Question Number		Scheme	Marks
1.	(*a*)	Attempt to find f(–4) or f(4). $\left(\text{f}(-4) = 2(-4)^3 - 3(-4)^2 - 39(-4) + 20\right)$	M1
		$\left(= -128 - 48 + 156 + 20\right) = 0$, so $(x + 4)$ is a factor.	A1 (2)
	(*b*)	$2x^3 - 3x^2 - 39x + 20 = (x + 4)(2x^2 - 11x + 5)$	M1 A1
		$.....(2x - 1)(x - 5)$ or equivalent	M1 A1 cso (4)
			(6 marks)
2.	(*a*)	1.732, 2.058, 5.196 awrt	B1 B1 (2)
	(*b*)	$\frac{1}{2} \times 0.5$	B1
		$..... \left\{\left(1.732 + 5.196\right) + 2\left(2.058 + 2.646 + 3.630\right)\right\}$	M1 A1 ft
		= 5.899	A1 (4)
			(6 marks)
3.	(*a*)	$(1 + ax)^{10} = 1 + 10ax.....$	B1
		$+ \frac{10 \times 9}{2}(ax)^2 + \frac{10 \times 9 \times 8}{6}(ax)^3$	M1
		$+ 45(ax)^2, + 120(ax)^3$ or $+ 45a^2x^2, + 120a^3x^3$	A1 A1 (4)
	(*b*)	$120a^3 = 2 \times 45a^2$ $a = \frac{3}{4}$ or equiv. $\left(\text{e.g.} \frac{90}{120}, 0.75\right)$	M1 A1 (2)
			(6 marks)
4.	(*a*)	$x = \frac{\log 7}{\log 5}$ or $x = \log_5 7$	M1
		1.21	A1 (2)
	(*b*)	$\left(5^x - 7\right)\left(5^x - 5\right)$	M1 A1
		$\left(5^x = 7 \text{ or } 5^x = 5\right)$ x = 1.2 (awrt)	A1 ft
		x = 1	B1 (4)
			(6 marks)

Question Number		Scheme	Marks
5.	(*a*)	$(8-3)^2+(3-1)^2$ or $\sqrt{(8-3)^2+(3-1)^2}$	M1 A1
		$(x\pm3)^2+(y\pm1)^2=k$ or $(x\pm1)^2+(y\pm3)^2=k$ (*k* a positive value)	M1
		$(x-3)^2+(y-1)^2=29$	A1 (4)
	(*b*)	Gradient of radius = $\frac{2}{5}$ (or exact equivalent)	B1
		Gradient of tangent = $\frac{-5}{2}$	M1
		$y-3=\frac{-5}{2}(x-8)$	M1 A1 ft
		$5x+2y-46=0$ or equivalent	A1 (5)
			(9 marks)
6.	(*a*)	$T_{20}=5\times\left(\frac{4}{5}\right)^{19}=0.072$	M1 A1 (2)
	(*b*)	$S_\infty=\frac{5}{1-0.8}=25$	M1 A1 (2)
	(*c*)	$\frac{5(1-0.8^k)}{1-0.8}>24.95$	M1
		$1-0.8^k>0.998$ or equivalent	A1
		$k\log0.8<\log0.002$ or $k>\log_{0.8}0.002$	M1
		$k>\frac{\log0.002}{\log0.8}$	A1 cso (4)
	(*d*)	$k=28$	B1
			(9 marks)

Question Number		Scheme	Marks
7.	(*a*)	$r\theta = 7 \times 0.8 = 5.6$ (cm)	M1 A1 (2)
	(*b*)	$\frac{1}{2}r^2\theta = \frac{1}{2} \times 7^2 \times 0.8 = 19.6$ (cm^2)	M1 A1 (2)
	(*c*)	$BD^2 = 7^2 + (\text{their } AD)^2 - (2 \times 7 \times (\text{their } AD) \times \cos 0.8)$	M1
		$BD^2 = 7^2 + 3.5^2 - (2 \times 7 \times 3.5 \times \cos 0.8)$ (or awrt 46° for the angle)	A1
		Perimeter = (their *DC*) + "5.6" + "5.21" = 14.3 (cm)	M1 A1 (4)
	(*d*)	$\Delta ABD = \frac{1}{2} \times 7 \times (\text{their } AD) \times \sin 0.8$ (ft their *AD*) (= 8.78…)	M1 A1 ft
		Area = "19.6" – "8.78…" = 10.8 (cm^2)	M1 A1 (4)
			(12 marks)
8.	(*a*)	$\left(\frac{\mathrm{d}y}{\mathrm{d}x} =\right) 8 + 2x - 3x^2$	M1 A1
		$3x^2 - 2x - 8 = 0$ $(3x+4)(x-2) = 0$ $x = 2$	A1 cso (3)
	(*b*)	Area of triangle = $\frac{1}{2} \times 2 \times 22$	M1 A1
		$\int 10 + 8x + x^2 - x^3 \,\mathrm{d}x = 10x + \frac{8x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4}$	M1 A1 A1
		$\left[10x + \frac{8x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4}\right]_0^2 = \ldots\ldots \left(= 20 + 16 + \frac{8}{3} - 4\right)$	M1
		Area of $R = 34\frac{2}{3} - 22 = \frac{38}{3} \left(= 12\frac{2}{3}\right)$ (Or $12.\dot{6}$)	M1 A1 (8)
			(11 marks)
9.	(*a*)	45 (α)	B1
		$180 - \alpha$, Add 20 (for at least one angle)	M1 M1
		65 155	A1 (4)
	(*b*)	120 or 240 (β):	B1
		$360 - \beta$, $360 + \beta$	M1 M1
		Dividing by 3 (for at least one angle)	M1
		40 80 160 200 280 320	A1 A1 (6)
			(10 marks)