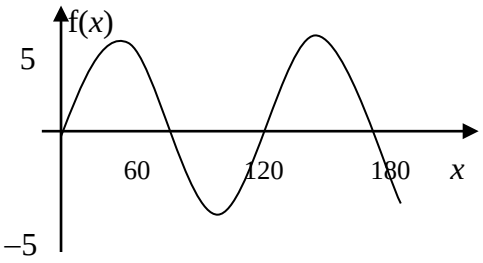
Question number		Scheme	Marks
1.	(a)	Centre is (5, –3) (M1 if sign errors)	M1 A1 (2)
	(b)	Radius is 7 (M1 attempts $\sqrt{g^2 + f^2 - c}$)	M1 A1 (2)
			(4 marks)
2.	(a)	$\frac{y+3}{(y+1)(y+2)} - \frac{y+1}{(y+2)(y+3)} \equiv \frac{(y+3)^2-(y+1)^2}{(y+1)(y+2)(y+3)}$	M1
		$\equiv \frac{(y^2+6y+9)-(y^2+2y+1)}{(y+1)(y+2)(y+3)} \equiv \frac{4y+8}{(y+1)(y+2)(y+3)}$	M1 A1
		$\equiv \frac{4(y+2)}{(y+1)(y+2)(y+3)} \equiv \underline{\underline{\frac{4}{(y+1)(y+3)}}}$ or $\frac{4}{y^2+4y+3}$	M1, A1
			(5 marks)
3.		$\sin 2\theta \div \cos 2\theta = \tan 2\theta$, $\tan 2\theta = 0.5$ *	M1 (1)
		$\tan 2\theta = 0.5$, $2\theta = 26.6°$	B1
		$2\theta = 206.6$, one more soln.	B1 ft
		386.6, 566.6 other 2 solns in range	B1 ft
		θ = 13.3, 103.3, 193.3, 283.3 (M: dividing by 2)	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*)	$\frac{1}{2}r^2\theta = \frac{1}{2}r^2 \times 1.5 = 15$	M1 A1
		$r^2 = 20 = \sqrt{(4 \times 5)}$ $r = 2\sqrt{5}$ (*)	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*)	ΔOAB: $\frac{1}{2}r^2 \sin\theta = 10 \sin 1.5$ (= 9.9749…)	M1
		Segment area = 15 – ΔOAB = 5.025 cm^2	M1 A1 (3)
			(8 marks)

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

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

Question number	Scheme	Marks
9. (a)	$x^2 - 2x + 3 = 9 - x$	M1
	$x^2 - x - 6 = 0$ $\quad (x + 2)(x - 3) = 0$ $\quad x = -2,\ 3$	M1 A1
	$y = 11,\ 6$	M1 A1 ft (5)
(b)	$\int \left(x^2 - 2x + 3\right) dx = \frac{x^3}{3} - x^2 + 3x$	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
	$\int \left(6 + x - x^2\right) dx = 6x + \frac{x^2}{2} - \frac{x^3}{3}$	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)