Solution	Marks	Remarks
1. (a) $x=\frac{y-3}{2}$ (or $\frac{y-3}{2}$)	1A	
(b) $(a+b)(x+2y)$	1A	No mark if parenthesis is missed
(c) $4\sqrt{3}$	1A	
(d) (i) 50	1A	In (d), accept ans. written in order
(ii) 65	1A	
(iii) 60	1A	
	6	
2. (a) $\frac{3\pi}{4}$ (or 0.75π)	1A	
(b) 144	1A	
(c) 216	1A	
(d) 5π (or 15.7)	1A	r.t. 15.7
(e) 8 : 27 (不接納 27:8)	1A	Accept $\frac{8}{27}$ etc.
(or 1:3.38, 0.296:1, $2^3:3^3$)		r.t 3 sig. fig.
	5	
3. $(k+3)(k-2)+2 = k^2$	1A	
$k^2+k-4 = k^2$	1A	
$k = 4$	1A	
OR by long division, $[(x+3)(\cancel{x}-2)\mp 2]+(x-k) = (x+k+1)\ldots(k^2+k-4)$		
$\therefore k^2+k-4 = k^2$	2A ~~1A + 1A~~	
$k = 4$	1A	
	3	
4. (a) $x = k\frac{y^2}{z}$ (for some constant $k \neq 0$) (可不寫)	1A	
$54 = k\frac{3^2}{10}$		
$k = 60$	1A	
$\therefore x = 60\frac{y^2}{z}$		
(b) When $y = 5$, $z = 12$,		
$x = \frac{60\times 5^2}{12} = 125$	1A	
OR $\frac{54\cdot 10}{3^2} = \frac{x\cdot 12}{5^2}$, $x = 125$	1A	
	3	

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Solution	Marks	Remarks
15. (a) (i) The number of babies born in Hong Kong in the first year after 1994 $= 70000 \times 1.02$ $= 71400$	1A	
(ii) The number of babies born in Hong Kong n the nth year after 1994 $= 70000(1.02)^n$ or $71400 \times 1.02^{n-1}$	1A	Accept $70000(1+\cancel{20\%}\,2\%)^n$
(b) If $70000(1.02)^n > 90000$	1M	Accept using $=$, $\geq$, $\leq$, $<$
then $n\log(1.02) > \log(\frac{9}{7})$	1M (可逐個n值去試)	For taking logarithm, may be absorbed by $n=13$ or $n>12.7$ in what follows
$n > 12.69$ ∴ In the 13th year after 1994, the number of babies born in Hong Kong will exceed 90000. i.e. In the year 2007.	1A	
(c) The total number of babies born in Hong Kong in the years 1997 to 2046 inclusive $= 70000(1.02^3 + 1.02^4 + \ldots + 1.02^{52})$ $= 70000(1.02)^3(1 + 1.02 + 1.02^2 + \ldots + 1.02^{49})$ $= 70000(1.02)^3(\frac{1.02^{50} - 1}{1.02 - 1})$	1M + 1A	1M for sum of G.P. {要出現70000 及1.02
≈ 6282944 ≈ 6280000	1A	r.t. 6 280 000
(d) (i) The leap years between 1997 to 2046 are 2000, 2004, ..., 2044. Number of leap years $= \frac{2044 - 2000}{4} + 1$ $= 12$	1A	
(ii) $70000(1.02^6 + 1.02^{10} + \ldots + 1.02^{50})$ $= 70000(1.02)^6(1 + 1.02^4 + \ldots + 1.02^{44})$ $= 70000(1.02)^6\frac{(1.02)^{4\times 12} - 1}{(1.02)^4 - 1}$	1M + 1A	1M for sum of G.P. {要出現1.02^4 及1.02之次數是4之倍數
≈ 1517744 ≈ 1520000	1A	r.t. 1 520 000

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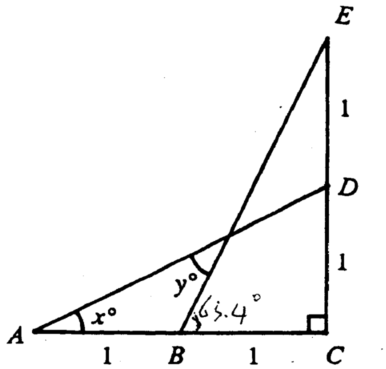
Solution	Marks	Remarks
5. (a) $BE = \sqrt{1^2+2^2} = \sqrt{5}$ (or 2.24)	1A	r.t. 2.24
(b) $\tan x^\circ = \frac{1}{2}$ (or $\sin x^\circ = \frac{1}{\sqrt{5}}$)	1A	
$x \approx 26.57$		
≈ 26.6	1A	r.t. 26.6; accept 26°34′
$\tan\angle EBC = 2$, $\angle EBC = 63.43°$		
$y \approx 63.43 - 26.57$		
≈ 36.9	1A	r.t. 36.9 , accept 36°52′
	4	



Solution	Marks	Remarks
6. (a) Selling Price = \$ $x(1+70\%)(1-5\%)$	1A	
Percentage gain = $\frac{(1.7)(0.95)x - x}{x} \times 100\%$	1M	
= 61.5%	1A	
OR $(1+70\%)(1-5\%)-1$	1A + 1M	
= 61.5%	1A	
(b) $x = \frac{2907}{(1+61.5\%)}$	1M	
= 1800	1A	
	5	

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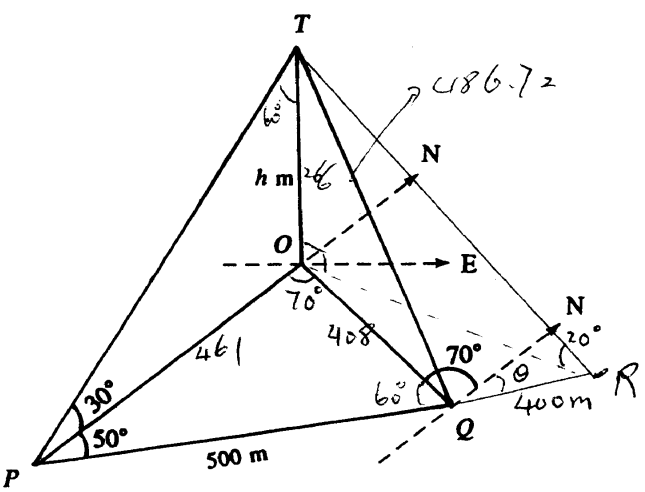
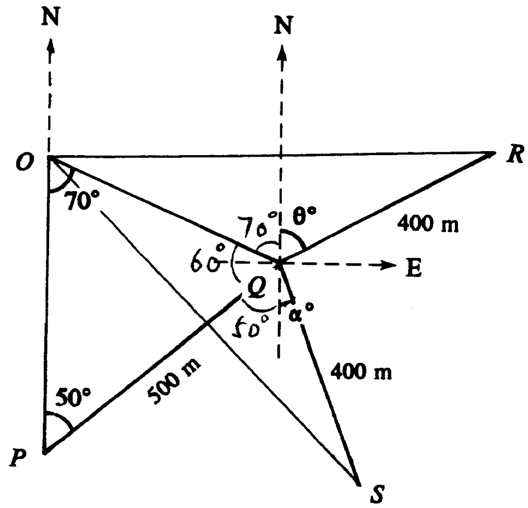
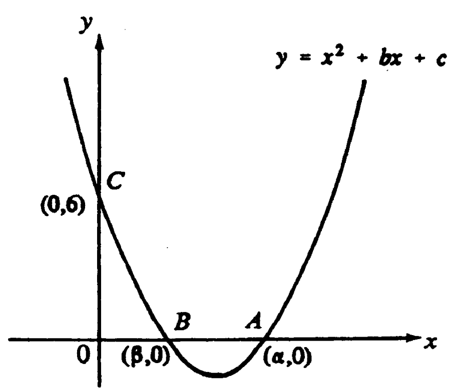
Solution	Marks	Remarks
14. (a) $\dfrac{OQ}{\sin 50°} = \dfrac{500}{\sin 70°} = \dfrac{OP}{\sin 60°}$	1A	For either
$OQ = \dfrac{500\sin 50°}{\sin 70°} \approx 407.60$ (m)		
≈ 408 (m)	1A	r.t. 408
$OP = \dfrac{500\sin 60°}{\sin 70°} \approx 460.80$ (m)		
≈ 461 (m)	1A	r.t. 461
(b) $h = OP\tan 30°$		
$\approx (460.80)\tan 30°$	1M	(不必代OP之值)
≈ 266	1A	r.t. 266
(c) $\tan\angle TQO = \dfrac{h}{OQ} = \dfrac{266.044}{407.6} \approx 0.6527$	1M	不必代OQ之值)
$\angle TQO \approx 33.1° \approx 33°$	1A	
(d) (i) $OR = \dfrac{h}{\tan 20°} \approx 730.95 \approx 731$ (m)		
$\cos\angle OQR = \dfrac{(OQ)^2 + (QR)^2 - (OR)^2}{2(OQ)(QR)}$		
$= \dfrac{(407.60)^2 + (400)^2 - (730.95)^2}{2(407.60)(400)}$	1M	(不必代OQ, QR, OR之值)
≈ -0.6383		
$\angle OQR = 129.66° \approx 130°$	1A	r.t. 130
$\theta = 130 - 70$		
$= 60$	1A	
(ii) By symmetry, $\triangle OQR \equiv \triangle OQS$,		
$\therefore \angle OQR = \angle OQS$	1M	
$\alpha + 50 + 60 = 130$		
$\alpha = 20$		
The bearing of S from Q is S20°E (or 160°)	1A	

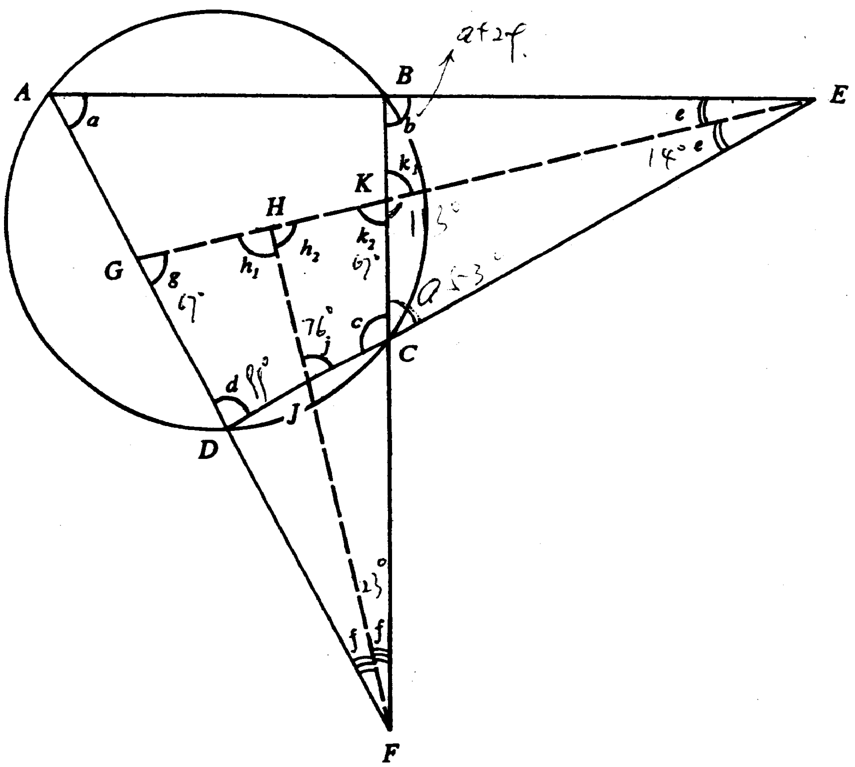




Solution	Marks	Remarks
7. (a) $\dfrac{(a^4b^{-2})^2}{ab} = \dfrac{a^8b^{-4}}{ab}$	1M	For applying $(a^pb^q)^n=a^{pn}b^{qn}$
$= \dfrac{a^8}{ab^{1+4}}$ } (容許跳一步)	1M	For applying $a^{-n}=\dfrac{1}{a^n}$
$= \dfrac{a^7}{b^5}$	1A	
(b) $\log\sqrt{12} = \dfrac{1}{2}(\log 12)$	1M	For applying $\log x^n = n\log x$
$= \dfrac{1}{2}(\log 4 + \log 3)$	1M	For applying $\log xy = \log x + \log y$
$= \dfrac{2x+y}{2}$ (or $x+\dfrac{y}{2}$)	1A	
	6	
8. (a) $c = 6$	1A	
$\alpha\beta = c = 6$	1A	
(b) $\alpha + \beta = -b$	1A	Accept $-\dfrac{b}{1}$
(c) $(\alpha-\beta)^2 = \alpha^2+\beta^2-2\alpha\beta$		
$= (\alpha+\beta)^2-4\alpha\beta$	1A	
$= b^2-24$	1A	
Area of $\Delta ABC = \dfrac{1}{2}(AB)(OC)$ (or $\dfrac{1}{2}\begin{vmatrix} 0 & 6 \\ \beta & 0 \\ \alpha & 0 \\ 0 & 6 \end{vmatrix}$)		
$= \dfrac{6}{2}(\alpha-\beta)$	~~1A~~	
$= 3\sqrt{b^2-24}$	1M+1A	
	7	



Solution	Marks	Remarks
13. (c)(ii) $\because \angle EKC = h_2+f, \quad c = \angle EKC+e$ $\therefore \angle EKC = 90°+23° = 113°$ $c = 113°+14°$ $= 127°$	1M 2A	For either
OR $\because c = b+2e, \quad b = a+2f$ $\therefore c = a+2f+2e = a+74°$ $\because a+c = 180°$ $\therefore c = (180°-c)+74°$ $= 127°$	1M 2A	For either
OR $g = 180°-f-h_1$ $= 180°-23°-90° = 67°$ $d = 180°-g-e$ $= 180°-67°-14° = 99°$ $c = 2f+180°-d$ $= 46°+180°-99°$ $= 127°$	1M 2A	
OR $\because 2a+2e+2f = 180°$ $\therefore a = 90°-14°-23° = 53°$ $c = 180°-a = 180°-53°$ $= 127°$	1M 2A	



Solution	Marks	Remarks
9. (a) (i) The probability that he will be late on all the three days		
$= (\frac{1}{7})^3$ (or $\frac{1}{7}\times\frac{1}{7}\times\frac{1}{7}$)	1A	
$= \frac{1}{343}$ (or 0.00292)	1A	r.t. 0.00292
(ii) The probability that he will not be late on all the three days		
$= (1-\frac{1}{7})^3$	1M	$(1-p)^3$, p in a(i)
$= \frac{216}{343}$ (or 0.630)	1A	r.t. 0.630
(b) (i) The probability that he will be late on Thursday and Friday only		
$= \frac{1}{10}\times\frac{1}{10}\times(1-\frac{1}{10})$	1A	
$= \frac{9}{1000}$ (or 0.009)	1A	
(ii) The probability that he will be late on any two of the three days		
$= \frac{1}{10}\times\frac{1}{10}\times(1-\frac{1}{10})+\frac{1}{10}\times(1-\frac{1}{10})\times\frac{1}{10}+(1-\frac{1}{10})\times\frac{1}{10}\times\frac{1}{10}$		
(or $3\times\frac{9}{1000}$)	1M	$3p$, p in (b)(i)
$= \frac{27}{1000}$ (or 0.027)	1A	
(c) The probability that he will be late for school on Sunday		
$= \frac{1}{2}\times\frac{1}{7}+\frac{1}{2}\times\frac{1}{10}$	1A	For the value $\frac{1}{2}$
	1M	For p_1+p_2
	1A	For the whole expression
$= \frac{17}{140}$ (or 0.121)	1A	r.t. 0.121

全無解釋 PP-1

Solution		Marks	Remarks
13. (a) In ΔBKE, $b+e+k_1 = 180°$	($\boxed{\angle \text{ sum of } \Delta}$) (or ∠ sum)	1	三角形內角和
$k_1 = 180° - b - e$			
Similarly, in ΔGDE,			
$g = 180° - d - e$			接納 ext. ∠, concyclic ext. ∠, cyclic 不接納 ext. ∠ cyclic quad.
$\because\ b = d$	($\boxed{\text{ext.}\angle\text{, cyclic quad.}}$)	1	圓內接四邊形外角 ext. ∠ = int. opp. ∠
$\therefore\ k_1 = g$			
$\because\ k_1 = k_2$	($\boxed{\text{vert. opp } \angle s}$)	1	對頂角 不接納 opp. ∠ vert. ∠ 接納 opp. vert. ∠
$\therefore\ g = k_2$			
i.e. $\angle FGH = \angle FKH$			
(b) In ΔFHG, $h_1+f+g = 180°$	($\angle$ sum of Δ)		
$h_1 = 180° - f - g$			
Similarly, in ΔFHK,			
$h_2 = \boxed{180° - f - k_2}$		1A	
$\because\ g = k_2$	(proved)		
$\therefore\ h_1 = \boxed{h_2}$		1A	
$\because\ h_1 + h_2 = 180°$	($\boxed{\text{adj. } \angle s \text{ on st. line}}$)	1	直線上的鄰角和 接納 ∠s on st. line ∠ sum on st. line ∠ sum on the line 不接納 adj. ∠s.
$\therefore\ 2h_1 = 180°$			
$h_1 = 90°$			
i.e. $FH \perp GK$			
(c)(i) In ΔEHJ, $h_1 = j + e$	($\boxed{\text{ext. } \angle \text{ of } \Delta}$) (or ext. ∠)	1	三角形外角
$j = h_1 - e$			
$= 90° - e$			
In ΔFHG, $g + h_1 + f = 180°$	($\angle$ sum of Δ)		
$g = 180° - h_1 - f$			
$= 180° - 90° - f$			
$= 90° - f$			
$\because\ \angle AED = \angle AFB$	(Given)		
$2e = 2f$			
$e = f$			
$\therefore\ \boxed{j} = g$	(ext. ∠ of quad. equal)	1A	
Hence, D,J,H,G are concyclic.	($\boxed{\text{ext.}\angle = \text{int. opp.}\angle}$)	1	外角=內對角 Converse of ext. ∠, cyclic quad. 圓內接四邊形外角的逆定理

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Solution	Marks	Remarks
10. (a) volume of water $= \pi(2)^2(1.5)\ m^3$		
$= 6\pi\ m^3$	1A	
(b) $\pi(2)^2 h = \frac{4}{3}\pi(0.6)^3$	1M + 1A	1M for an equation in h (any equation involving
$h = 0.072$ or $\frac{9}{125}$ (要約至最簡)	1A	
(c) $\frac{4}{3}\pi r^3 + 6\pi = \pi(2)^2(2r)$	1M + 1A	1M for an equation in r in the form of $x+y=z$, or equivalent, with exactly 2 terms in r
$2r^3 - 12r + 9 = 0$	1	f.t.
Let $f(r) = 2r^3 - 12r + 9$ (or $r^3 - 6r + 4.5$) (or $2r^2 - 12r + 9 = 0$) (若試 PP-1)		
$f(0.6) \approx 2.23 > 0$		
$f(1) = -1 < 0$		
$\therefore\ f(r) = 0$ has a root between 0.6 and 1	1M	Testing that the signs are different

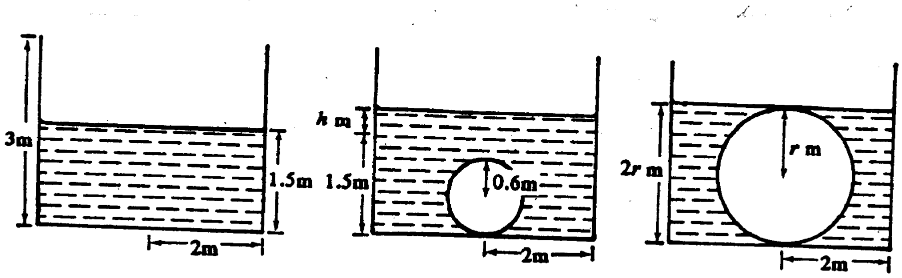
Interval	mid-value (r_i)	$f(r_i)$
$0.6 < r < 1$	0.8	+ve (0.424)
$0.8 < r < 1$	0.9	−ve (−0.342)
$0.8 < r < 0.9$	0.85	+ve (0.0283)
$0.85 < r < 0.9$	0.875	−ve (−0.160)
$0.85 < r < 0.875$	0.8625	−ve (−0.0668)
$0.85 < r < 0.8625$	0.85625	−ve (−0.0195)
$0.85 < r < 0.85625$	0.853125	+ve (0.00435)
$0.853125 < r < 0.85625$	0.8546875	−ve (−0.00757)

1M + 1A: 1 M for testing sign at mid-value; 1A for the correct sign of the function at mid-value

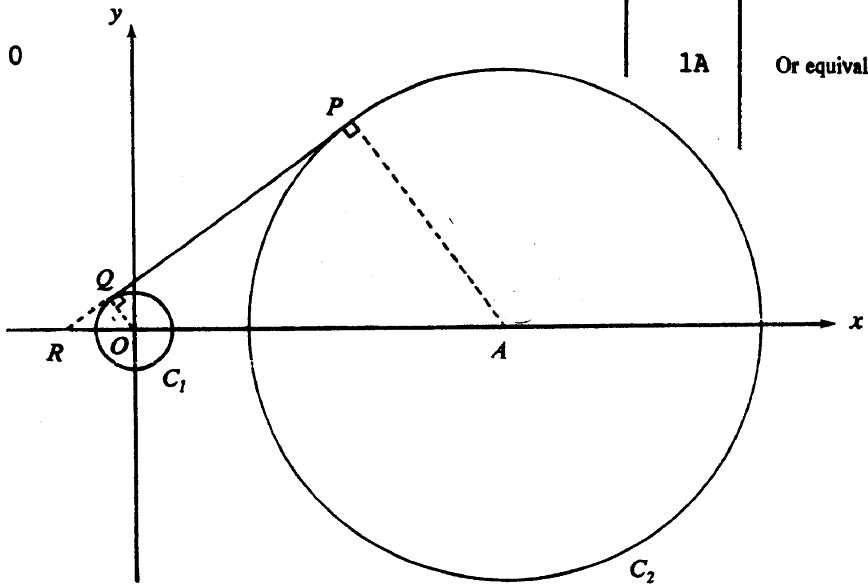
1M: 1M for the correct choice of the next interval

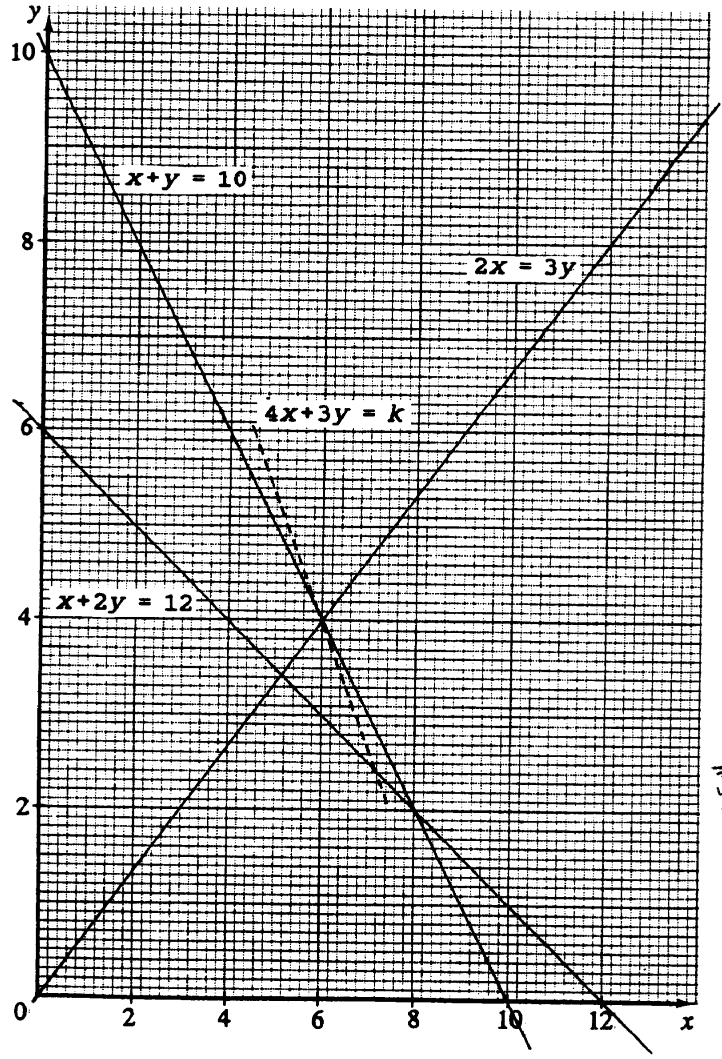
$\therefore\ 0.853125 < r < 0.8546875$

The value of r correct to 2 decimal places is 0.85. — 1A — Check whether it is bounded by the last interval



Solution	Marks	Remarks
12. (a) $A = (10,0)$	1A	pp-1 if parenthesis is missed Accept $x=10$, $y=0$
radius of $C_2 = 7$	1A	
(b) $\because \triangle OQR \sim \triangle APR$ (頂点不必對齊)	1M	Or equating ratios involving OR
$\frac{7}{1} = \frac{10+OR}{OR}$ $\quad \frac{OR}{1} = \frac{10+OR}{7}$	1A	
$OR = \frac{5}{3}$		
Hence the x-coordinate of $R = -\frac{5}{3}$. (約至最簡) (接納 -1.67，以後之答案不接納由此產生之誤差)	1A	pp-1 if writing $R = -\frac{5}{3}$ pp-1 if $R=(-\frac{5}{3},0)$
(c) $QR = \sqrt{(\frac{5}{3})^2 - 1^2} = \frac{4}{3}$	1A	
Slope of $QP = \tan\angle ORQ$ $= \frac{OQ}{QR} = \frac{3}{4}$ (or 0.75)	1A	
OR $\sin\angle ORQ = \frac{OQ}{OR} = \frac{3}{5}$	1A	
slope of $QP = \tan\angle ORQ$ $= \dfrac{\frac{3}{5}}{\sqrt{1-(\frac{3}{5})^2}}$ $= \frac{3}{4}$ (or 0.75)	1A	
(d) The external common tangent QP has equation $\dfrac{y-0}{x+\frac{5}{3}} = \frac{3}{4}$	1M + 1A	1M for pointt-slope form
$3x - 4y + 5 = 0$	1A	Or equivalent
(e) The external common tangent with negative slope has slope $= -\frac{3}{4}$	1M	
equation: $\dfrac{y-0}{x+\frac{5}{3}} = -\frac{3}{4}$ $3x + 4y + 5 = 0$	1A	Or equivalent



Solution	Marks	Remarks
11. (a) 		缺寫或寫錯 label 不扣分
	1A	For the line $x+y=10$
	1A	For the line $x+2y=12$
	1A	For the line $2x=3y$
		Accept broken lines
		x-intercept 及 y-intercept 誤差不超過一格
		劃錯範圍不扣分
(b) (i) $2x+2y \ge 20$ (or $x+y \ge 10$)	1A	缺等號最多扣一分
$2x \ge 3y$	1A	
$x+2y \ge 12$	1A	-1 for any strict inequality
$y > 0$ (or $x > 0$, $y > 0$)	1A	Accept $x \ge 0$, $y \ge 0$; go through
(ii) Total payment, P, in \$ is $P = 300(x+2y) + 500x$ $= 800x + 600y$	1A ~~1M~~	Ignore unit
By drawing parallel lines of $4x + 3y = 0$,	1M + 1A	Must shown on the graph paper
OR $P(6,4)=7200$, $P(8,2)=7600$ $P(12,0)=9600$	1M + 1A	1M for substituting 1 point Optional (供參考)
P is minimum when $x=6$, $y=4$ $\therefore$ The total payment is minimum when the length is 6 m and the width is 4 m	1A	
Minimum total payment $= \$(800\times 6 + 600\times 4)$ $= \$\ 7200$	1A	