MAJLIS PENGETUA SEKOLAH MALAYSIA (MPSM)
CAWANGAN KELANTAN

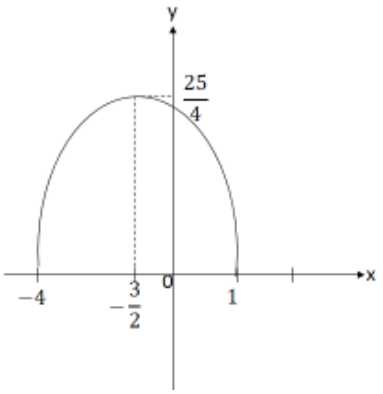
TINGKATAN 5
2020

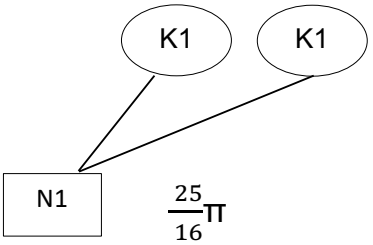
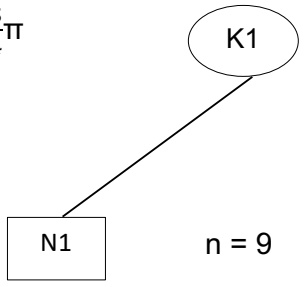
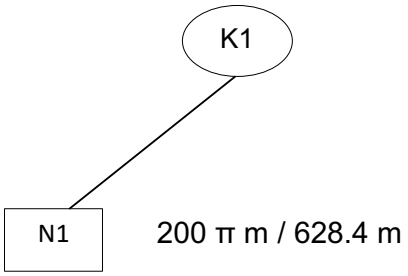
ADDITIONAL MATHEMATICS

KERTAS 2

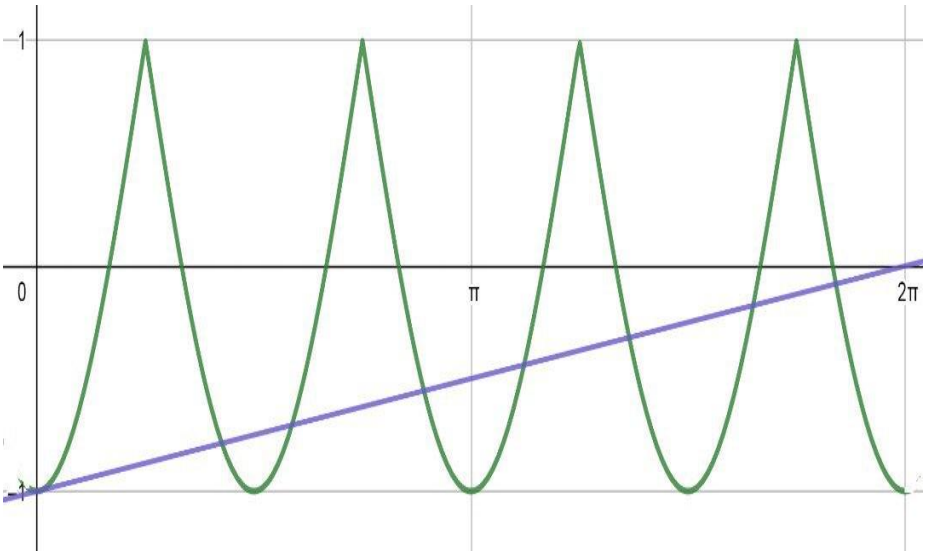
UNTUK KEGUNAAN PEMERIKSA SAHAJA

SKEMA PEMARKAHAN

NO	SOLUTION AND MARK SCHEME	SUB MARKS	TOTAL MARKS
1.			
(a)	$f(x) = -(x^2 + 3x + (\frac{3}{2})^2 - (\frac{3}{2})^2 - 4)$ OR equavalent $f(x) = -(x + \frac{3}{2})^2 + \frac{25}{4}$ K1 K1 $(-\frac{3}{2}, \frac{25}{4})$ N1	3	
(b)	 Shape N1 Maximum point N1 X intercept N1	3	
(c)	$0 \le f(x) \le \frac{25}{4}$ N1	1	
			7

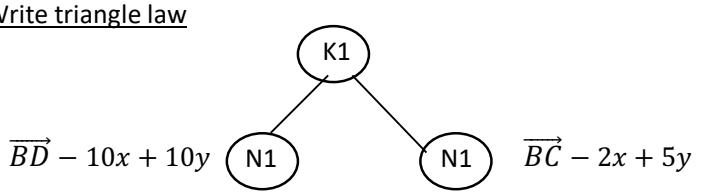
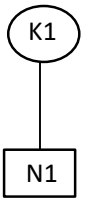
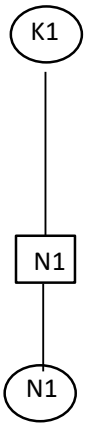
NO	SOLUTION AND MARK SCHEME	SUB MARKS	TOTAL MARKS
2.			
(a)	$T_7 = 100\pi\ (\frac{1}{2})^{7-1}$ 	3	
(b)	$100\pi\ (\frac{1}{2})^{n-1} = \frac{25}{64}\pi$ 	2	
(c)	$\frac{100\,\pi}{1-\frac{1}{2}}$ 	2	
			7

NO	SOLUTION AND MARK SCHEME	SUB MARKS	TOTAL MARKS
3.			
(a)	$x + 2(2x + 6) = 20$ or $\frac{y-6}{2} + 2y = 20$ K1 N1 $(\frac{8}{5}, \frac{46}{5})$	2	
(b)	$\sqrt{(20 - \frac{8}{5})^2 + (0 - \frac{46}{5})^2}$ K1 20.57 K1 $40 = \frac{20.57}{time}$ K1 $80 = \frac{s}{0.5143}$ $t_p = t_Q$ 41.14 N1	4	
			6

O	SOLUTION AND MARK SCHEME	SUB MARKS	TOTAL MARKS
4 (a)			
	Shape of $kos\ 2x$ N1		
	Max and min $y = -2kos2x$ N1		
	2 cycles for $0 \leq x \leq 2\pi$ N1		
	Modulus graph N1	4	
(b)	$y = \frac{x}{2\pi} - 1$ N1		
	Graph straight line c=-1 and m positive N1		
	Number of solutions = 8 N1	3	
			7

NO	SOLUTION AND MARK SCHEME	SUB MARKS	TOTAL MARKS
5	$x - 3y + 4 = 5$ P1 $y(x + 2y) = 5$ P1 $x = 1 + 3y$ or $y = \frac{x-1}{3}$ P1 $y(1 + 3y + 2y) = 5$ or $\frac{x-1}{3}\left(x + 2\left(\frac{x-1}{3}\right)\right) = 5$ K1 Solve the quadratic equation K1 **Formulae** $y = \frac{-(1)\pm\sqrt{(1)^2-4(5)(-5)}}{2(5)}$ or $x = \frac{-(-7)\pm\sqrt{(-7)^2-4(5)(-43)}}{2(5)}$ $y = 0.905,\ y = -1.105$ N1 Or $x = 3.715,$ x$= -2.315$ $x = 3.715,$ x$= -2.315$ N1 Or $y = 0.905,\ y = -1.105$	7	7

NO	SOLUTION AND MARK SCHEME	SUB MARKS	TOTAL MARKS
6(a)	$\frac{dV}{dt} = \frac{0.316-0.054}{25}$ K1 $\frac{131}{12500}$ or 0.01048 N1	2	
(b)	$\frac{dV}{dr} = 4\pi r^2$ or $\frac{dA}{dr} = 8\pi r$ K1 K1 Substitute $r = 1.2$ $\frac{dA}{dt} = \frac{dV}{dt} \times \frac{dA}{dr} \times \frac{dr}{dV}$ K1 $\frac{131}{12500} \times 8\pi r \times \frac{1}{4\pi r^2}$ $\frac{131}{450}$ or 0.2911 N1	4	
			6

NO	SOLUTION AND MARK SCHEME	SUB MARKS	TOTAL MARKS
7 (a)	Write triangle law  	3	
(b)(i)	$\overrightarrow{AC} = 8x + 5y$  $\overrightarrow{AF} = \frac{k}{1+k}(12x - 5y)$		
(ii)	$\overrightarrow{ED} = -4x + 10y$  $\overrightarrow{AF} = (4 - 4h)x + 10hy$	4	
(c)	Equate and solve coefficient of x or y $\frac{8k}{1+k} = 4 - 4h$ or $\frac{5k}{1+k} = 10h$  $k = \frac{2}{3}$ $h = \frac{1}{5}$	3	
			10

NO	SOLUTION AND MARK SCHEME	SUB MARKS	TOTAL MARKS
8 (a)(i)	mean, $\mu = 500$ N1	1	
(ii)	$P(Z > \frac{m-500}{100}) = 0.2$ K1 $\frac{m-500}{100} = 0.842$ K1 $m = 584.2$ N1 Ahmad qualify/ *layak* 585 > 584.2 N1	4	
(b)(i)	$P\left(\frac{400-500}{100} \le z \le \frac{680-500}{100}\right)$ or $P(-1 \le z \le 1.8)$ K1 0.80541 N1	2	
(II)	$n = \frac{1252}{0.8054}$ K1 0.2(1554) K1 310 / 311 N1	3	
			10

NO	SOLUTION AND MARK SCHEME	SUB MARKS	TOTAL MARKS
9 (a)	$120^0 \times \frac{\pi}{180^0}$ K1 $\frac{2\pi}{3}$ N1	2	
(b)(i)	$Sin\ 60^0 = \frac{x}{j}$ P1 K1 Use $2\,j\,sin\frac{\theta}{2}$ $2\left[\frac{\sqrt{3}}{2}\ j\right]$ $\sqrt{3}\,j$ N1	3	
(ii)	$sin60^0 = \frac{\sqrt{3}}{2}$ or $\theta = \frac{\pi}{3}$ or $\theta = \frac{2\pi}{3}$ P1 $A_1 = \pi j^2$ or $A_2 = \frac{1}{2}j^2\left(\frac{2\pi}{3}\right)$ K1 K1 $A_3 = \frac{1}{2}j^2\frac{\pi}{3} - \frac{1}{2}j^2\frac{\sqrt{3}}{2}$ $A_1 - A_2 - 2A_3$ K1 $\frac{\pi j^2}{3} + \frac{\sqrt{3}j}{2}$ N1	5	
			10

NO	SOLUTION AND MARK SCHEME	SUB MARKS	TOTAL MARKS
10 (a)			

$\frac{1}{u}$	0.80	0.50	0.33	0.25	0.21	0.17
$\frac{1}{v}$	0.35	1.60	2.25	2.55	2.75	2.90

N1

N1

2

(b) Plot $\frac{1}{v}$ against $\frac{1}{u}$ (Correct axes and uniform scales) — K1

6 *points plotted correctly — N1

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

Line of best fit (At least *5 points plotted) — N1

3

(c)(i) $u = 2.33 \pm 0.1$ N1

$\frac{1}{v} = \frac{2k}{hu} + \frac{9}{h}$ P1

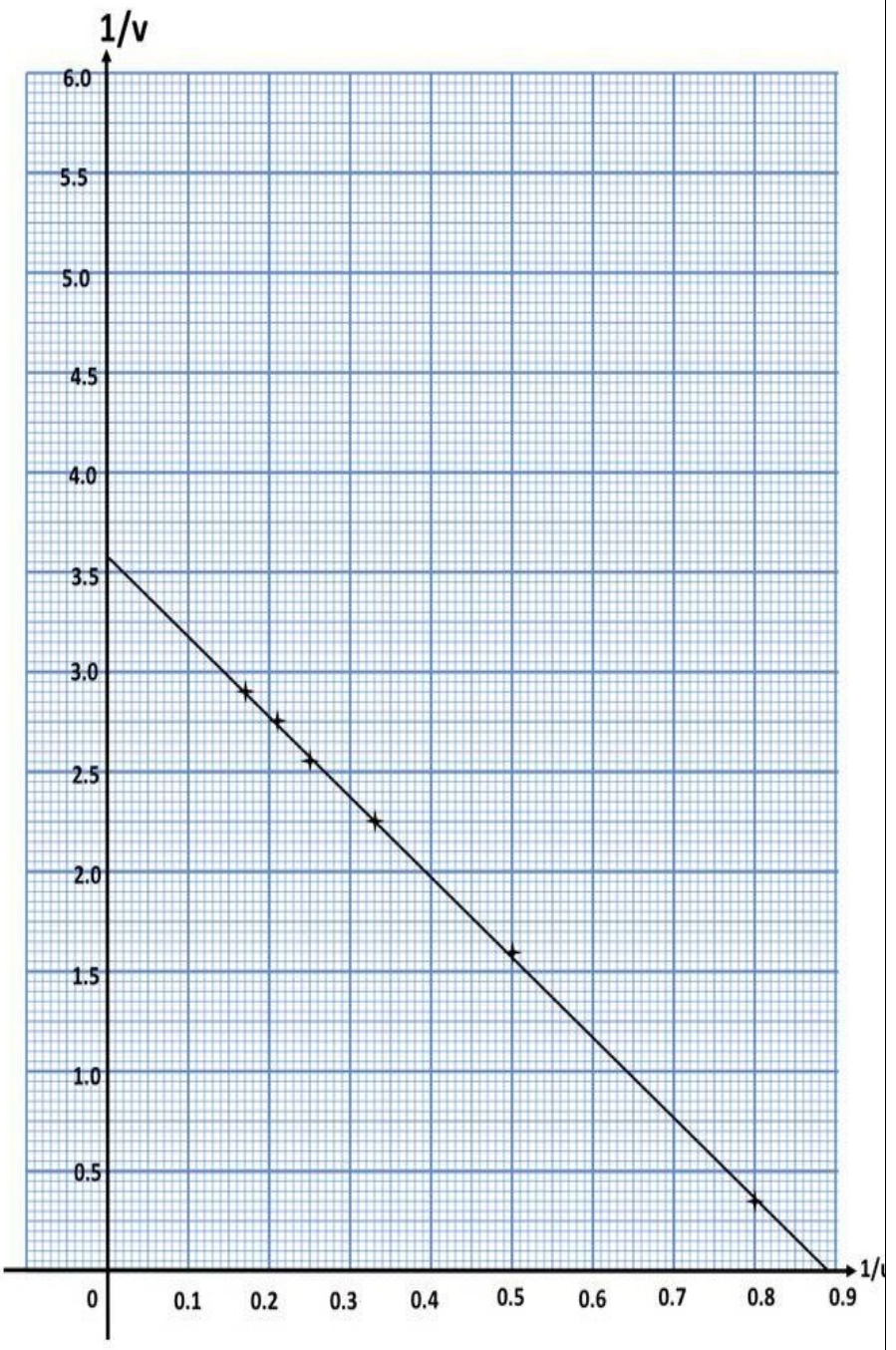
Use $c = \frac{9}{h}$ *or* $m = \frac{2k}{h}$ — K1

$h = 2.54$ N1

$k = -5.14$ N1

5

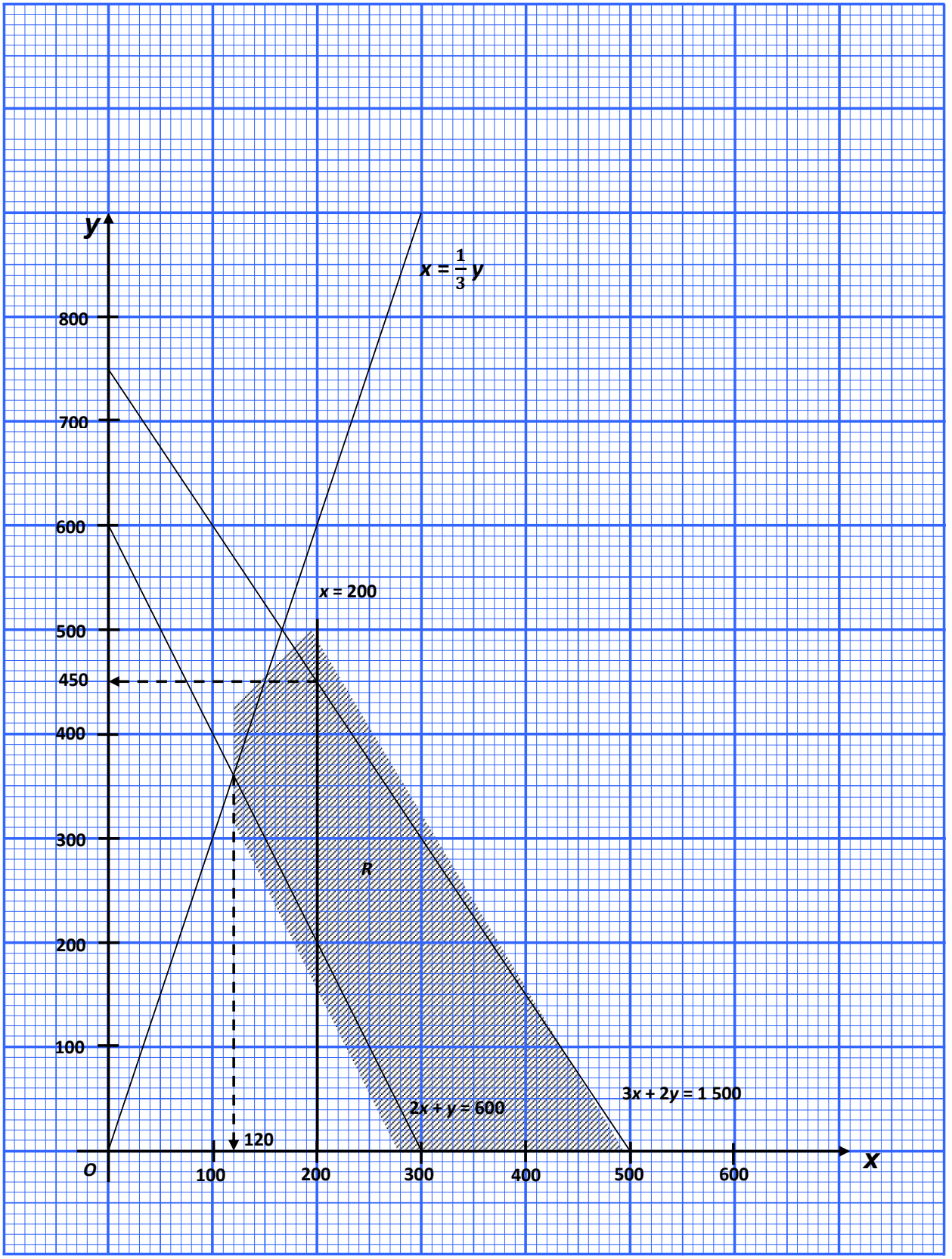
10

NO	SOLUTION AND MARK SCHEME	SUB MARKS	TOTAL MARKS
10			

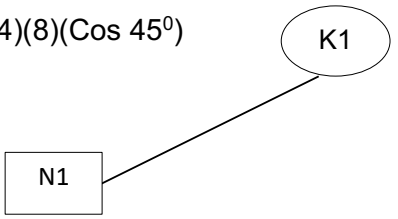
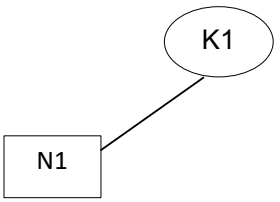
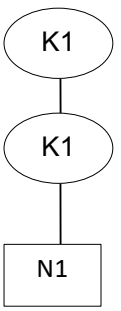
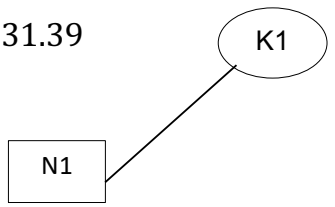
NO	SOLUTION AND MARK SCHEME	SUB MARKS	TOTAL MARKS
11 (a)	$3 = 4 - \frac{x^2}{4}$ K1 $x = 2, x = -2$ N1 $BC = 4$ N1	3	
(b)	$\int_{-2}^{2}\left[4 - \frac{x^2}{4}\right]dx$ K1 $\left[4x - \frac{x^3}{12}\right]_{-2}^{2}$ K1 $\left[4(2) - \frac{2^3}{12}\right] - \left[4(-2) - \frac{(-2)^3}{12}\right]$ K1 14.67 or $\frac{44}{3}$ N1	4	
(c)	$4(1)$ K1 $\frac{44}{3} + 4(1)$ K1 18.67 or $\frac{56}{3}$ N1	3	
			10

NO	SOLUTION AND MARK SCHEME	SUB MARKS	TOTAL MARKS
12			
(a)	r = 6 P1 substitute t=3 in equation V $p(3)^2 + q(3) + 6 = 42$ K1 $\frac{dv}{dt} = 2pt + q$ K1 $9p + 3q = 36$ OR $6p + q = 0$ K1 $p = -4$ and $q = 24$ N1	5	
(b)	$t = \frac{-(-24) \pm \sqrt{(24)^2 - 4(-4)(6)}}{2(-4)}$ K1 $-4t2 + 24t + 6 = 0$ $t = 3 + \frac{1}{8}\sqrt{672}$ N1	2	
(c)	$s = \frac{4}{3}t^3 + \frac{24}{2}t^2 + 6t$ K1 substitute t = 6 or t = 5 in equation S $s = \frac{4}{3}(6)^3 + \frac{24}{2}(6)^2 + 6(6)$ or $s = \frac{4}{3}(5)^3 + \frac{24}{2}(5)^2 + 6(5)$ K1 $\frac{778}{3}$ N1	3	
			10

NO	SOLUTION AND MARK SCHEME	SUB MARKS	TOTAL MARKS
13. a)	(i) $x \geq \frac{1}{3}y$ or $y \leq 3x$ N1 (ii) $12x + 8y \leq 6000$ or $3x + 2y \leq 1500$ N1 (iii) $8x + 4y \geq 2400$ or $2x + y \leq 600$ N1	3	
(b)	graph- attachment - draw correctly at least one straight line from * inequalities involves x and y K1 - draw correctly ***ALL*** the * straight line N1 Note: Accept dotted line Region shaded correctly. N1	3	
(c)	(i) 120 N1 (ii) (200, 450) N1 seen 450 8(200) + 4 (450) K1 8x + 4y (profit equation) N1 RM 3400.00	4	
	Noted: inequality for which no symbol "=" is accepted		10


y
x = 1/3 y
800
700
600
x = 200
500
450
400
300
R
200
100
2x + y = 600
3x + 2y = 1 500
120
O
100
200
300
400
500
600
x

NO	SOLUTION AND MARK SCHEME	SUB MARKS	TOTAL MARKS
14. (a)	(i) $135 = \frac{210}{Q_{2018}} X\ 100$ K1 RM 155.56 N1	2	
	(ii) $\frac{120}{100} X \frac{130}{100} X\ 100$ K1 156 N1 Increase 56 % N1	3	
(b)	(i) p = 15 N1 $\frac{(135\ X\ 50)+(y\ X\ 25)+(120\ X\ 15)+(70\ X\ 10)}{50+25+p+(p-5)}$ = 119.50 K1 108 N1	3	
	(ii) $108 = \frac{Q_{2020}}{130} X\ 100$ K1 RM 140.40 N1	2	
			10

NO	SOLUTION AND MARK SCHEME	SUB MARKS	TOTAL MARKS
15. (a)	(i) $BD^2 = 3.74^2 + 8^2 - 2(3.74)(8)(\text{Cos } 45^0)$ 		
	5.973 km	2	
	(ii) $\frac{Sin \angle ACD}{8} = \frac{Sin\ 45^0}{7.85}$ 		
	46.11^0	2	
	Noted: $\angle ACD = \angle BCD$		
	(iii)  88.89^0		
	A = $\frac{1}{2}$ x 8 x 7.85 x Sin 88.89^0	3	
	31.39 km^2		
(b)	The farthest hotel from hotel A is hotel C because the distance between them faces the largest angle N1	1	
(c)	$\frac{1}{2}$ x 8 x (shortest distance) = 31.39 		
	7.848 km	2	
			10