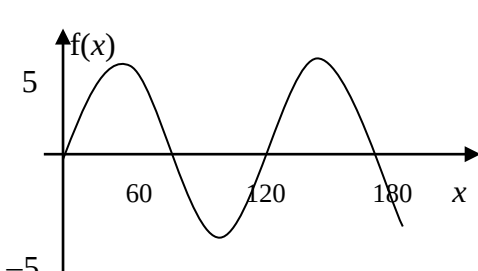


Question number	Scheme	Marks
1. (a)	Centre is $(5, -3)$ (M1 if sign errors)	M1 A1 (2)
(b)	Radius is 7 (M1 attempts $\sqrt{g^2 + f^2 - c}$)	M1 A1 (2)
		(4 marks)
2. (a)	$\frac{y+3}{(y+1)(y+2)} - \frac{y+1}{(y+2)(y+3)} \equiv \frac{(y+3)^2 - (y+1)^2}{(y+1)(y+2)(y+3)}$ $\equiv \frac{(y^2 + 6y + 9) - (y^2 + 2y + 1)}{(y+1)(y+2)(y+3)} \equiv \frac{4y+8}{(y+1)(y+2)(y+3)}$ $\equiv \frac{4(y+2)}{(y+1)(y+2)(y+3)} \equiv \frac{4}{(y+1)(y+3)} \text{ or } \frac{4}{y^2 + 4y + 3}$	M1 M1 A1 M1, A1 (5 marks)
3.	$\sin 2\theta \div \cos 2\theta = \tan 2\theta,$ $\tan 2\theta = 0.5$ * $\tan 2\theta = 0.5,$ $2\theta = 26.6^\circ$ $2\theta = 206.6,$ one more soln. 386.6, 566.6 other 2 solns in range $\theta = 13.3, 103.3, 193.3, 283.3$ (M: dividing by 2)	M1 (1) B1 B1 ft B1 ft M1 A1 (5) (6 marks)
4. (a)	$64 - 16 - 28 + c = 0$ $c = -20$	M1 A1 (2)
(b)	$(x-4)(x^2 + 3x + 5)$ (B1 for $(x-4)$)	B1 M1 A1 (3)
(c)	For $x^2 + 3x + 5,$ $b^2 - 4ac = -11 < 0$ $\therefore$ No real roots.	M1 A1 ft (2)
		(7 marks)
5. (a)	$\frac{1}{2}r^2\theta = \frac{1}{2}r^2 \times 1.5 = 15$ $r^2 = 20 = \sqrt{4 \times 5}$ $r = 2\sqrt{5}$ (*)	M1 A1 A1 (3)
(b)	$r\theta + 2r = 3\sqrt{5} + 4\sqrt{5} = 7\sqrt{5}$ cm (or 15.7, or a.w.r.t 15.65....)	M1 A1 (2)
(c)	$\Delta OAB: \frac{1}{2}r^2 \sin \theta = 10 \sin 1.5 (= 9.9749\dots)$ Segment area = $15 - \Delta OAB = 5.025 \text{ cm}^2$	M1 M1 A1 (3) (8 marks)

Question number	Scheme	Marks
6.	(a) $r = 5.12 \div 6.4 = 0.8$ (b) $a = 6.4 \div 0.64 = 10$ (c) Sum to $\infty = a \div (1 - r) = 10 \div (1 - 0.8) = 50$ (d) $S_{25} = 10 (1 - 0.825) \div (1 - 0.8) (= 49.8111)$ $50 - 49.8111 = 0.189$ a.w.r.t 0.19	M1 A1 (2) M1 A1ft (2) M1 A1 (2) M1 A1 ft M1 A1 (4) (10 marks)
7.	(a)  shape 60, 120, 180 on x-axis 5, -5 on y-axis (may be implied by part (b)) (b) $(30^\circ, 5); (150^\circ, 5); (90^\circ, -5)$ coordinate one x- all x-coordinates all correct (c) $f(x) = 2.5 \Rightarrow \sin 3x^\circ = \frac{1}{2}$ value $3x = 30 (150, 390, 510)$ one correct $3x = (\alpha), 180 - \alpha, 360 + \alpha, (540 - \alpha)$ $x = 10, 50, 130, 170$	B1 B1 B1 (3) B1 B1 B1 (3) B1 M1, M1 A1 (ignore extras out of range) (4) (10 marks)

Question number	Scheme	Marks
8. (i)	$\arcsin 0.6 = 36.9^\circ$ (awrt) α $2x + 50 = 36.87, \quad 2x = -13.13^\circ + 360^\circ = 346.87^\circ$ $2x + 50 + 180 - 36.87, \quad 2x = 143.13^\circ - 50^\circ = 93.13^\circ$ $x = 46.6, \quad 173.4$	B1 M1 M1 M1 M1 A1 A1 (7)
(ii) (a)	$\sin 60^\circ = \frac{\sqrt{3}}{2}, \quad \frac{BC}{\left(\frac{1}{3}\right)} = \frac{18}{\sin 60^\circ}$ $BC = 6 \div \frac{\sqrt{3}}{2} \quad BC = \frac{12}{\sqrt{3}} = 4\sqrt{3}$ (*)	B1, M1 M1 A1 (4)
(b)	$\cos^2 \theta = 1 - \sin^2 \theta = 1 - \frac{1}{9}$ $\sin \theta = \sqrt{\frac{8}{9}} \quad \left(= \frac{\sqrt{8}}{3} = \frac{2\sqrt{2}}{3} \right)$	M1 A1 (2)
		(13 marks)

Question number	Scheme	Marks
9.	(a)	
	$x^2 - 2x + 3 = 9 - x$	M1
	$x^2 - x - 6 = 0$	M1 A1
	$(x + 2)(x - 3) = 0$	M1 A1 ft (5)
	$x = -2, 3$	
	$y = 11, 6$	
	(b)	
	$\int (x^2 - 2x + 3) dx = \frac{x^3}{3} - x^2 + 3x$	M1 A1
	$\left[\frac{x^3}{3} - x^2 + 3x \right]_{-2}^3 = (9 - 9 + 9) - \left(\frac{-8}{3} - 4 - 6 \right) \quad \left(= 21\frac{2}{3} \right)$	M1 A1
	Trapezium: $\frac{1}{2} (11 + 6) \times 5 \quad \left(= 42\frac{1}{2} \right)$	B1 ft
	Area = $42\frac{1}{2} - 21\frac{2}{3} = 20\frac{5}{6}$	M1 A1 (7)
	<u>Alternative:</u> $(9 - x) - (x^2 - 2x + 3) = 6 + x - x^2$	M1 A1
	$\int (6 + x - x^2) dx = 6x + \frac{x^2}{2} - \frac{x^3}{3}$	M1 A1 ft
	$\left[6x + \frac{x^2}{2} - \frac{x^3}{3} \right]_{-2}^3 = \left(18 + \frac{9}{2} - 9 \right) - \left(-12 + 2 + \frac{8}{3} \right), = 20\frac{5}{6}$	M1 A1, A1 (7)
		(12 marks)