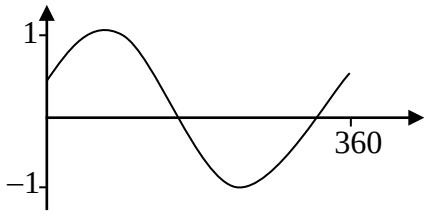
Question number		Scheme	Marks
1.		Obtains centre (0, 6.5) Finds radius or diameter by Pythagoras Theorem, to obtain r = 2.5 or $r^2 = 6.25$ $x^2 + (y - 6.5)^2 = 2.5^2$ or $x^2 + y^2 - 13y + 36 = 0$	B1 M1, A1 B1 **(4 marks)**
2.	(*a*)	$a = 4, b = 5$ (both are required)	B1 (1)
	(*b*)	$(x-4)^2 + (y-5)^2 = 25$	M1A1ft (2)
	(*c*)	Finding the distance between centre and (8, 17), $\sqrt{[(8-a)^2 + (17-b)^2}$ Complete method to find *PT*, i.e. use Pythagoras theorem and subtraction, *PT* = 11.6	M1 M1 A1 (3) **(6 marks)**
3.	(*a*)	Using $f(\pm 2) = 3$ Showing that *p* = 6 (*), with no wrong working seen. **S.C**. If *p* = 6 used and the remainder is shown to be 3 award B1	M1 A1 (2)
	(*b*)	Attempt to find quotient when dividing (*n* + 2) into f(*n*) or attempting to equate coefficients. Quotient = $n^2 + 4n + 3$, or finding either *q* = 1 or *r* = 3 Finding both *q* = 1 and *r* = 3	M1 A1 A1 (3)
	(*c*)	The product of three consecutive numbers must be divisible by 3 Complete argument	M1 A1 (2) **(7 marks)**

Question number	Scheme	Marks
4. (*a*)	 Scales (–1, 1 and 360) Shape, position	B1 B1 (2)
(*b*)	(0, 0.5) (150, 0) (330, 0)	B1 B1 B1 (3)
(*c*)	(x + 30 =) 210° or 330° One of these x = 180° , 300° M: Subtract 30, A: Both	B1 M1 A1 (3) **(7 marks)**
5.	$(2 - px)^6 = 2^6 + \binom{6}{1}2^5(-px) + \binom{6}{2}2^4(-px)^2$ Coeff. of x or x^2 $= 64 + 6 \times 2^5(-px);\ + 15 \times 2^4(-px)^2$ No $\binom{n}{r}$ $15 \times 16p^2 = 135 \Rightarrow p^2 = \frac{9}{16}$ or $p = \frac{3}{4}$ (only) $-6.32p = A$ $\Rightarrow A = -144$	M1 $\binom{n}{r}$ okay A1; A1 M1, A1 M1 A1 ft (their p (> 0)) **(7 marks)**
6.	$2\cos^2\theta - \cos\theta - 1 = 1 - \cos^2\theta$ $3\cos^2\theta - \cos\theta - 2 = 0$ $(3\cos\theta + 2)(\cos\theta - 1) = 0 \quad \cos\theta = -\frac{2}{3}$ or 1 $\theta = 0$ $\theta = 131.8°$ θ = (360 – "131.8")° = 228.2°	M1 A1 M1 A1 B1 A1 M1 A1 ft **(8 marks)**

Question number		Scheme	Marks
7.	(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 = $15 - \Delta OAB = 5.025$ cm^2	M1 A1 (3)
			(8 marks)
8.	(*a*)	$x^2 - 2x + 3 = 9 - x$	M1
		$x^2 - x - 6 = 0$ $(x + 2)(x - 3) = 0$ $x = -2,\ 3$	M1 A1
		$y = 11,\ 6$	M1 A1 ft (5)
	(*b*)	$\int (x^2 - 2x + 3)\,dx = \frac{x^3}{3} - x^2 + 3x$	M1 A1
		$\left[\frac{x^3}{3} - x^2 + 3x\right]_{-2}^{3} = (9 - 9 + 9) - \left(\frac{-8}{3} - 4 - 6\right)$ $\left(= 21\frac{2}{3}\right)$	M1 A1
		Trapezium: $\frac{1}{2}(11 + 6) \times 5$ $\left(= 42\frac{1}{2}\right)$	B1 ft
		Area = $42\frac{1}{2} - 21\frac{2}{3} = 20\frac{5}{6}$	M1 A1 (7)
			(12 marks)

Question number	Scheme	Marks
9. (*a*)	$\frac{dy}{dx} = 4x^3 - 16x$	M1 A1 (2)
(*b*)	$4x^3 - 16x = 0$	M1
	$4x(x^2 - 4) = 0$ $\quad x = 0,\ 2,\ -2$	A2 (1, 0)
	$y = 3,\ -13,\ -13$	M1 A1 (5)
(*c*)	$\frac{d^2y}{dx^2} = 12x^2 - 16$	M1
	ft $x = 0$ Max. One of these, $x = 2$ Min. $x = -2$ Min. All three	A1ft A1 (3)
(*d*)	$x = 1$: $\quad y = 1 - 8 + 3 = -4$	B1
	At $x = 1$, $\quad \frac{dy}{dx} = 4 - 16 = -12$ $\quad (m)$	B1 ft
	Gradient of normal $= -\frac{1}{m}$ $\quad \left(= \frac{1}{12}\right)$	M1
	$y - (-4) = \frac{1}{12}(x - 1)$ $\quad x - 12y - 49 = 0$	M1 A1 (5)
		(15 marks)