Skema PPC kertas 2 set 1 2020

	Skema pemarkahan	
1	a). Use $S_n or\ T_n$ $S_n = \frac{n}{2}[2(10) + (n-1)(2)]$ or $T_n = 109 + (n-1)(9)$ K1 Equate $S_n = T_n$ $\frac{n}{2}[2(10) + (n-1)(2)] = 109 + (n-1)(9)$ K1 $n = 10$ N1 OR listing method P=10,22,36,52,70,90,112,136,162,190 Q=109,118,127,136,145,154,163,172,181,190 b). Use S_n $S_{10} = \frac{10}{2}[2(10) + (9)(2)]$ K1 190 N1 OR listing method	5
2	a). i). $fg(3) = 3(1 - 3(3)) - 1$ $fg(3) = -25$ N1 ii). Find inverse of $f(x)$, $f^{-1}(x) = \frac{x+1}{3}$ K1 $f^{-1}g(5) = \frac{(5+3)+1}{3}$ $f^{-1}g(5) = 3$ N1 b). i). $g^2(x) = \frac{1 + \left(\frac{1+x}{1-x}\right)}{1 - \left(\frac{1+x}{1-x}\right)}$ K1 $g^2(x) = -\frac{1}{x}$ N1 ii). $g^4(x) = * - \frac{1}{\left(-\frac{1}{x}\right)}$ $g^4(x) = x$ N1	

	iii). $*g^4(x) = x$ and use $g^{36}(x) = g^4(x)$ K1 N1 $g^{37}(x) = \frac{1+x}{1-x}$	8
3	a). $t = 4$ P1 Equation of OA and use $m_1 \times m_2 = -1$ to find gradient $y = 2x$ Or other valid method K1 Substitute $(2, *4)$ into equation $*4 = -\frac{1}{2}(2) + c$ K1 N1 $y = -\frac{x}{2} + 3$ b). Use point $C\ (-4, y)$ and $ZC = ZA$ $\sqrt{(x-(-4))^2 + (y-y)^2} = \sqrt{(x-2)^2 + (y-*4)^2}$ OR other valid method K1 N1 $0 = 12x + y^2 - 8y + 4$	6
4	Find / construct equation $\frac{y+3}{4} = x^2$ N1 $x - 2 = 5 - y$ N1 $y = 7 - x$ or $x = 7 - y$ P1 Substitute $y = 7 - x$ or $x = 7 - y$ into $\frac{y+3}{4} = x^2$ $\frac{*(7-x)+3}{4} = x^2$ or $\frac{y+3}{4} =* (7-y)^2$ K1 Use formulae $y = \frac{-*(-57) \pm \sqrt{*(-57)^2 - 4(*4)(*193)}}{2(*4)}$ Or other valid method K1 $x = -1.711, y = 8.711$ N1 $x = 1.461, y = 5.539$ N1	7

5

a). Use trigonometry to find O to PS

$\sin a = \frac{10}{15}$

$\angle POS = \frac{83.62^\circ}{180^\circ} \times \pi$ K1

1.4596 N1

b). Use trigonometry to find BY,

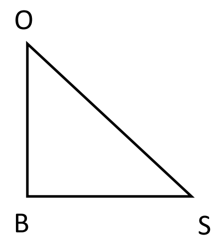
$BY = OY - OB$

$OB = \frac{10}{tan * 41.81^\circ}$

Or

$OB = \sqrt{15^2 - 10^2}$

$BY = 15 -* 8.944$ K1

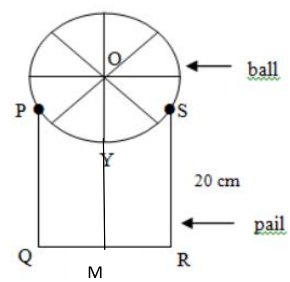


Find YM,

$YM = BM - BY$ K1

$YM = 20 -* 3.8195$

N1 16.1805



c).

Find area of chord PSY

$\frac{1}{2}(15)^2(* 1.4596 - sin * 83.62^\circ)$ K1

$Area\ of\ section\ PYSRQ = area\ of\ PQRS - area\ of\ chord * PSY$

$20 \times 20 -* 52.4$ K1

N1 $347.6cm^2$

Marks: 8

6

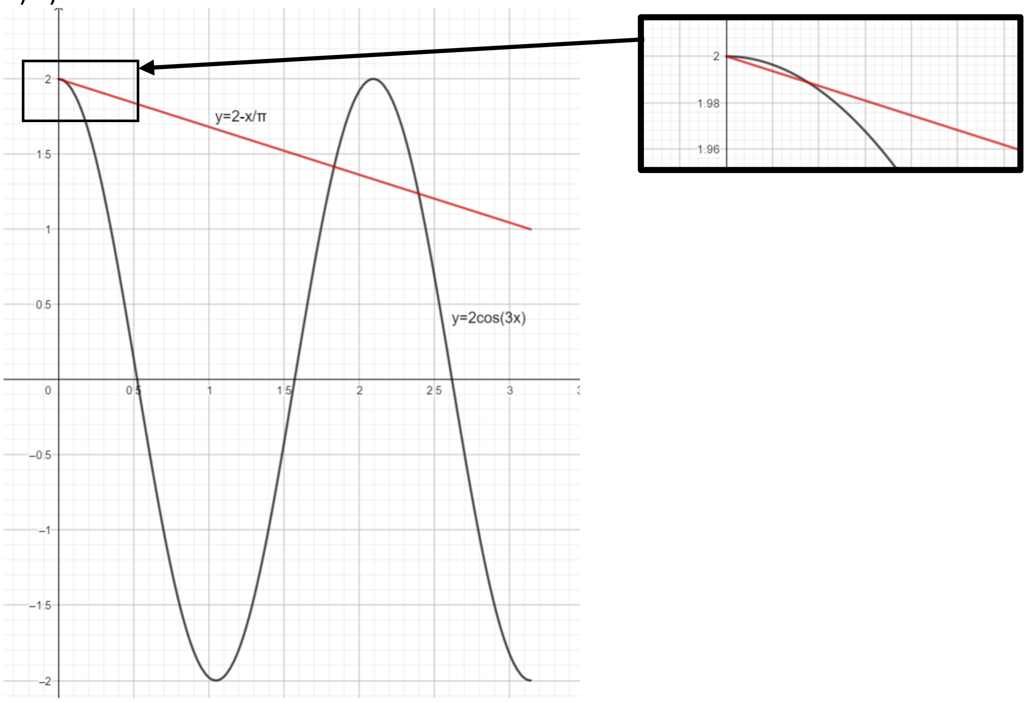
a). Find radius of water surface using Pythagoras theorem

$x = \sqrt{8^2 - (8 - h)^2}$ K1

N1 $Area\ of\ water\ surface = \pi(16h - h^2)$

	b). Differentiate $A = \pi(16h - h^2)$ $\frac{dA}{dh} = 16\pi - 2\pi h$ K1 Use chain rule and substitute $h = 6$ $\frac{dA}{dt} = \frac{dA}{dh} \times \frac{dh}{dt}$ K1 $\frac{dA}{dt} = \pi(16 - 2(6)) \times 0.2$ N1 $0.8\pi cm^2 s^{-1}$ c). $\frac{dV}{dt} < 0$ N1	6
7	a). Substitute trigonometry by using $sekA = \frac{1}{kosA}$ and $tanA = \frac{sinA}{kosA}$ $\frac{1 + \frac{1}{kosA}}{\frac{sinA}{kosA} + sinA}$ K1 N1 $\frac{1}{sinA} = kosecA$ Find basic angle $sinA = \frac{1}{3}$ $basic\ angle = 19.47°$ K1 N1 $A = 19.47°, 160.53°.$	

b). i).



Graph of cos x / sin x **N1**

Amplitude = 2 **N1**

1.5 cycle for $0 \leq x \leq \pi$ **N1**

ii). Equation of straight line $y = 2 - \frac{x}{\pi}$ **P1**

No of solution =4 **N1** **K1** Sketch the graph of straight line

10

8 a). i). Use triangle law and find $\overrightarrow{BD}$,

$\overrightarrow{BD} = \overrightarrow{BA} + \overrightarrow{AD}$

$-\underset{\sim}{x} + \underset{\sim}{y}$ **N1**

ii). Substitute $\overrightarrow{BD} = -\underset{\sim}{x} + \underset{\sim}{y}$ and find $\overrightarrow{BF}$

$\overrightarrow{BF} = \frac{2}{5} * \left(-\underset{\sim}{x} + \underset{\sim}{y} \right)$ **K1**

Use triangle law and find $\overrightarrow{AF}$

$\overrightarrow{AF} = \overrightarrow{AB} + \overrightarrow{BF}$

N1 $\frac{3}{5}\underset{\sim}{x} + \frac{2}{5}\underset{\sim}{y}$

	b). i). Find $\overrightarrow{AC}$ and use $\overrightarrow{AC} = \frac{\overrightarrow{AF}}{m}$, $\overrightarrow{AC} = \frac{3}{5m}\underset{\sim}{x} + \frac{2}{5m}\underset{\sim}{y}$ K1 Use triangle law to find $\overrightarrow{DC}$ $\overrightarrow{DC} = \overrightarrow{DA} + \overrightarrow{AC}$ N1 $\overrightarrow{DC} = \frac{3}{5m}\underset{\sim}{x} + \left(\frac{2}{5m} - 1\right)\underset{\sim}{y}$ ii). Use triangle law to find $\overrightarrow{DC}$ and use $\overrightarrow{BC} = \frac{n\overrightarrow{AD}}{5}$ $\overrightarrow{DC} = \overrightarrow{DB} + \overrightarrow{BC}$ $\underset{\sim}{x} + \left(\frac{n}{5} - 1\right)\underset{\sim}{y}$ N1 c). Equate $\underset{\sim}{x}$ $\frac{3}{5m} = 1$ K1 N1 $m = \frac{3}{5}$ Equate coefficient $\underset{\sim}{y}$ and substitute $m = * \frac{3}{5}$ $\frac{2}{5 * \left(\frac{3}{5}\right)} - 1 = \frac{n}{5} - 1$ K1 N1 $n = \frac{10}{3}$	10
9	a).i). Use Binomial formulae and find $P(X = 1)$ ${}^{5}C_1(0.6)(0.4)^4$ K1 N1 0.0768 ii). Use Binomial formulae $P(X = 0) = {}^{5}C_0(0.4)^0(0.6)^5$ K1 $P(X < 3) = P(X = 0) + P(X = 1) + P(X = 2)$ ${}^{5}C_0(0.4)^0(0.6)^5 + {}^{5}C_1(0.4)^1(0.6)^4 + {}^{5}C_2(0.4)^2(0.6)^3$ OR ${}^{5}C_3(0.6)^3(0.4)^2 + {}^{5}C_4(0.6)^4(0.4)^1 + {}^{5}C_5(0.6)^5$ K1 N1 0.3174	

	b). i). Use $Z = \frac{x-\mu}{\sigma}$, $P(X < 2) = 1 - P\left(Z > \frac{2-1.5}{0.2}\right)$ K1 $P(Z < 2.5) = 0.9938$ N1 ii). Find inverse normal from the area under z-score graph K1 Equate $Z = \frac{x-\mu}{\sigma}$ with the value of x-axis. $\frac{m-1.5}{0.2} =* -0.385$ K1 N1 $m = 1.423$	10
10	a). Equate the equation of straight line and the curve. $3x = -\frac{x^2}{2} + 8$ $x = -8, x = 2$ K1 $y = 3(2)$ $h = 2, k = 6$ N1 Substitute $y = 0$ and find the value of x, $0 = -\frac{x^2}{2} + 8$ $x = \pm 4$ N1 $m = 4$ b). Integrate $\int_2^4 -\frac{x^2}{2} + 8dx$ and substitute limit $\left[\frac{-x^3}{6} + 8x\right]_2^4$ K1 Find the area of triangle and add the area K1 $\frac{1}{2}(2 \times 6) + \left[\frac{-x^3}{6} + 8x\right]_2^4$ N1 $\frac{38}{3}$ unit^2	

c). Integrate $\int_0^6 \pi(16 - 2y)dy$
and substitute limit y=0 and y=6. K1

Find the volume of cone
$volume\ of\ cone = \frac{1}{3}\pi(2)^2(6)$ K1

subtract
$\left[16y - y^2\right]_0^6 - 8\pi$ K1

N1 52π

10

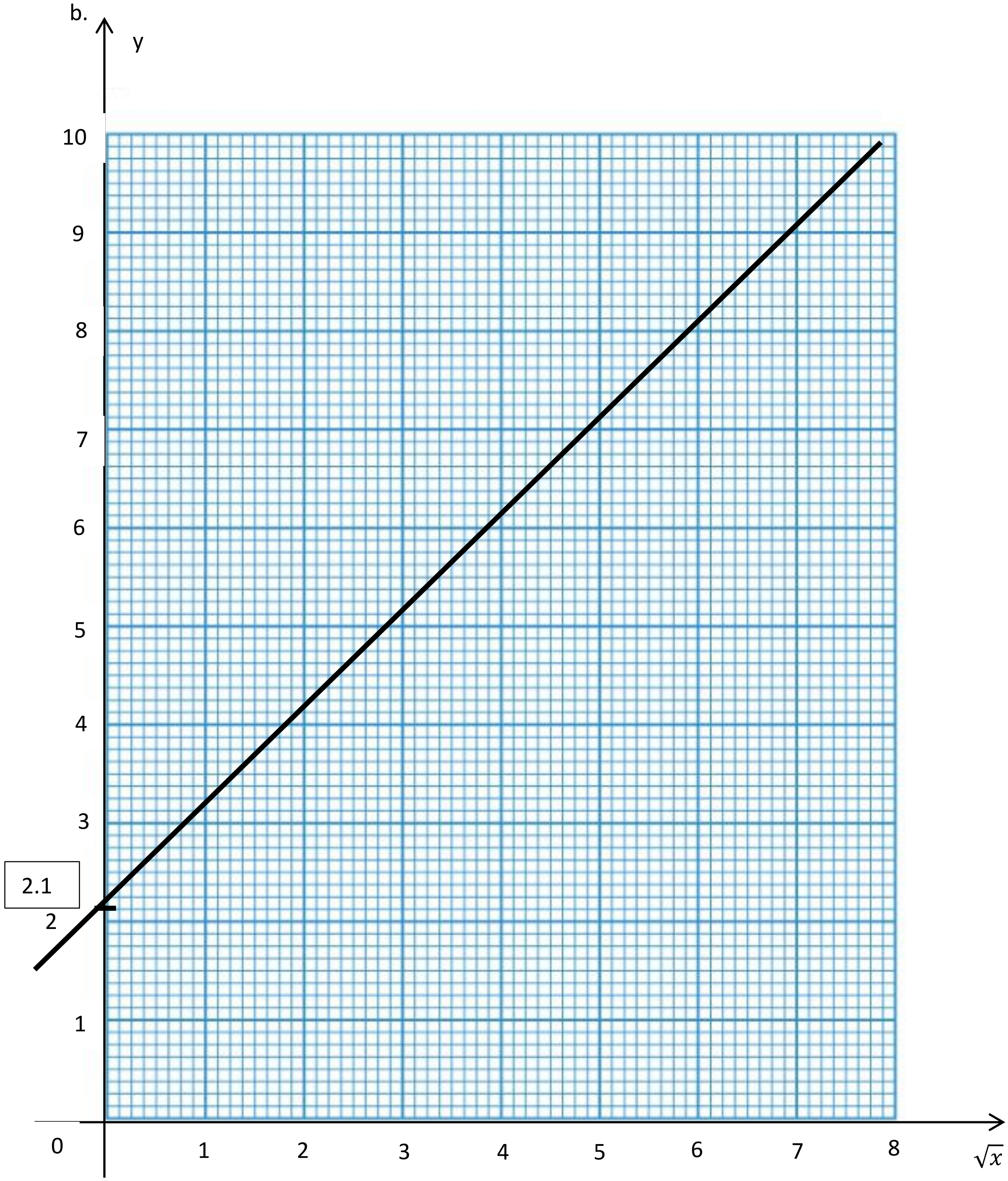
11 11. a

$\sqrt{x}.$	3.16	4.47	5.48	6.32	7.07	7.75

Table for the values of $\sqrt{x}$

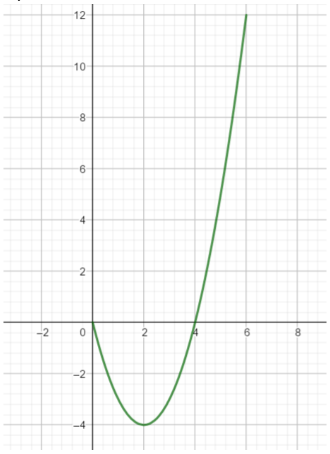
N1

b.



	Correct axes, uniform scale and one point correctly plotted K1 All points correctly plotted N1 Line of best fit N1 c. i. y = 5a$\sqrt{x}$ + b P1 Find and equate gradient with 5a K1 a = 0.196 N1 ii. use b = y-intercept K1 b = 2.1 N1 iii. x = 36 N1	10
12	a). Find first equation when $t = 4, v = 0$, P1 $16p + 4q = 0$ Find second equation when $t = 1, a = -2$ P1 $2p + q = -2$ Solve simultaneous equation $16p + 4q = 0$ and $2p + q = -2$ K1 N1 $p = 1, q = -4$ b). Differentiate V and equate to 0 and find time for turning point. $t^2 - 4t < 0$, K1 $0 < t < 4$ N1	

c).



U shape and (2,-4), (6,12) N1

d). Integrate $\int_3^4 t^2 - 4t\, dt$ K1

Substitute limit t=3 and t=4 K1

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

N1 $1\frac{2}{3}$

10

13 a). i). $P_{2014} = \frac{105 \times 75}{100}$ K1

N1 $P_{2014} = RM78.75$

ii). $P_{2008} = \frac{183 \times 100}{122}$ K1

N1 $P_{2008} = 150$

b). Equate

$$108 = \frac{110 \times 3 + 105 \times m + 120 \times m + 102 \times 2m}{3 + 4m}$$ K1

$m = 2$ N1

P1 Use ratio 3:∗ 2:∗ 2:∗ 4

Find $\bar{I}_{\frac{15}{08}}$,

$$\bar{I}_{\frac{15}{08}} = \frac{112 \times 3 + 107 \times * 2 + 122 \times * 2 + 107 \times * 4}{* 11}$$

OR

$$\frac{(* 101.82 \times 3) + (101.9 \times * 2) + (* 101.67 \times * 2) + (* 104.9 \times * 4)}{* 11}$$

Find $I_{\frac{15}{14}}$ for P,Q, R and S, (101.82, 101.9, 101.67, 104.9) K1

$\bar{I}_{\frac{15}{14}} = \frac{111.09}{108} \times 100$ K1

N1 $\bar{I}_{\frac{15}{14}} = 102.86 \leftrightarrow 102.93$

10

14

(i)Use cos rule

$13^2 = 12^2 + 15^2 - 2(12)(15)COS <DCE$ K1

$< PRS = 56.25^0$ N1

(ii)Find $\angle BCA$,

$< BCA = 180^0 - 56.25^0$ K1

$= 123.75^0$

Use sin rule

K1 $\frac{BC}{\sin 30} = \frac{30}{\sin 123.75}$

BC = 18.04 cm N1

(iii) $< ABC = 180^0 - 30^0 - (180^0 - 56.25^0)$

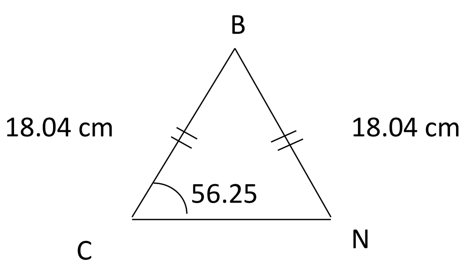
$= 26.25^0$

Use formulae area of triangle

K1 Area of $\Delta ABC = \frac{1}{2}(30)(18.04) \sin 26.25$

N1 $= 119.68 \text{ cm}^2$

(b)



Find$\angle$NBC

$< NBC = 180^0 - 2(56.25^0)$ K1

$= 67.50^0$

Use sin rule OR cos rule

K1 $\frac{CN}{\sin 67.50} = \frac{18.0403}{\sin 56.25}$

N1 BC = 20.0453 cm

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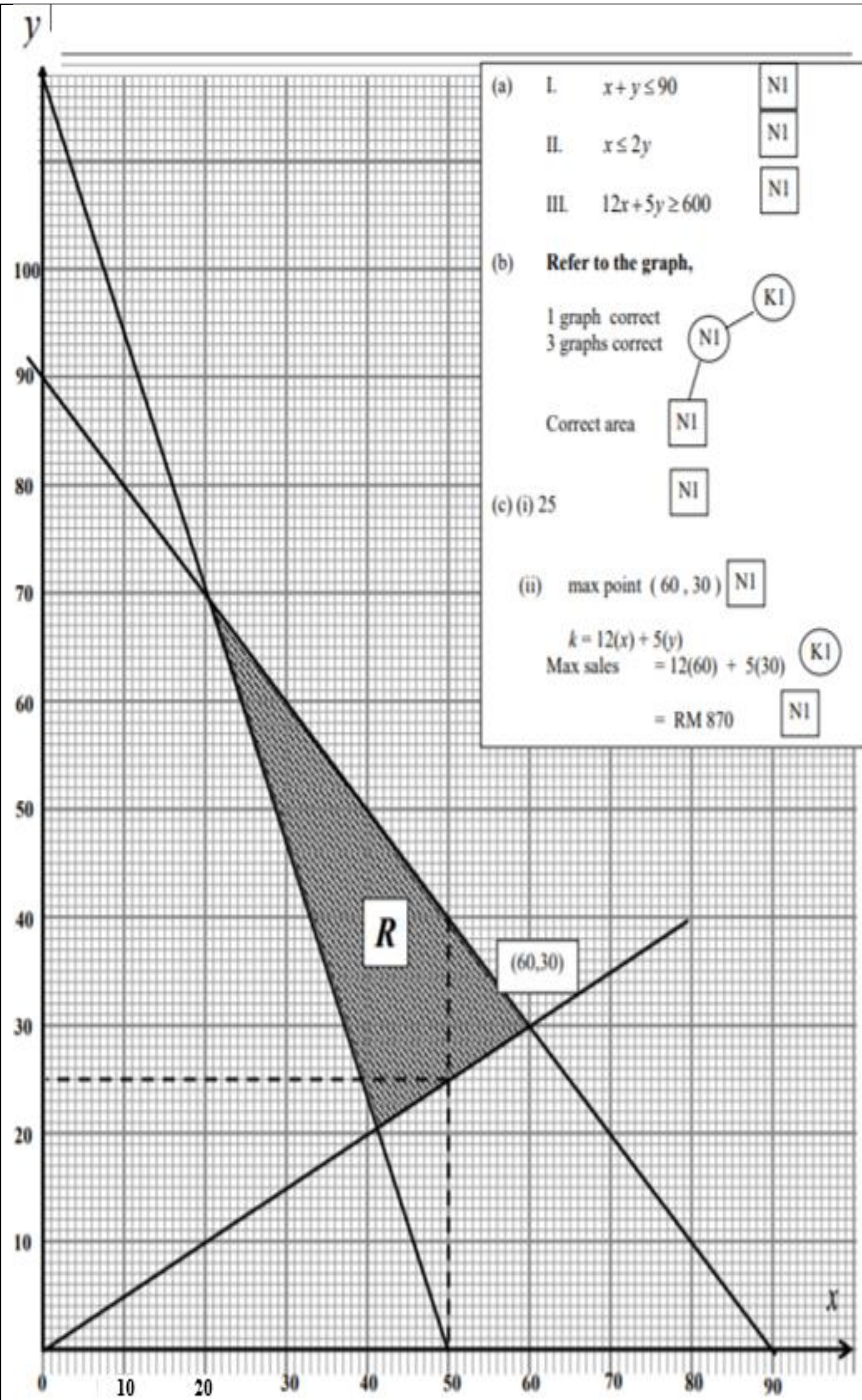
15



(a) I. $x + y \le 90$ N1

II. $x \le 2y$ N1

III. $12x + 5y \ge 600$ N1

(b) **Refer to the graph,**

1 graph correct K1

3 graphs correct N1

Correct area N1

(c) (i) 25 N1

(ii) max point (60 , 30) N1

$k = 12(x) + 5(y)$

Max sales $= 12(60) + 5(30)$ K1

$=$ RM 870 N1

10