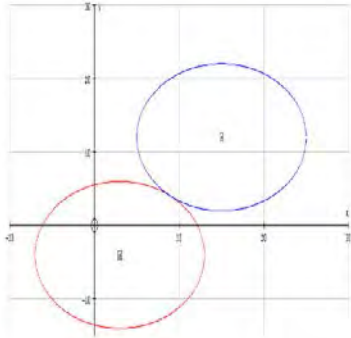
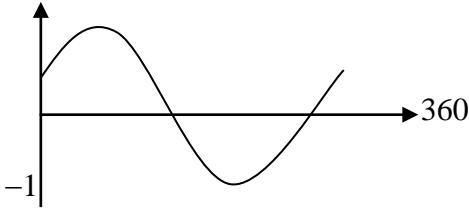
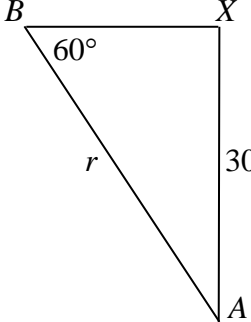


Question number	Scheme	Marks
<p>1. (a)</p> <p>(b)</p>	$\log_q 16 = \log_q 2^4, \therefore p = 4 \log_q 2 \text{ i.e. } \log_q 2 = \frac{p}{4}$ $\log_q (8q) = \log_q 8 + \log_q q$ $= \dots + 1$ $= 3 \log_q 2 + \dots$ $\therefore \log_q (8q) = \frac{3}{4}p + 1$	<p>M1, A1 (2)</p> <p>M1</p> <p>B1</p> <p>M1</p> <p>A1 (4)</p> <p>(6 marks)</p>
<p>2. (a)</p> <p>(b)</p>	$(2 - px)^6 = 2^6 + \binom{6}{1} 2^5(-px) + \binom{6}{2} 2^4(-px)^2$ $= 64 + 6 \times 2^5(-px) + 15 \times 2^4(-px)^2$ $15 \times 16p^2 = 135 \Rightarrow p^2 = \frac{9}{16} \text{ or } p = \frac{3}{4} \text{ (only)}$ $-6.32p = A$ $\Rightarrow A = -144$	<p>Coeff. of x or x^2</p> <p>M1 $\binom{n}{r}$ okay</p> <p>No $\binom{n}{r}$</p> <p>A1; A1</p> <p>M1, A1</p> <p>M1</p> <p>A1 ft (their $p > 0$)</p> <p>(7 marks)</p>
<p>3. (a)</p> <p>(b)</p>	<p>Centre is at (3,-4)</p> $\text{radius} = \sqrt{(3^2 + (-4)^2 - -75)} = 10$ <p>1st circle</p> <p>2nd circle</p> <p>Circles touching</p> <p>At (9, 4)</p> 	<p>B1</p> <p>M1 A1 (3)</p> <p>B1</p> <p>B1</p> <p>B1</p> <p>B1 (4)</p> <p>(7 marks)</p>

Question number	Scheme	Marks
<p>4. (a)</p>	 <p>Scales (-1, 1 and 360) Shape, position</p>	<p>B1 B1 (2)</p>
<p>(b)</p>	<p>(0, 0.5) (150, 0) (330, 0)</p>	<p>B1 B1 B1 (3)</p>
<p>(c)</p>	<p>$(x + 30 =) 210^\circ \text{ or } 330^\circ$ $x = 180^\circ, 300^\circ$</p> <p>One of these M: Subtract 30, A: Both</p>	<p>B1 M1 A1 (3)</p>
(8 marks)		
<p>5.</p>	 <p>$\sin 60^\circ = \frac{3}{r}$ or $r = 2x, 4x^2 = x^2 + 3^2, x = \sqrt{3}$</p> <p>$r = \frac{6}{\sqrt{3}}$ or $r = 2\sqrt{3}$</p>	<p>M1 A1 (2)</p>
<p>(b)</p>	<p>Area = $\frac{1}{2} r^2 \theta^c$ or $\frac{\theta^\circ}{360^\circ} \times \pi r^2 = , \frac{1}{6} \times \pi \times 12 = 2\pi$ (cm²)</p>	<p>M1, A1 (2)</p>
<p>(c)</p>	<p>Arc = $r^2 \theta^c$ or $\frac{\theta^\circ}{360^\circ} \times 2\pi r = , \frac{1}{6} \times 2\pi \times 2\sqrt{3}$</p>	<p>M1</p>
<p>Perimeter = Arc + 2r = , $\frac{2\sqrt{3}}{3} \pi + 2 \times 2\sqrt{3} = \frac{2\sqrt{3}}{3} (\pi + 6)$ (cm) (*)</p>		
(7 marks)		
<p>6. (a)</p>	<p>Uses the remainder theorem with $x = \frac{1}{2}$, or long division, and puts remainder = 0 to obtain</p> <p>$p + 2q = -35$ or any correct equivalent (allow more than 3 terms)</p> <p>Uses the remainder theorem with $x = 1$, or long division, and puts remainder = ± 7 to obtain</p> <p>$p + q = -21$ or any correct equivalent (allow more than 3 terms)</p> <p>Solves simultaneous equations to give $p = -7$, and $q = -14$</p>	<p>M1 A1 M1 A1 M1 A1 (6)</p>
<p>(b)</p>	<p>Then $6x^3 - 7x^2 - 14x + 8 = (2x - 1)(3x^2 - 2x - 8)$ So $f(x) = (2x - 1)(3x + 4)(x - 2)$</p>	<p>M1 A1 ft B1 (3)</p>
(9 marks)		

Question number	Scheme	Marks
<p>7. (a)</p> <p>(b)</p> <p>(c)</p> <p>(d)</p>	$\frac{a}{1-r} = \frac{1200}{1-r} = 960$ $960(1-r) = 1200 \qquad r = -\frac{1}{4} \qquad (*)$ <p>$T_9 = 1200 \times (-0.25)^8$ (or T_{10})</p> <p>Difference = $T_9 - T_{10} = 0.0183105\dots - (-0.0045776\dots)$</p> <p>= 0.023 (or -0.023)</p> $S_n = \frac{1200(1 - (-0.25)^n)}{1 - (-0.25)}$ <p>Since n is odd, $(-0.25)^n$ is negative,</p> <p>so $S_n = 960(1 + 0.25^n)$ (*)</p>	<p>M1 A1</p> <p>A1 (3)</p> <p>M1</p> <p>M1</p> <p>A1 (3)</p> <p>M1 A1 (2)</p> <p>M1</p> <p>A1 (2)</p> <p>(12 marks)</p>
<p>8. (a)</p> <p>(b)</p> <p>(c)</p>	<p>$(x-3)^2 + (y-4)^2 = 18$ (accept $(3\sqrt{2})^2$)</p> <p>Use $y = x + 3$ to obtain $(x-3)^2 + (x-1)^2 = 18$</p> <p>And thus $2x^2 - 8x = 8$</p> <p>Solve quadratic, to obtain $x = 2 \pm \sqrt{8}$, $y = 5 \pm \sqrt{8}$</p> <p>Distance = $\sqrt{((2\sqrt{8})^2 + (2\sqrt{8})^2)} = 8$</p>	<p>M1 A1 (2)</p> <p>M1</p> <p>A1</p> <p>M1, A1ft, A1ft (5)</p> <p>M1 A1 cso (2)</p> <p>(9 marks)</p>

Question number	Scheme	Marks
9. (a)	A: $y = 1$ B: $y = 4$	B1 (1)
(b)	$\frac{dy}{dx} = \frac{2x}{25} = \frac{2}{5}$ where $x = 5$	M1 A1
	Tangent: $y - 1 = \frac{2}{5}(x - 5)$ ($5y = 2x - 5$)	M1 A1 (4)
(c)	$x = 5y^{\frac{1}{2}}$	B1 B1 (2)
(d)	Integrate: $\frac{5y^{\frac{3}{2}}}{\frac{3}{2}} \left(= \frac{10y^{\frac{3}{2}}}{3} \right)$	M1 A1ft
	$\left[\right]_1^4 = \left(\frac{10 \times 4^{\frac{3}{2}}}{3} \right) - \left(\frac{10 \times 1^{\frac{3}{2}}}{3} \right), = \frac{70}{3} \quad \left(23\frac{1}{3}, 23.3 \right)$	M1 A1, A1 (5)
		(12 marks)