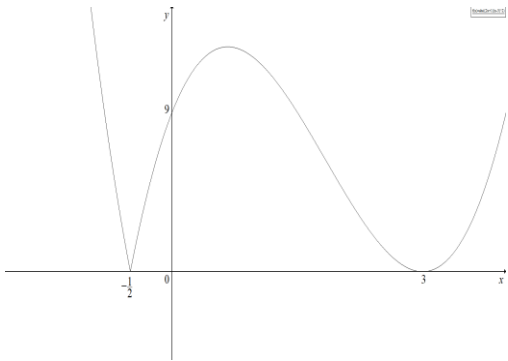


Question	Answer	Marks	Guidance
1(a)	1080°	B1	
1(b)	$a = 4$	B1	
	$b = 3$	B1	
	$c = -2$	B1	
2(a)	(0, 14)	2	B1 for x -coordinate B1 for y -coordinate
2(b)	$y - 14 = -\frac{1}{2}x$	2	M1 for finding the gradient of a perpendicular line and attempt at the straight line equation using <i>their B</i> A1 Allow unsimplified
2(c)	Area = $\frac{1}{2} \times 14 \times 28$	M1	Must be a complete method making use of <i>their answer to (b)</i>
	196	A1	
3(a)	13 soi	B1	For finding the magnitude of $\begin{pmatrix} 12 \\ -5 \end{pmatrix}$
	$\begin{pmatrix} 36 \\ -15 \end{pmatrix}$	B1	
3(b)	$10 + 4\lambda = -4\mu$ or $-5 + 6\lambda = 5\mu$	2	M1 for equating like vectors Dep M1 for attempt to solve <i>their</i> simultaneous equations to obtain 2 solutions
	$\mu = -\frac{20}{11}$	A1	
	$\lambda = -\frac{15}{22}$	A1	
4(a)	$a = \frac{7}{2}$	B1	
	$b = 1$	B1	
	$c = \frac{1}{6}$	B1	

Question	Answer	Marks	Guidance
4(b)	$\left(3x^{\frac{2}{5}} - 5\right)\left(x^{\frac{2}{5}} - 1\right) = 0$	2	M1 for recognition of a quadratic in $x^{\frac{2}{5}}$ Dep M1 for solution and a correct attempt to get at least one solution for x
	$[\pm]3.59$	A1	
	$[\pm]1$	A1	
5(a)	$0 = 8a + 4b + 12 + 4$	B1	For $p(2)$
	$p'(x) = 3ax^2 + 2bx + 6$	M1	For an attempt to obtain $p'(x)$
	$3a - 2b + 6 = -7$	M1	Dep for $p'(-1)$
	$0 = 2a + b + 4$ $-13 = 3a - 2b$	M1	Dep on both previous M marks for solution of equations to obtain both a and b
	$a = -3 \quad b = 2$	A1	
5(b)	$p''(x) = -18x + 4$	M1	For differentiation of <i>their</i> $p'(x)$ to obtain $p''(x)$
	4	A1	FT on twice <i>their</i> b .
6	$\frac{dy}{dx} = me^{3x} + 2x^2(+c)$	M1	
	$\frac{dy}{dx} = 2e^{3x} + 2x^2(+c)$	A1	
	$5 = 2 + c$ $c = 3$	M1	Dep on previous M mark
	$f(x) = pe^{3x} + qx^3 \dots$	M1	
	$y = \frac{2}{3}e^{3x} + \frac{2}{3}x^3 \dots$	A1	
	$\frac{5}{3} = \frac{2}{3} + d$ $d = 1$	M1	Dep on previous M mark
	$(f(x) =) \frac{2}{3}e^{3x} + \frac{2}{3}x^3 + 3x + 1$	A1	
7(a)	6	B1	

Question	Answer	Marks	Guidance
7(b)	$b = 192a$	B1	May be implied by the term in x
	$c = 240a^2$	B1	May be implied by the term in x^2
	$\frac{c}{240} = \frac{b^2}{192^2}$	M1	For elimination of a
	$5b^2 = 768c$	A1	For correct manipulation to verify the given answer
7(c)	$a = \frac{1}{16}$	B1	
	$c = \frac{15}{16}$	B1	
8(a)	$\sin \frac{AOC}{2} = \frac{3}{5}$ or $6^2 = 5^2 + 5^2 - (2 \times 5 \times 5) \cos AOC$	M1	For a complete method to find AOC
	$AOC = 1.2870$ $AOC = 1.287$	A1	AG Must see $AOC = 1.2870$ or better before rounding for A1
8(b)	Arc length = 1.287×5	B1	
	Perimeter = 32.4	B1	
8(c)	Sector area = $\frac{1}{2} \times 5^2 \times 1.287$	B1	
	Area of triangle = $\frac{1}{2} \times 5^2 \times \sin 1.287$	B1	
	Total area = 28.1	B1	
9(a)	$\frac{dy}{dx} = 2(2x+1)(x-3) + 2(x-3)^2$ or $\frac{dy}{dx} = 6x^2 - 22x + 12$	M1	For differentiation of a quotient, or expansion and subsequent differentiation
	$0 = 2(x-3)(3x-2)$	M1	Dep for simplification, equating to zero and attempt to solve
	(3, 0)	A1	
	$\left(\frac{2}{3}, \frac{343}{27}\right)$	A1	

Question	Answer	Marks	Guidance
9(b)		4	B1 for correct shape with maximum in the first quadrant B1 for $\left(-\frac{1}{2}, 0\right)$ and $(3, 0)$ with a cubic curve with one max only B1 for $(0, 9)$ with a cubic curve with one max only B1 All correct with a cusp at $x = -\frac{1}{2}$ and a minimum at $x = 3$
9(c)	$\frac{343}{27}$	B1	FT on <i>their</i> answer from (a)
10(a)(i)	$2 + (n-1)0.5 = 16$ oe	M1	For use of $a + (n-1)d$
	$n = 29$	A1	
10(a)(ii)	$\frac{8}{2}(2(2) + 7(0.5))$	M1	For use of sum formula, may be implied if distances have been multiplied by 5 first.
	$\frac{8}{2}(2(2) + 7(0.5)) \times 5$	M1	For multiplication by 5
	150 (km)	A1	
10(b)(i)	$r = 1.25$ oe	B1	
10(b)(ii)	$2(1.25)^{n-1} > 16$ or $2(1.25)^{n-1} = 16$	M1	For use of ar^{n-1}
	$n-1 > \frac{\ln 8}{\ln 1.25}$ or $n-1 = \frac{\ln 8}{\ln 1.25}$	M1	Dep for correct method of solution to obtain $n-1$
	11	A1	
10(b)(iii)	$\frac{2(1.25^8 - 1)}{1.25 - 1}$	M1	For use of sum formula may be implied by multiplication by 5
	$\frac{2(1.25^8 - 1)}{1.25 - 1} \times 5$	M1	For multiplication by 5
	198 (km)	A1	Allow greater accuracy

Question	Answer	Marks	Guidance
11(a)	$3\cot^2 \theta - 5\cot \theta - 2 = 0$	M1	For use of correct identity and simplification to a 3 term quadratic equated to zero.
	$\tan \theta = -3, \tan \theta = \frac{1}{2}$	M1	Dep for solution of quadratic and dealing with cot
	108.4°	A1	
	26.6°	A1	
11(b)	$\phi + \frac{\pi}{3} = -\frac{\pi}{6}$	M1	For a correct order of operations
	$\phi = -\frac{\pi}{2}$	A1	
	$\phi + \frac{\pi}{3} = \frac{7\pi}{6}$	M1	For a correct order of operations
	$\phi = \frac{5\pi}{6}$	A1	