Question number	Scheme	Marks
1.	(a) 2+1-5 + c = 0 or -2 + c = 0	M1
	$c = 2$	A1 (2)
	(b) f(x) = $(x-1)(2x^2+3x-2)$ ($x-1$)	B1
	division	M1
	= … $(2x-1)(x+2)$	M1 A1 (4)
	(c) f $\left(\frac{3}{2}\right) = 2\times\frac{27}{8}+\frac{9}{4}-\frac{15}{2}+c$	M1
	Remainder = c + 1.5 = 3.5 ft their c	A1ft (2)
		Total 8 marks
2.	(a) $(1+px)^9 = 1+9px$; $+\binom{9}{2}(px)^2$	B1 B1 (2)
	(b) $9p = 36$, so $p = 4$	M1 A1
	$q = \frac{9\times 8}{2}p^2$ or $36p^2$ or $36p$ if that follows from their (a)	M1
	So $q = 576$	A1cao (4)
		Total 6 marks
3.	(a) $(AB)^2 = (4-3)^2+(5)^2$ [= 26]	M1
	$AB = \sqrt{26}$	A1 (2)
	(b) $p = \left(\frac{4+3}{2}, \frac{5}{2}\right)$	M1
	= $\left(\frac{7}{2}, \frac{5}{2}\right)$	A1 (2)
	(c) $(x-x_p)^2+(y-y_p)^2 = \left(\frac{AB}{2}\right)^2$ LHS	M1
	RHS	M1
	$(x-3.5)^2+(y-2.5)^2 = 6.5$ oe	A1 c.a.o (3)
		Total 7 marks

Question number	Scheme	Marks
4.	(a) $\frac{a}{1-r}=480$	M1
	$\frac{120}{1-r}=480 \Rightarrow 120=480(1-r)$	M1
	$1-r=\frac{1}{4} \Rightarrow \quad \underline{r=\frac{3}{4}}$ *	A1cso (3)
	(b) $u_5=120\times\left(\frac{3}{4}\right)^4$ [= 37.96875]	
	$u_6=120\times\left(\frac{3}{4}\right)^5$ [= 28.4765625] either	M1
	Difference = $\underline{9.49}$ (allow $\pm$)	A1 (2)
	(c) $S_7=\frac{120(1-(0.75)^7)}{1-0.75}$	M1
	= 415.9277… (AWRT) $\underline{416}$	A1 (2)
	(d) $\frac{120(1-(0.75)^n)}{1-0.75}>300$	M1
	$1-(0.75)^n>\frac{300}{480}$ (or better)	A1
	$n>\frac{\log(0.375)}{\log(0.75)}$ (=3.409…)	M1
	$\underline{n=4}$	A1cso (4)
		Total 11 marks
5.	(a) $\cos A\hat{O}B=\frac{5^2+5^2-6^2}{2\times5\times5}$ or	M1
	$\sin\theta=\frac{3}{5}$ with use of $\cos 2\theta=1-2\sin^2\theta$ attempted	
	$=\underline{\frac{7}{25}}$ *	A1cso (2)
	(b) $A\hat{O}B=1.2870022...$ radians 1.287 or better	B1 (1)
	(c) Sector $=\frac{1}{2}\times5^2\times(b)$, = 16.087… (AWRT) $\underline{16.1}$	M1 A1 (2)
	(d) Triangle $=\frac{1}{2}\times5^2\times\sin(b)$ or $\frac{1}{2}\times6\times\sqrt{5^2-3^2}$	M1
	Segment = (their sector) – their triangle	dM1
	= (sector from c) – 12 = (AWRT)$\underline{4.1}$ (ft their part(c))	A1ft (3)

Total 8 marks

Question number	Scheme	Marks
6.	(a) t = 15 25 30 v = 3.80 9.72 15.37	B1 B1 B1 (3)
	(b) $S \approx \frac{1}{2}\times 5;[0+15.37+2(1.22+2.28+3.80+6.11+9.72)]$	B1 [M1]
	$= \frac{5}{2}[61.63]$ = 154.075 = AWRT 154	A1 (3)
		Total 6 marks

7.	(a) $\frac{dy}{dx} = 6x^2 - 10x - 4$	M1 A1 (2)
	(b) $6x^2 - 10x - 4 = 0$	M1
	$2(3x + 1)(x - 2)$ [=0]	M1
	$x = 2$ or $-\frac{1}{3}$ (both x values)	A1
	Points are (2, - 10) and $(-\frac{1}{3}, 2\frac{19}{27}$ or $\frac{73}{27}$ or 2.70 or better) (both y values)	A1 (4)
	(c) $\frac{d^2y}{dx^2} = 12x - 10$	M1 A1 (2)
	(d) $x = 2 \Rightarrow \frac{d^2y}{dx^2}(=14) > 0 \therefore [(2, - 10)]$ is a Min	M1
	$x = -\frac{1}{3} \Rightarrow \frac{d^2y}{dx^2}(=-14) < 0 \therefore [(-\frac{1}{3}, \frac{73}{27})]$ is a Max	A1 (2)
		Total 10 marks

Question number	Scheme	Marks
8.	(a) $\sin(\theta+30)=\frac{3}{5}$ ($\frac{3}{5}$ on RHS)	B1
	$\theta+30=36.9$ (α = AWRT 37)	B1
	or = 143.1 $(180-\alpha)$	M1
	$\theta=6.9,\ 113.1$	A1cao (4)
	(b) $\tan\theta=\pm2$ or $\sin\theta=\pm\frac{2}{\sqrt{5}}$ or $\cos\theta=\pm\frac{1}{\sqrt{5}}$	B1
	$(\tan\theta=2\Rightarrow)$ $\theta=\underline{63.4}$ $(\beta=$ AWRT 63.4$)$	B1
	or $\underline{243.4}$ $(180+\beta)$	M1
	$(\tan\theta=-2\Rightarrow)$ $\theta=\underline{116.6}$ $(180-\beta)$	M1
	or $\underline{296.6}$ (180 + their 116.6)	M1 (5)
	Total 9 marks	

Question number	Scheme	Marks
9.	(a) $\frac{3}{2} = -2x^2 + 4x$	M1
	$4x^2 - 8x + 3 (= 0)$	A1
	$(2x-1)(2x-3) = 0$	M1
	$\underline{x = \frac{1}{2},\ \frac{3}{2}}$	A1 (4)
	(b) Area of $R = \int_{\frac{1}{2}}^{\frac{3}{2}} (-2x^2 + 4x)\ \mathrm{d}x\ - \frac{3}{2}$ (for $-\frac{3}{2}$)	B1
	$\int (-2x^2 + 4x)\ \mathrm{d}x = \left[-\frac{2}{3}x^3 + 2x^2 \right]$ (Allow $\pm[\ ]$, accept $\frac{4}{2}x^2$)	M1 [A1]
	$\int_{\frac{1}{2}}^{\frac{3}{2}} (-2x^2 + 4x)\ \mathrm{d}x = \left(-\frac{2}{3} \times \frac{3^3}{2^3} + 2 \times \frac{3^2}{2^2} \right) - \left(-\frac{2}{3} \times \frac{1}{2^3} + 2 \times \frac{1}{2^2} \right)$	M1 M1
	$\left(= \frac{11}{6} \right)$	
	Area of $R = \frac{11}{6} - \frac{3}{2} = \underline{\frac{1}{3}}$ (Accept exact equivalent but not 0.33…)	A1cao (6)
		Total 10 marks