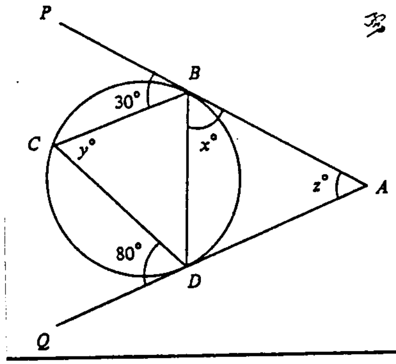
SOLUTION STEPS	MARKS	NOTES
SECTION A		
1. Let $f(x) = 3x^2 - kx - 2$		
$f(k) = 3k^2 - k^2 - 2$	1M	For sub. $x = k$
$= 2k^2 - 2$	1A	
$2k^2 - 2 = 0$	1M	Remainder = 0
$k = 1$ or -1	1A+1A	
ALTERNATIVELY, By long division,	1M	Divisor must be corre
$f(x) = (3x + 2k)(x - k) + (2k^2 - 2)$		
remainder $= 2k^2 - 2$	1A	
$2k^2 - 2 = 0$	1M	
$k = 1$ or -1	1A+1A	
2. Total Marks $= (1)(10)+(2)(10)+(3)(5)+(4)(20)+(5)(x)$ $= 125 + 5x$	1A	
Total number of students $= 10 + 10 + 5 + 20 + x$ $= 45 + x$	1A	
$\frac{125 + 5x}{45 + x} = 3$	1M	Awarded only when the appropriate data are given in numerator a denominator. 只寫 $s = \frac{\Sigma f}{n}$ 不給分
$125 + 5x = (45 + x)3$		
$2x = 10$		
$x = 5$	2A	
3. (Syl A only)		ALTERNATIVELY,
$(1 + \sqrt{2})^4$		$(1 + \sqrt{2})^4$
$= 1 + 4\sqrt{2} + 6(\sqrt{2})^2 + 4(\sqrt{2})^3 + (\sqrt{2})^4$	2A	$= (1 + 2\sqrt{2} + 2)^2$
$= 1 + 4\sqrt{2} + 12 + 8\sqrt{2} + 4$	2A	$= (3 + 2\sqrt{2})^2$ — 2.
$= 17 + 12\sqrt{2}$	1A	$= (9 + 12\sqrt{2} + 8)$ — 2.
		$= 17 + 12\sqrt{2}$ — 1.
(Syl B only)		
(a) 15 (minutes)	3A	For wrong units, withhold 1 mark for whole question.
(b) 8 (km)	2A	
4. (a) $x^2y + 2xy + y$		ALTERNATIVELY, $x^2y + 2xy + y$
$= y(x^2 + 2x + 1)$	1A	$= (yx + y)(x + 1)$ 2.
$= y(x + 1)^2$	2A	$= y(x + 1)^2$ 1.
(b) $x^2y + 2xy + y - y^3$		
$= y(x^2 + 2x + 1 - y^2)$	1A	
$= y[(x + 1)^2 - y^2]$		
$= y(x + 1 - y)(x + 1 + y)$	2A	



SOLUTION STEPS	MARKS	NOTES
寫 showing working $\angle CBD = 80°$	2A	寫錯Th 不扣分. ALTERNATIVELY,
$x = 180 - 80 - 30$		$\angle BDC = 30°$ 2A
$= 70$	1A	$\angle ADB = 180° - 30° - 80°$ $= 70°$
$y = 70$	1A	$x = 70$ 1A
$z = 180 - 70 - 70$		$y = x$ $= 70$ 1A
$= 40$	2A	$z = 180-70-70$ $= 40$ 2A
		Accept $x = 70°$, etc.
$x - 5\sqrt{x} - 6 = 0$		ALTERNATIVELY, $x - 5\sqrt{x} - 6 = 0$
$x - 6 = 5\sqrt{x}$	1A	$(\sqrt{x})^2 - 5\sqrt{x} - 6 = 0$ 1M
$(x - 6)^2 = 25x$	1M	$(\sqrt{x} - 6)(\sqrt{x} + 1) = 0$ 2A
$x^2 - 37x + 36 = 0$	1A	$\sqrt{x} = 6$ or -1 1A
$(x - 1)(x - 36) = 0$		rejecting $\sqrt{x} = -1$ 1A
$x = 1$ or 36	1A+1A	$x = 36$ 1A
After checking,		
$x = 1$ is rejected. $\therefore x = 36$	1A	
(a) $\tan\theta = \frac{1 + \cos\theta}{\sin\theta}$		
$\frac{\sin^2\theta}{\cos\theta} = 1 + \cos\theta$	1M	For sub $\tan\theta = \frac{\sin\theta}{\cos\theta}$
$\frac{1 - \cos^2\theta}{\cos\theta} = 1 + \cos\theta$	1M	For sub $\sin^2\theta = 1 - \cos^2\theta$
$2\cos^2\theta + \cos\theta - 1 = 0$	1A	
(b) $(2\cos\theta - 1)(\cos\theta + 1) = 0$ or $\cos\theta = \frac{-1 \pm \sqrt{1^2 - 4(-1)(2)}}{2(2)}$	1A	
$\cos\theta = \frac{1}{2}$ or -1	1A	Accept $\cos\theta = \frac{1}{2}$.
$\theta = 60°$	1A	Accept $\theta = 60$. Do not accept $\theta = \frac{\pi}{3}$.
General solution, do not award the last mark. If 2 or more answers given, do not award the last mark.		

SOLUTION STEPS	MARKS	NOTES
(a) (2 marks)		
$\frac{y-10}{x-0} = \frac{0-10}{10-0}$	1M	If a candidate wrote $\frac{x}{10} + \frac{y}{10} = 1$ 2A
ℓ_3 : $x + y - 10 = 0$ or $x + y = 10$	1A	
(b) (3 marks) Accept $\frac{3}{2}$		
A : $(1, 1\frac{1}{2})$	1A	If a candidate did not name the points in the answer, deduct 1 mark as pp.
B : $(4, 6)$	1A	
C : $(8\frac{1}{2}, 1\frac{1}{2})$	1A	
(c) (3 marks)		
$2y \geq 3$	1A	If equality sign omitted, deduct 1 mark from the marks scored in this part.
$x + y - 10 \leq 0$	1A	
$3x \geq 2y$	1A	If a candidate gave (e.g. $x \geq 0$, $y \geq 0$) 1 or 2 extra ineq. ..-1, 3 extra ineq. ....-2, more than 3 extra....-3.
(d) (4 marks)		
$P(1, 1\frac{1}{2}) = 1 + 3 - 5 = -1$		
$P(4, 6) = 4 + 12 - 5 = 11$	2M	Accept graphical method.
$P(8\frac{1}{2}, 1\frac{1}{2}) = \frac{17}{2} + 3 - 5 = 6.5$		
Maximum of P = 11	1A	只有答案給 2A.
Minimum of P = -1	1A	

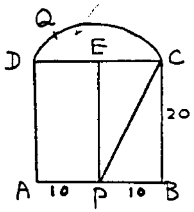
SOLUTION STEPS	MARKS	NOTES
9. (a) (6 marks)		
Sub. $y = k - x$ in $x^2 + y^2 = 4$	1M	
$x^2 + (k - x)^2 = 4$		
$2x^2 - 2kx + k^2 - 4 = 0 \ldots (*)$	1A	
$(-2k)^2 - 8(k^2 - 4) = 0$	1M	For $\Delta = 0$
$4k^2 - 8k^2 + 32 = 0$		
$4k^2 = 32$		
$k^2 = 8$	1A	Accept any figure which can be rounded to 2.8 or -2.8
$k = \sqrt{8}$ or $-\sqrt{8}$	1A+1A	
$= 2\sqrt{2}$ or $-2\sqrt{2}$		
ALTERNATIVELY,		
Distance from (0, 0) to L $= \pm \frac{k}{\sqrt{1^2 + 1^2}}$	1M+1A	1M for distance formula 1A for ±
Radius of C = 2	1A	
$\pm \frac{k}{\sqrt{1^2 + 1^2}} = 2$	1M	
$k = 2\sqrt{2}$ or $-2\sqrt{2}$ ($\sqrt{8}$ or $-\sqrt{8}$)	1A+1A	
(b) (6 marks)		
(i) Sub. (2,0) in $y = k - x$ or $x = 2$ in (*)	1M	← 可 omitted
$k = 2$	1A	~~只有答案 award 1A only~~
From (*),		
$2x^2 - 4x = 0$		
$x = 2$ or 0		
$B = (0,2)$	1A	
(ii) Centre = (1, 1)		
Radius $= \sqrt{(2-1)^2 + 1^2} = \sqrt{2}$	1A	Both must be correct
$(x - 1)^2 + (y - 1)^2 = 2$ Equ. 錯不扣分	1M+1A	
ALTERNATIVELY,		
$\frac{y-2}{x-0} \cdot \frac{y-0}{x-2} = -1$	1M+1A	1M for product of slopes = -1
$y^2 - 2y = -(x^2 - 2x)$		
$x^2 + y^2 - 2x - 2y = 0$	1A	

SOLUTION STEPS	MARKS	NOTES
). (a) (2 marks)		
$a, -2, b$ in G.P.		
$\frac{-2}{a} = \frac{b}{-2}$ or $(-2)^2 = ab$	1A	This can be omitted.
$ab = 4$	1A	$\sqrt{ab} = -2$ $ab = 4$ (扣1)
(b) (5 marks)		
$-2, b, a$ in A.P.		
$b + 2 = a - b$ $a = 2b + 2$	1A	
Sub. in $ab = 4$, $2(b + 1)b = 4$	1M	ALTERNATIVELY, $a(\frac{a-2}{2}) = 4$
$b^2 + b - 2 = 0$ $(b - 1)(b + 2) = 0$	1A	$a^2 - 2a - 8 = 0$ 1A $(a - 4)(a + 2) = 0$
$b = 1$ or -2 (Accept $b = 1$)	1A	$a = 4$ or -2 1A
$\left.\begin{array}{l} b = 1 \\ a = 4 \end{array}\right\}$	1A	$\left.\begin{array}{l} a = 4 \\ b = 1 \end{array}\right\}$ 1A
(c) (5 marks)		
(i) For the G.P. $4, -2, 1, \ldots$		
common ratio $= -\frac{1}{2}$	1M	
Sum $= \frac{4}{1 - (-\frac{1}{2})}$	1M	For $S = \frac{a}{1 - r}$
$= \frac{8}{3}$	1A	
(ii) For the G.P. $4, 1, \frac{1}{4}, \ldots$		
common ratio $= \frac{1}{4}$	1M	
Sum $= \frac{4}{1 - \frac{1}{4}}$ or $2(\frac{8}{3})$		
$= \frac{16}{3}$	1A	

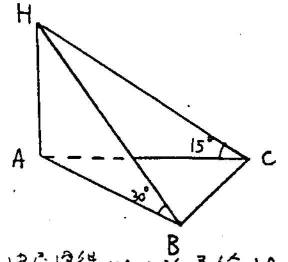
SOLUTION STEPS	MARKS	NOTES
11. (a) (6 marks)		Intermediate steps may be omitted.
(i) P (both balls are red)		
$= \frac{1}{3} \times \frac{1}{3}$	1A	
$= \frac{1}{9}$	1A	or any figure which can be rounded to 0.11
(ii) P (two balls of the same colour)		
$\frac{3}{9}$ 不扣分 $= 3 \times \frac{1}{9}$ or $\frac{1}{3} \times \frac{1}{3} + \frac{1}{3} \times \frac{1}{3} + \frac{1}{3} \times \frac{1}{3}$	1M	For $3 \times p$ or $p_1+p_2+p_3$
$= \frac{1}{3}$	1A	or 0.33
(iii) P (two balls of different colurs)		
$= 1 - \frac{1}{3}$ or $\frac{1}{3} \times \frac{2}{3} + \frac{1}{3} \times \frac{2}{3} + \frac{1}{3} \times \frac{2}{3}$	1M	For $1-p$ or $p_1+p_2+p_3$
$\frac{6}{9}$ 不扣分 $= \frac{2}{3}$	1A	or 0.66 to 0.67
(b) (6 marks)		
(i) P (both balls are red)		
$= \frac{2}{7} \times \frac{2}{7}$	1A	
$= \frac{4}{49}$	1A	or 0.081 to 0.082
(ii) P (two balls of the same colour)		
$= \frac{2}{7} \times \frac{2}{7} \times 2 + \frac{3}{7} \times \frac{3}{7}$	1M	For $p_1+p_2+p_3$
$= \frac{17}{49}$	1A	or 0.34 to 0.35
(iii) P (two balls of different colours)		
$= 1 - \frac{17}{49}$ or $\frac{2}{7} \times \frac{5}{7} + \frac{2}{7} \times \frac{5}{7} + \frac{3}{7} \times \frac{4}{7}$	1M	For $1-p$ or $p_1+p_2+p_3$
$= \frac{32}{49}$	1A	or 0.65 to 0.66

If "required probability" or "P" omitted in all parts, deduct one mark as pp. 只列一次也不扣分

SOLUTION STEPS	MARKS	NOTES
(i) For answers without units, do not deduct marks. (ii) For answers with wrong units, deduct at most one mark from the marks scored in the answers (not as pp). (iii) If answers are not rounded off to 1 decimal place, deduct at most one mark from the marks scored in the answers (not as pp).		segment area $= 31.8238 \text{ cm}^2$
(a) (3 marks)		
$\tan\angle CPE = \frac{10}{20}$ or $\tan\angle BPC = \frac{20}{10}$	1M	
$\angle CPE = 26.565°$ or $\angle BPC = 63.435°$		
$\angle CPD = 2\angle CPE$ or $\angle CPD = 180° - 2\angle BPC$	1M	
$\approx 53.1°$ $\qquad \approx 53.1°$	1A	Accept 53.0° ~~or~~ to 53.2° (1 dec. place)
ALTERNATIVELY,		
$CP = \sqrt{20^2 + 10^2} = \sqrt{500}$		
$\cos\angle CPD = \frac{CP^2 + DP^2 - CD^2}{2(CP)(DP)}$	1M	
$= \frac{500 + 500 - 400}{2\sqrt{500}\cdot\sqrt{500}}$	1M	
$\angle CPD \approx 53.1°$	1A	Accept 53.0° ~~or~~ to 53.2°
(b) (3 marks)		
$CP = \sqrt{20^2 + 10^2}$ or $CP = \frac{20}{\sin\angle BPC}$	1M	
$\overset{\frown}{CQD} = \frac{53.13}{360} \times 2\pi\sqrt{20^2 + 10^2}$ or $\sqrt{20^2 + 10^2}\,(0.9273)$	1M	for arc length $= r\theta$ and sub
≈ 20.7 (cm)	1A	Accept 20.7 to 20.8
(c) (3 marks)		
Area of sector		
$= \pi(20^2+10^2) \times \frac{53.13}{360}$ or $\frac{1}{2}(20^2+10^2)(0.9273)$.	1M	or $\frac{1}{2}(CP)(\overset{\frown}{CQD})$
Area of APBCQD		
$= \pi(20^2 + 10^2) \times \frac{53.13}{360} + 2 \times \frac{1}{2} \times 20 \times 10$	1M	
$= 231.8238 + 200$ ≈ 431.8 (cm²)	1A	Accept 431.2 to 432.1
(d) (3 marks)		作半圓計也有2M
Area of curved surface		
$= \overset{\frown}{CQD} \times 20$	1M	
Total surface area $= 431.82 \times 2 + 20 \times 20 \times 3 + 20.735 \times 20$	1M	for 6 faces.
≈ 2478.3 (cm²)	1A	Accept 2476.1 to 2480.0



SOLUTION STEPS	MARKS	NOTES
3. (i) For answers without units, do not deduct marks. (ii) For answers with wrong units, deduct at most one mark from the marks scored in the answers (not as pp). (iii) If answers are not rounded off to 2 decimal place, deduct at most one mark from the marks scored in the answers (not as pp).		
(a) (6 marks)		
(i) $\tan 15° = \frac{HA}{AC}$	2A ~~1M~~	四捨五入得 HA=5.36. 只給 1A.
$HA = 20\tan 15°$	~~1A~~	
≈ 5.36 (m)	1A	
(ii) $\tan 30° = \frac{HA}{AB}$	~~1M~~ 2M	
$AB = \frac{HA}{\tan 30°}$	~~1M~~	
≈ 9.28 (m)	1A	Accept 9.27 to 9.29 9.269 no mark.
(b) (6 marks)		
(i) $\angle ABC = 90°$	1	或者在圖註明.
$BC^2 = AC^2 - AB^2$	1M	
$= 20^2 - (9.282)^2$	1M	
$BC \approx 17.72$ (m)	1A	Accept 17.71 to 17.73
ALTERNATIVELY,		
$\angle ABC = 90°$	1	may be omitted.
$\sin C = \frac{AB}{AC}$	1M	
$\cos C = \frac{BC}{AC}$	1M	
$BC \approx 17.72$ (m)	1A	
(ii) $\triangle ABC$		
$= \frac{1}{2}(AB)\cdot(BC)$	1M	
≈ 82.22 (m²)	1A	Accept 82.00 to 82.40



SOLUTION STEPS	MARKS	NOTES
(Syl A only)		
(a) (7 marks)		
(i) $x^3 + x^2 + x - 4 = 0$		
$x^3 + x^2 = -x + 4$		
$y = -x + 4$	1A	This may be omitted.
Graph of $y = -x + 4$	1A	Labelling may be omitted.
$x = 1.1$ or 1.2	1A	
(ii) Testing sign of $x^3 + x^2 + x - 4$ for values of x to 2 decimal places.	1M	

x	$x^3 + x^2 + x - 4$
1.11	+
1.12	+
1.13	+
1.14	+
1.15	+
1.16	-
1.151 to 1.155	+

SOLUTION STEPS	MARKS	NOTES
(sign change at 1.15 / 1.16)	1M	For change of sign
1.151 to 1.155 +	1A	
$x = 1.15$	1A	
ALTERNATIVELY, Graphical Method.		
First graph (magnified)	1M	
Point of intersection lies between 1.15 and 1.16	1A	
Second graph (magnified).	1M	
$x = 1.15$	1A	
(b) (5 marks)		
(i) $2500(1 + r\%)^3 + 2500(1 + r\%)^2 + 2500(1+r\%) = 10\ 000$	2A	or equivalent form
$(1 + r\%)^3 + (1+ r\%)^2 + (1 + r\%) = 4$	1	
(ii) put $x = 1 + r\%$	1M	This may be omitted.
$1.15 = 1 + r\%$		
$r = 15$	1A	Accept $r = 15\%$

SOLUTION STEPS	MARKS	NOTES
14. (Syl B only)		
(a) (2 marks)		
$\$7500 \times \frac{4}{3}$ or $\$7500 + \$7500 \times \frac{1}{3}$ (or $7500 \div \frac{3}{4}$)	1A	
$= \$10\ 000$	1A	For answer with no units, withhold this mark.
(b) (5 marks)		
$E = C + kN$	1M	
$10\ 000 = C + 300k$	1A	
$16\ 000 = C + 500k$	1A	
$200k = 6\ 000$	1M	Attempt to solve for k or C
$k = 30$		
$C = 1000$	1A	
(c) (2 marks)		
$E = 1000 + 30N$	2A	
(d) (3 marks)		
$E = 4750 \times 4$	1A	
$= 19\ 000$		
$19\ 000 = 1000 + 30N$	1M	For substitution
$N = 600$	1A	