (2\pi - 1.031)(6)$ $\quad$ $AB = 11.66(1.031)$ $CD = 31.518$ $\quad$ $AB = 12.02$ $OB = \sqrt{10^2 + 6^2}$ $OB = 11.66$ $BD = AC$ $= 11.66 - 6$ $= 5.66$ Perimeter of shaded region $= 31.518 + 5.66 + 5.66 + 12.02$ $= 54.858$ Area of sector $= \frac{1}{2} \times 11.66^2 \times 1.031$ $= 70.09$ Or	2 5 3	10

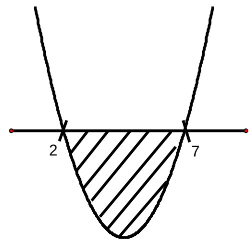
	Area of right angle triangle $=\frac{1}{2}\times 6\times 10$ $=30$ Area of shaded region $=70.09-30$ $=40.09$		
9(a) (i) (ii) (b)	Use the triangle law for $\overrightarrow{PS}$ or $\overrightarrow{QR}$ K1 $\overrightarrow{OP}+\overrightarrow{PS}=\overrightarrow{OS}$ $9\underline{y}+\overrightarrow{PS}=\underline{x}$ N1 $\overrightarrow{PS}=\underline{x}-9\underline{y}$ $\overrightarrow{OQ}+\overrightarrow{QR}=\overrightarrow{OR}$ $5\underline{x}+\overrightarrow{QR}=3\underline{y}$ $\overrightarrow{QR}=3\underline{y}-5\underline{x}$ N1 $\overrightarrow{ST}=m(9\underline{y}-\underline{x})$ N1 $\overrightarrow{RT}=n(5\underline{x}-3\underline{y})$ N1	3 7	10

	Use the triangle law to find $\overrightarrow{TQ}$: $\overrightarrow{ST}+\overrightarrow{TQ}=\overrightarrow{SQ}$ $\quad\quad$ $\overrightarrow{RT}+\overrightarrow{TQ}=\overrightarrow{RQ}$ $\overrightarrow{TQ}=4\underline{x}-m\left(9\underline{y}-\underline{x}\right)$ $\quad\quad$ $\overrightarrow{TQ}=5\underline{x}-3\underline{y}-n\left(5\underline{x}-3\underline{y}\right)$ K1 $4\underline{x}-m\left(9\underline{y}-\underline{x}\right)=5\underline{x}-3\underline{y}-n\left(5\underline{x}-3\underline{y}\right)$ K1 *compare* $4+m=5-5n$ K1 $\quad\quad$ $-9m=-3+3n$ $m=1-5n$ $\quad\quad$ $-9\left(1-5n\right)=-3+3n$ $m=1-5\left(\frac{1}{7}\right)$ $\quad\quad$ $-9+45n=-3+3n$ $m=\frac{2}{7}$ N1 $\quad\quad$ $42n=6$ $n=\frac{1}{7}$ N1		
10 (a)	$\frac{dy}{dx}=2x$ $m_T=2(1)=2$ Equation of tangent $y-2=2\left(x-1\right)$ $y=2x$	3	10
(b)	Area of triangle $\frac{1}{2}\left(1\right)\left(2\right)$ $=1$ Area under the curve $\int_0^1\left(x^2+1\right)dx$ $=\left[\frac{x^3}{3}+x\right]_0^1$ $=\left[\left(\frac{1}{3}+1\right)-0\right]$ $=\frac{4}{3}$	4	

	Area of shaded region = $\frac{4}{3}-1=\frac{1}{3}unit^2$		
(c)	$\pi\int_1^2 (y-1)\,dy$ $=\pi\left[\frac{y^2}{2}-y\right]_1^2$ $=\pi\left[\left(\frac{(2)^2}{2}-2\right)-\left(\frac{(1)^2}{2}-1\right)\right]$ $=\frac{1}{2}\pi\,unit^2$	3	
11 (a) (i)	$n=8,\ p=0.8,\ q=0.2$ $P(X\le 2)=P(X=0)+P(X=1)+P(X=2)$ $=\left({}^8C_0\times 0.8^0\times 0.2^8\right)+\left({}^8C_1\times 0.8^1\times 0.2^7\right)+\left({}^8C_2\times 0.8^2\times 0.2^6\right)$ $=0.7969$	5	10
(ii)	$\sigma=\sqrt{npq}$ $\sigma=\sqrt{250\times 0.8\times 0.2}$ $\sigma=6.325$		
(b) (i)	$\mu=110,\ \sigma=4$ $P(100\le X\le 120)$ $=P\left(\frac{100-110}{4}\le Z\le\frac{120-110}{4}\right)$ $=P(-2.5\le Z\le 2.5)$ $=0.9876$	5	

(ii)	$P(X<100)$ $=P\left(Z<\frac{100-110}{4}\right)$ $=P(Z<-2.5)$ $=0.00621$ $P(A)=\frac{n(A)}{n(s)}$ $0.00621=\frac{n(A)}{480}$ $n(A)=2.98$ Bilangan helaian yang ditolak ialah 3		

No	Solution and Mark Scheme	Sub Marks	Total Marks
12	$v=2t^2-18t+28$ $a=\frac{dv}{dt}=4t-18$ $s=\int vdt=\int(2t^2-18t+28)dt$ $s=\frac{2t^3}{3}-9t^2+28t+c$ $s=0, t=0, c=0$ $s=\frac{2t^3}{3}-9t^2+28t$		10
(a)	$at\ \ A, t=0$ $a=-18ms^{-2}$	2	
(b)	$v=2t^2-18t+28$ $v_{initial}, t=0$ $v=28ms^{-1}$	2	

(c)	$v = 2t^2 - 18t + 28 < 0$ $t^2 - 9t + 14 < 0$ $(t-2)(t-7) < 0$ $2 < t < 7$ 	3	
(d)	distance s $s = \frac{2}{3}t^3 - 9t^2 + 28t$ $s_{t=2} = \frac{2}{3}(2)^3 - 9(2)^2 + 28(2)dt$ $s_{t=2} = 25\frac{1}{3}$ $s_{t=7} = \frac{2}{3}(7)^3 - 9(7)^2 + 28(7)$ $s_{t=2} = -16\frac{1}{3}$ The distance is $s = 2s_{t=2} + \lvert s_{t=7} \rvert$ $s = 2 \times 25\frac{1}{3} + \left\lvert -16\frac{1}{3} \right\rvert$ $s = 67$	3	

13(a)

$$116 = \frac{Q_{10}}{250} \times 100$$

$$Q_{10} = 290$$

Marks: 2 | Total: 10

(b)

Marks: 2

	2006	2008	2010
2006	100	115	$I_{10/08}$
2008	-	100	130
2010	-	-	100

$$\frac{I_{10/08}}{130} = \frac{115}{100}$$

$$I_{10/08} = 149.5$$

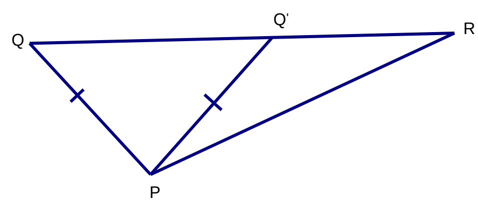
(c)

Marks: 4

I	w	Iw
110	13	1430
116	25	2900
130	40	5200
x	10	103x
120	12	1440
	100	10970 + 103 x

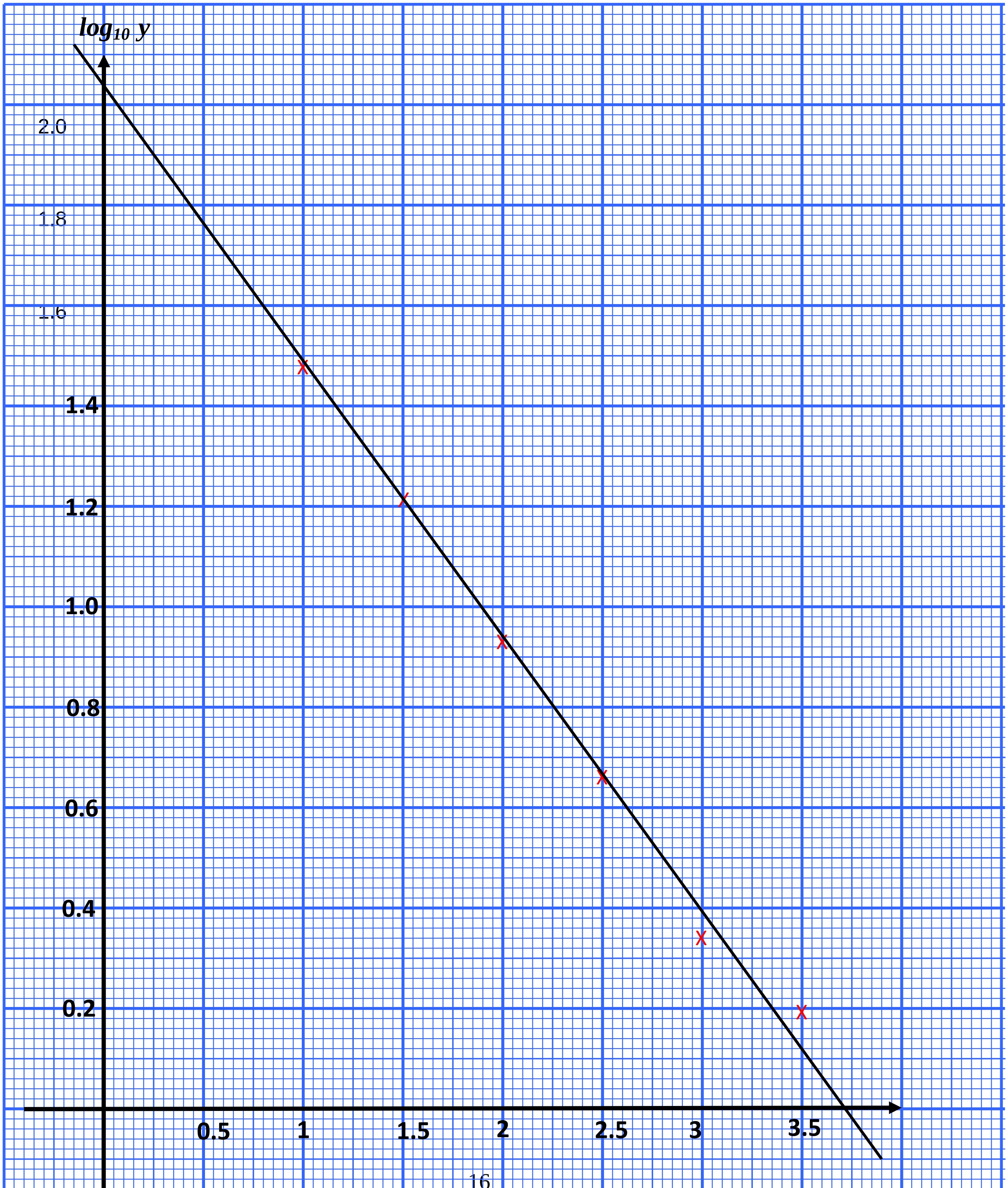
$$\bar{I} = \frac{10970 + 10x}{100} = 120$$

$$x = 103$$

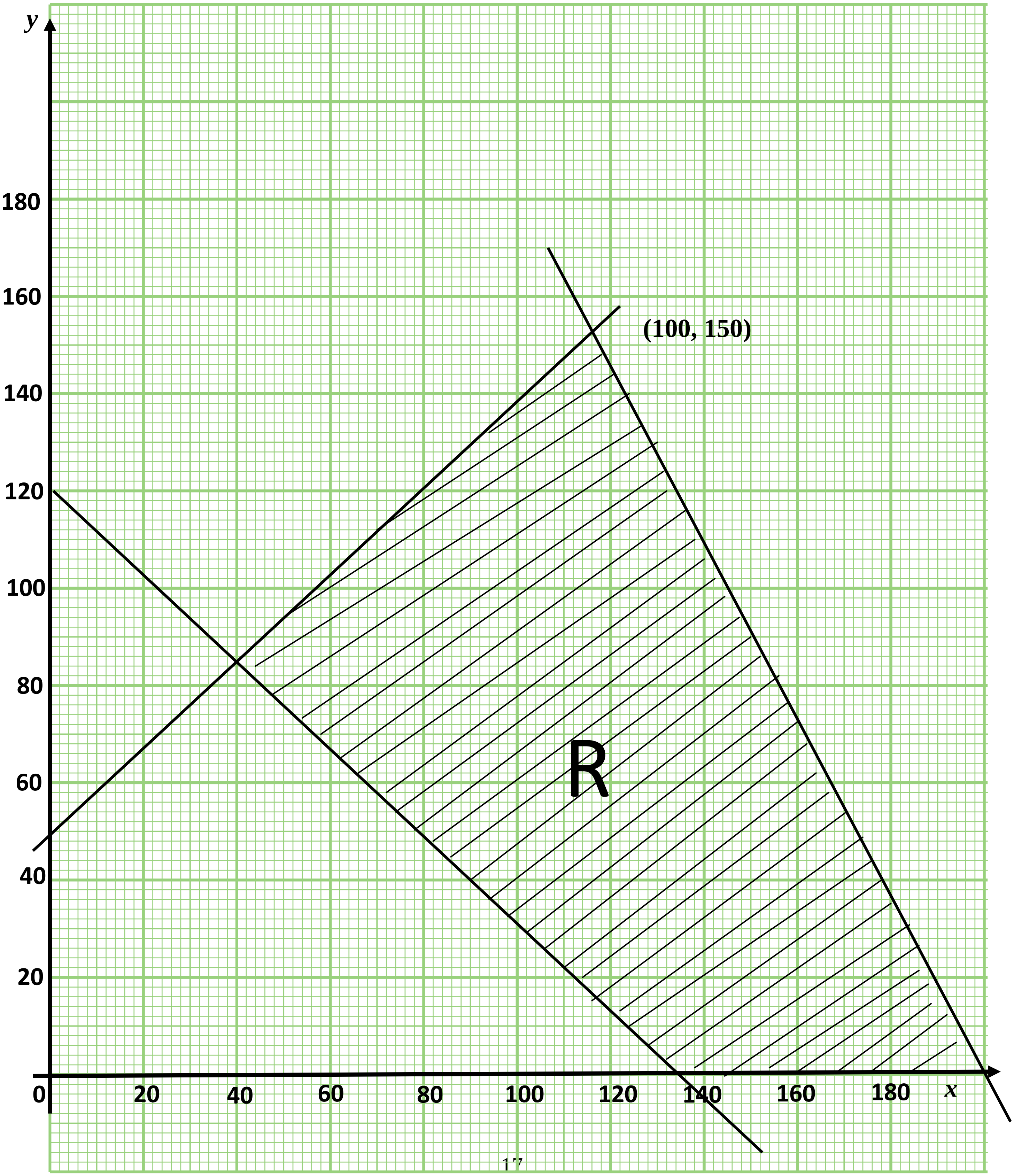
(d)	$120 = \frac{1599}{Q_{08}} \times 100$ $Q_{08} = 1332.5$	2	
14a (i)	$QS^2 = 10.5^2 + 12.5^2 - 2(10.5)(12.5)\cos 80$ $QS = 14.86$	2	10
(ii)	$\frac{\sin R}{14.86} = \frac{\sin 35}{9.5}$ $\sin R = 0.8972$ $\angle QRS = 63.79^0$ $\angle QRS = 116.21^0$	2	
b(i)		1	

(ii)	$Find\ \angle PQS$ $\frac{\sin Q}{12.5} = \frac{\sin 80}{{}^{*}14.86}$ $\sin Q = 0.8284$ $\angle PQS = 55.94$ $Area\ of\ \ \Delta PQQ'$ $= \frac{1}{2}(10.5)(10.5)\sin 68.12^{o}$ $= 51.15cm^2$ $Find\ \ area\ \ of\ \ \Delta PQS$ $= \frac{1}{2}(10.5)(12.5)\sin 80^{0}$ $= 64.63$ $\therefore Area\ of\ \ \Delta PQ'S$ $= 64.63 - 51.15$ $= 13.48$	5	
15(a) (b) (c)	$1.8x + 2y \le 240$ $3x + 2y \le 600$ $y \le x + 50$ Rujuk Lampiran (i) *Jambu batu sebanyak 66 pokok* (ii) Maximum point = (100 ,150) Maximum total fees = 120 (100) + 180 (150) = 39000		

Soalan 7(a)



Soalan 15(b)


y
180
160
140
120
100
80
60
40
20
0
20
40
60
80
100
120
140
160
180
x
(100, 150)
R