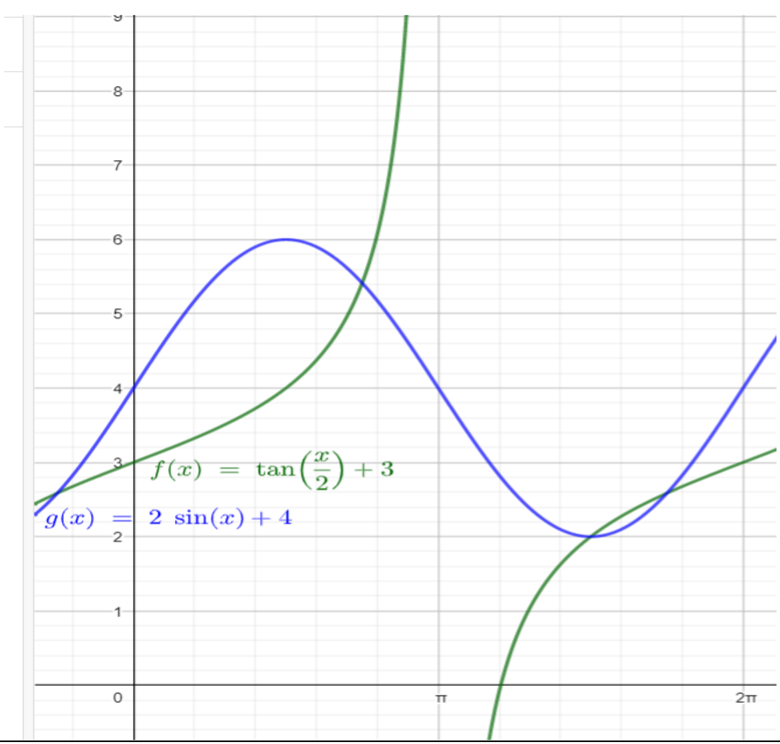
Skema PPC kertas 2 set 1 2021

	Skema pemarkahan	
1	$q = 1 - 2p$ P1 Substitute linear equation into non-linear equation $2p^2 + (1-2p)^2 + p(1-2p) = 7$ or $2\left(\frac{1-q}{2}\right)^2 + q^2 + \left(\frac{1-q}{2}\right)q$ K1 Solve quadratic equation $p = \frac{-(-3) \pm \sqrt{(-3)^2 - 4(4)(-6)}}{2(4)}$ OR other valid method K1 $p = 1.656$, $p = -0.906$ or $q = 2.812$, $q = -2.312$ N1 $p = 1.656$, $p = -0.906$ or $q = 2.812$, $q = -2.312$ N1	5
2	$i)$ use $s = r\theta$ to find arc length QSR or OPQ or OTR $QSR = \frac{1}{2}(2\pi)(5) = 5\pi$ $OPQ = \frac{1}{2}(2\pi)(9) = 9\pi$ or $OTR = \frac{1}{2}(2\pi)(4) = 4\pi$ K1 $2(5\pi + 9\pi + 4\pi)$ K1 36π N1	

	ii) use $A = \frac{1}{2}r^2\theta$ to find area of QSR or OPQ or OTR $\frac{1}{2}(\pi)(5)^2$ or $\frac{1}{2}(\pi)(9)^2$ *or* $\frac{1}{2}(\pi)(4)^2$ K1 Subtract semicircle OPQ with semicircle OTR $\frac{1}{2}(\pi)(9)^2 - \frac{1}{2}(\pi)(4)^2$ K1 Compute $2\left(\frac{25}{2}\pi + \frac{65}{2}\pi\right)$ K1 N1 90π	**7**
3	(a) Use $r = \frac{T_{n+1}}{T_n}$, r = $\frac{x}{256}$ = $\frac{4096}{x}$ K1 x = 1024 r =$\frac{1024}{256}$ N1 r = 4 use $S_n = \frac{a(r^n-1)}{r-1}$ or $\frac{a(1-r^n)}{1-r}$ to find first term $S_4 = \frac{a(4^4-1)}{4-1} = 85$ K1 N1 a = 1 (b) Use $T_n > 12000$ K2 $ar^{n-1} > 12000$ $1(4)^{n-1} > 12000$ Use logarithms in order to find n (n-1) log 4 > $\log 12000$ K1 n-1 > $\frac{\log 12000}{log 4}$ N1 n= 8	8

4	a). $m = \frac{2}{5}$ P1 use formula to find equation of straight line and find y-intercept $7 = \frac{2}{5}(2) + c$ or other valid method K1 N1 $5y = 2x + 31$ b) use the formula division of line segment $\frac{2(3)+6}{4}$ or $\frac{7(3)-3}{4}$ K1 N1 $\left(3, \frac{9}{2}\right)$ c). use $\frac{1}{2}\begin{vmatrix} 0 & 2 & 6 & 0 \\ 0 & 7 & -3 & 0 \end{vmatrix}$ $\frac{1}{2}\lvert -6 - 42 \rvert$ K1 N1 24	**7**
5	a)  	

Graph of tangent P1

½ cycle for $0 \leq x \leq 2\pi$ P1

Shifted to +3 for y-axis P1

Note : 1. Ignore graph outside range
2. SS-1 if no asymptote

b) y = 2 sin x + 4 N1

K1 Sketch the graph of y = 2 sin x + 4

N1 No. of solutions = 3

C) $\frac{2\sin\theta\, cos\theta}{1+(2\cos^2\theta-1)}$

Use $2\cos^2\theta - 1 = cos2\theta$ or $sin2\theta = 2sin\theta cos\theta$ K1

$\frac{sin\,\theta}{\cos\theta} = tan\theta$ N1

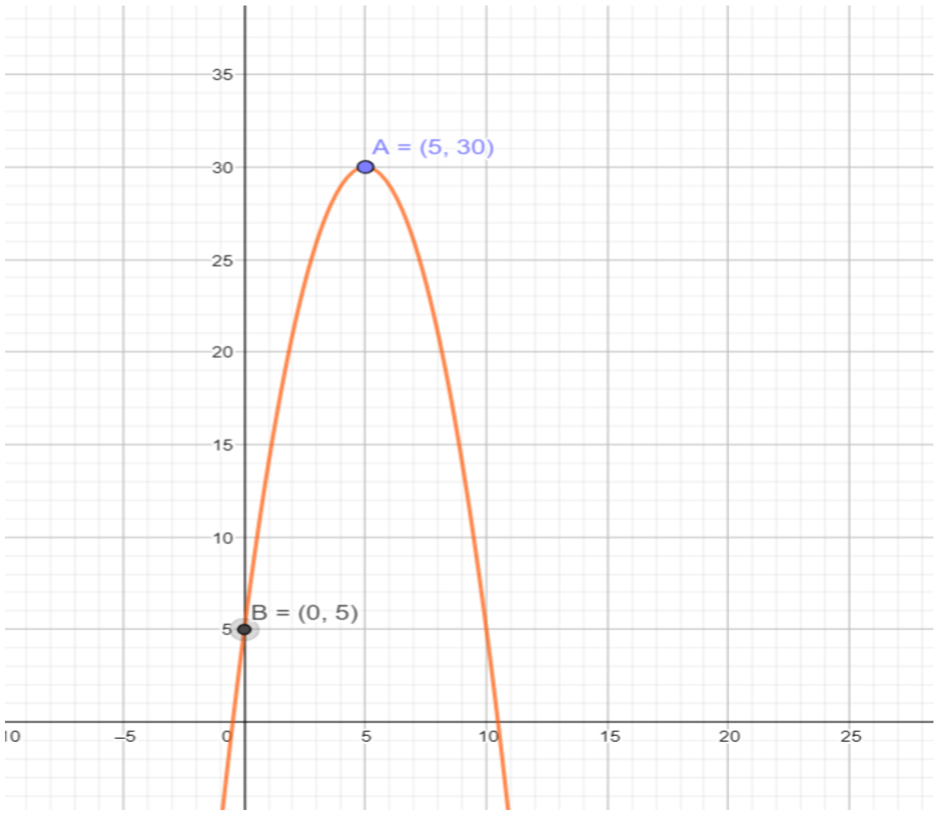
8

6

a) Use completing square

$$f(x) = -\left[x^2 - 10x + \left(\frac{-10}{2}\right)^2 - \left(\frac{-10}{2}\right)^2 - h\right]$$ K1

X = 5 N1



Shape ∩ N1

y-intercept (0,5) K1

Max point (5,30) N1

b). $f(x) = -3(x-1)(x+\frac{1}{3})$ K1

N1 p=1 OR q=1/3 OR a= -3

N1 p=1 , q=1/3 , a= -3

8

7

a)(i) Equate $\frac{dy}{dx} = 0$,

$\frac{dy}{dx} = 8 - p^3 = 0$ K1

N1 $p = 2$

ii) Differentiate $\frac{dy}{dx}$ and substitute $p = 2$

$\frac{d^2y}{dx^2} = -3(* 2)^2 = -12$ K1

N1 $\frac{d^2y}{dx^2} < 0$, Hence,(2, 3) is maximum

.

b) Differentiate $y = 3x^2 + 4x - 2$

$\frac{dy}{dx} = 6x + 4$ K1

Substitute $x = 1$ $into$ $\frac{dy}{dx}$ and find y-intercept.

$\frac{dy}{dx} = 6(-1) + 4$ K1

$3 = -2(-1) + c$

c = 1

N1 $y = -2x + 1$

7

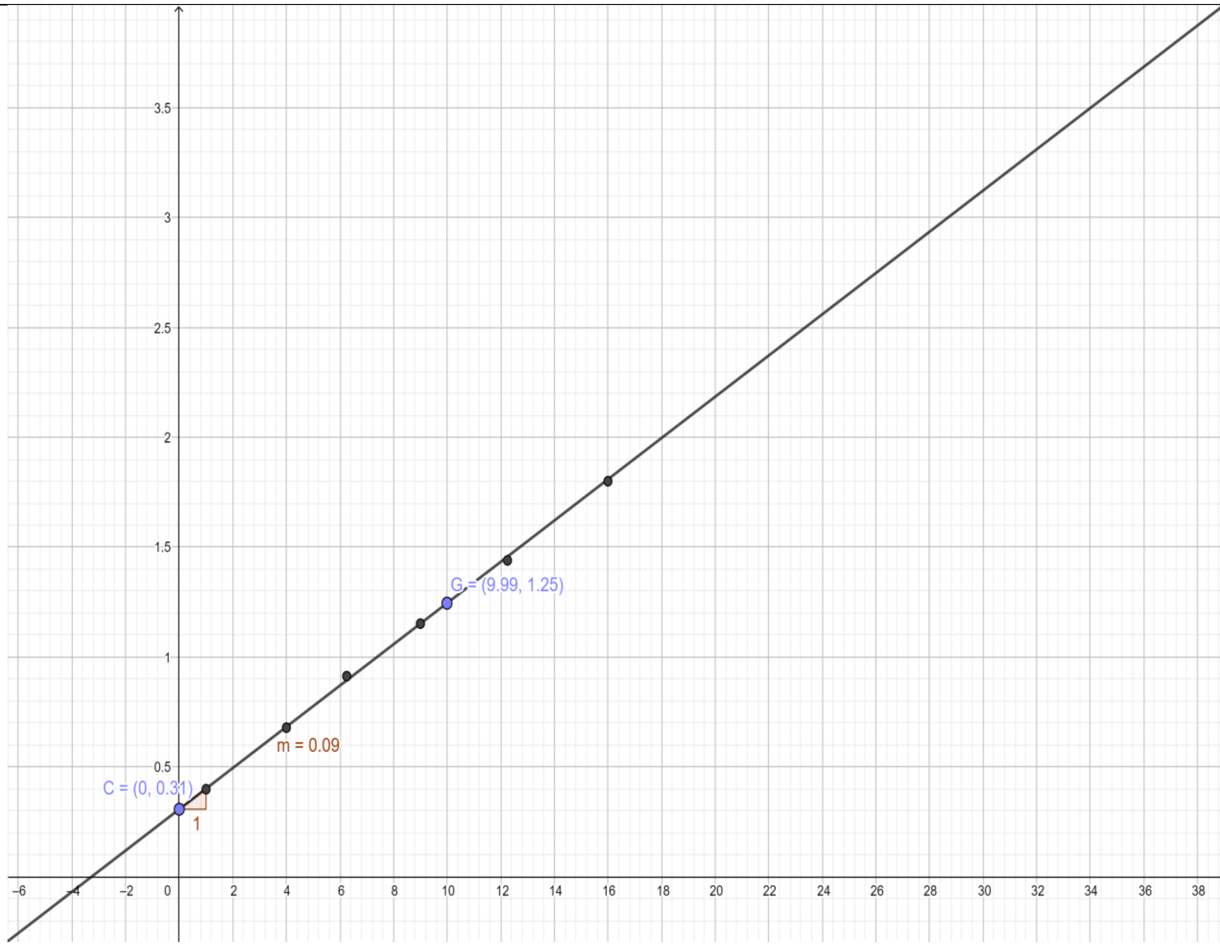
8

a)

$log_{10}y$	0.3997	0.6794	0.9138	1.1526	1.44	1.80
x^2	1	4	6.25	9	12.25	16

N1

N1



Plot $\log y$ against x^2 — K1

6 *points plotted correctly — N1

Line of best fit — N1

If table not shown, all the points are correctly plotted, award N1

b)
$log_{10}y = -log_{10}W\ (x)^2 + log_{10}P$ — P1

i) Use $*c = log_{10}P$ — K1

$log_{10}p$ =0.31,

P=2.0417
(2.0 ≤p<2.1) — N1

ii) Use $*m = -log_{10}W$ — K1

$-log_{10}W = 0.09$
$w = 0.8128$ (ft) — N1

(iii) y=17.78 — N1

Note : SS-1 if part of scale is not uniformat the x^2-axis or not using graph paper

10

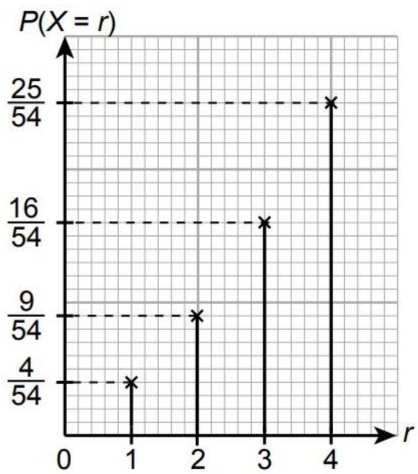
9 a). (i). Substitute r=1,2,3,4 into $P(X = r)$

$m(1+1)^2 + m(2+1)^2 + m(3+1)^2 + m(4+1)^2$ K1

$54m = 1$

N1 $m = \frac{1}{54}$

(ii)



*Correct axis K1

* all points plotted correctly N1

(a) $z = 1.281$ N1

$\frac{m-59.7}{11.2} =* 1.281$ K1

$m = 74.05$ N1

$P(Z \leq z) = 0.3612$ N1

Find the probability in correct region

$\frac{n-59.7}{11.2} = -0.355$ K1

$n = 55.72$ N1

10

10	a (i) Use triangle law $\overrightarrow{DB} = \overrightarrow{DO} + \overrightarrow{OB}$ K1 N1 $-6\underline{u} + 9\underline{v}$ * (ii) $\overrightarrow{OC} = \overrightarrow{OD} + \overrightarrow{DC}$ $6\underline{u} + \frac{1}{6} * \overrightarrow{DB}$ K1 N1 $5\underline{u} + \frac{3}{2}\underline{v}$ (iii) $\overrightarrow{EC} = \overrightarrow{ED} + \overrightarrow{DC}$ $= -3\underline{u} + \frac{3}{2}\underline{v} - \underline{u}$ K1 N1 $-4\underline{u} + \frac{3}{2}\underline{v}$ b) $\overrightarrow{EA} = \overrightarrow{EO} + \overrightarrow{OA}$ $\overrightarrow{EA} = -9\underline{u} + 3\underline{v}$ K1 $\lambda_1 = \frac{-9}{-4}, \lambda_2 = \frac{3}{\frac{3}{2}}$ K1 N1 $\lambda_1 \neq \lambda_2$ Points E, C and A is not collinear LRT will not pass-through building C N1	10
11	a) $\int (4 - x^2) dx$ $A_1 = 4x - \frac{x^3}{3}$ K1 K1 Use $\int_{-2}^{0}$ in $4x - \frac{x^3}{3}$ $A_1 = 5\frac{1}{3}$ $\int_{-2}^{0} 2x + 4\, dx$ or Find area of triangle $A_2 = \frac{1}{2}(2)(4)$ K1 K1 $A_1 - A_2$ $A_1 > A_2$ N1 $1\frac{1}{3}$	

b) $\int 4 - y \, dy$

$4y - \frac{y^2}{2}$ K1

Use $\int_0^4$ in $4y - \frac{y^2}{2}$

$V_1 = \pi \left[16 - \frac{16}{2}\right] - 0$ K1

$V_2 = \pi \int_0^4 \left(\frac{y-4}{2}\right)^2 dy$ or find volume of cone

$V_2 = \frac{1}{3}\pi(2^2)(4)$ K1

$V_2 = \frac{16}{3}\pi$

$V_1 - V_2$

$V_1 > V_2$ K1

$\frac{8}{3}\pi$ N1

10

12

a)

use $I = \frac{Q_1}{Q_o} \times 100$

$\frac{2.00}{1.60} \times 100 = p$ or $\frac{q}{4.00} \times 100 = 120$ or $\frac{1.60}{r} \times 100 = 80$ K1

p = 125 N1 q = RM4.80 N1 r = RM2 N1

b) i

$$\frac{125 * (60) + 120(100) + 150(120) + 80(80)}{360}$$ K1

121.9 N1

ii) * 121.9 = $\frac{40}{x}$ x 100 K1

RM32.81 N1

c) $\frac{*121.9}{100}$ x $\frac{140}{100}$ x 100 K1

170.66 N1

10

13

(a) Integrate

$s_A = \int (4t - 7)\,dt$ or $s_B = \int (6 - 2t)\,dt$ — K1

$s_A = = 2t^2 - 7t + c_A$

$s_B = \int (6 - 2t)\,dt$

$= 6t - t^2 + c_B$

Substitute

$t = 0$, $s_A = 0$, $s_B = 10$, — K1

$s_A = 2t^2 - 7t$

$s_B = 6t - t^2 + 10$

Find t when $v_A = 0$,

$4t - 7 = 0$

$t = \frac{7}{4}$ — K1

$s = s_B - s_A$

$= (6t - t^2 + 10) - (2t^2 - 7t)$ — K1

$= -3t^2 + 13t + 10$

$= -3\left(\frac{7}{4}\right)^2 + 13\left(\frac{7}{4}\right) + 10$

$= \frac{377}{16}$ — N1

(b) Differentiate $s = -3t^2 + 13t + 10$ and $\frac{ds}{dt} = 0$,

$\frac{ds}{dt} = -6t + 13$

$\frac{d^2s}{dt^2} = -6 < 0$, maksimum

$-6t + 13 = 0$ — K1

$t = \frac{13}{6}$ — N1

(c) Use $s = 0$,

$-3t^2 + 13t + 10 = 0$

$(3t + 2)(t - 5) = 0$ — K1

$t = -23$ or/*atau* $t = 5$ — N1

$t \geq 0$, $t = 5$.

$s_A = 2(5)^2 - 7(5)$

$= 15$ — N1

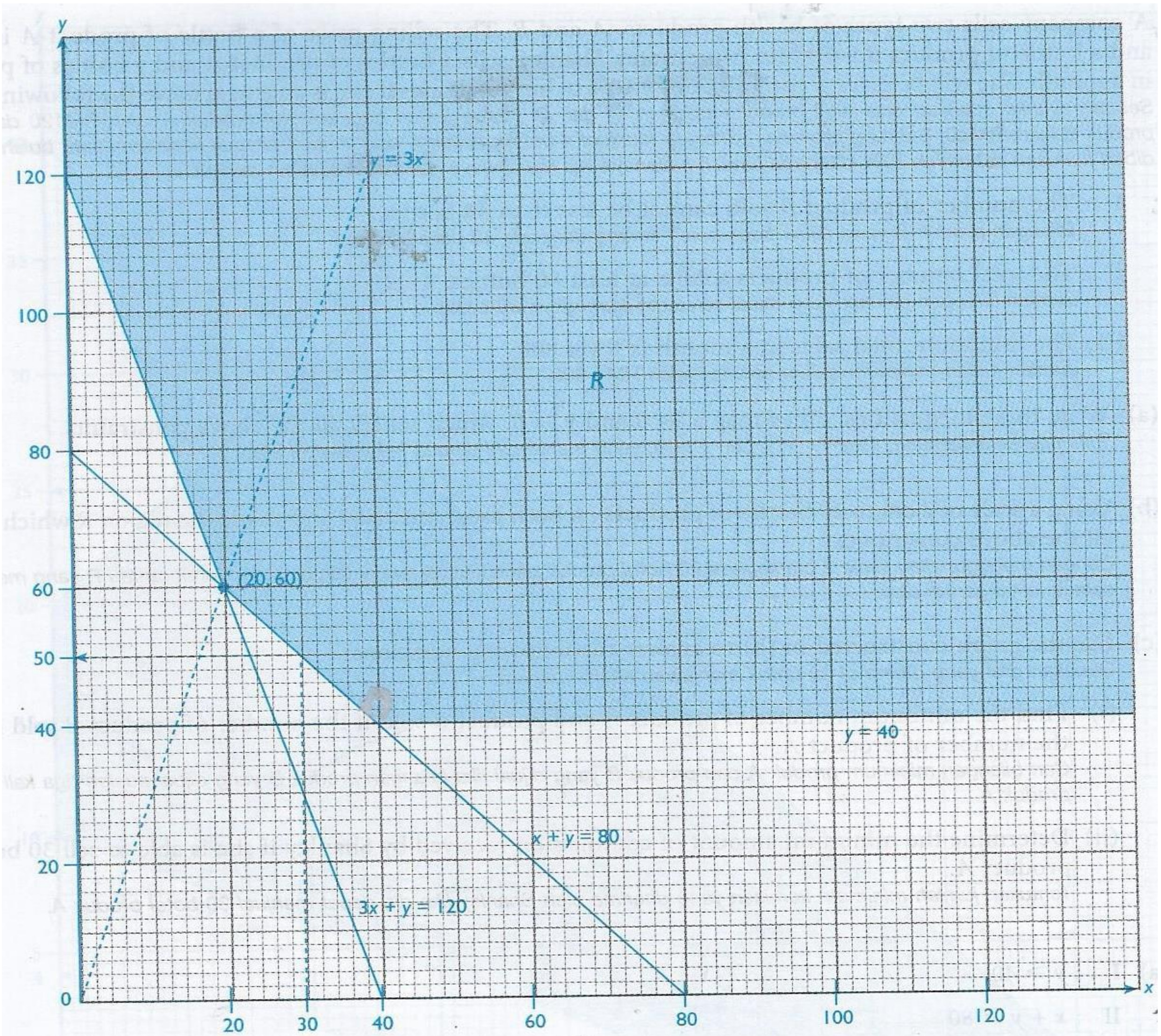
10

14	(a)(i) Use Cos rule $AC^2 = 8^2 + 14^2 - 2(8)(14)\cos 73^{o}$ K1 N1 AC = 13.947 cm (ii) ∡ ADC = 180° - 73° = 107° P1 *Use Sine rule* $\frac{\sin \measuredangle ACD}{4} = \frac{\sin 107^o}{13.947}$ ∡ ACD = 15.92° K1 Or Other valid method ∡ CAD = 180° -15.92° - 107° K1 N1 = 57.08° / 57° 5' (b) (i) Use $A = \frac{1}{2}ab\sin c$ or heron formulae Area ABC = $\frac{1}{2}$ x 8 x 14 x sin 73°. K1 N1 = 53.553 cm² *(i)* $\frac{1}{2}$ x *13.947 x h = *53.553 K1 N1 h = 7.68 cm	**10**

a) . I: $y \geq 40$ N1

II: $x + y \geq 80$ N1

III: $120x + 40y \geq 4800$
$3x + y \geq 120$ N1



b). Draw correctly at least one straight line from the *inequalities K1

Draw correctly all *straight lines . Notes : accept dotted lines N1

The correct region shaded N1

	c). i. straight line y = 3x passing through optimum point (20,60) Product A=20 bottles, product B=60 bottles N1 ii. (30,50) N1 [120(30) + 40(50)] x 10% K1 N1 RM560	