Question number	Scheme	Marks
8 (a)	$\alpha+\beta=\frac{2}{3},\quad \alpha\beta=-\frac{1}{3}$	B1
	$\alpha^2+\beta^2=(\alpha+\beta)^2-2\alpha\beta \Rightarrow \left(\frac{2}{3}\right)^2-2\left(-\frac{1}{3}\right)=\frac{10}{9}$	M1A1 (3)
(b)	$\alpha-\beta=\sqrt{(\alpha-\beta)^2}=\sqrt{(\alpha^2+\beta^2-2\alpha\beta)}=\sqrt{\left(\frac{10}{9}-2\left(-\frac{1}{3}\right)\right)}=\frac{4}{3}$	M1A1cso (2)
	OR: $\sqrt{((\alpha+\beta)^2-4\alpha\beta)}=\sqrt{\left(\frac{4}{9}+\frac{4}{3}\right)}=\frac{4}{3}$ *	
(c)	Sum $=\frac{\alpha+\beta}{\alpha}+\frac{\alpha-\beta}{\beta}=\frac{\alpha\beta+\beta^2+\alpha^2-\alpha\beta}{\alpha\beta}=\frac{\frac{10}{9}}{-\frac{1}{3}}=-\frac{10}{3}$	M1A1
	Product $\left(\frac{\alpha+\beta}{\alpha}\right)\times\left(\frac{\alpha-\beta}{\beta}\right)=\frac{\frac{2}{3}\times\frac{4}{3}}{-\frac{1}{3}}=-\frac{8}{3}$	M1A1
	Equation $x^2-\left(-\frac{10}{3}\right)x+\left(-\frac{8}{3}\right)=0 \Rightarrow 3x^2+10x-8=0$	M1A1 (6) [11]

	"Without solving the equation" applies throughout this question. All work must be based on the sum and product of the roots.
(a)B1	Correct sum and product of roots. May be shown explicitly or just used but must be clear that $\alpha+\beta=\frac{2}{3}$. Award if seen anywhere.
M1	Using the sum and product to obtain a value for $\alpha^2+\beta^2$ Algebra used must be correct.
A1	Correct value. Allow if $\alpha+\beta=-\frac{2}{3}$ used **NB** B1 lost in this case.
(b)M1	For correct algebra leading to a value for $\alpha-\beta$ or $(\alpha-\beta)^2$ May use their value for $\alpha^2+\beta^2$ or use the sum and product values
A1cso	Correct **given** value for $\alpha-\beta$ obtained from a correct solution
(c)	
M1	Correct algebra used to reach a value for the sum
A1	Correct sum
M1	Form the product and use previous results to obtain a value for the product. Algebra must be correct.
A1	Correct product
M1	Use "$x^2-(\text{sum of roots})x+\text{product of roots}$" with or without = 0 with their sum and product
A1	Correct equation, including = 0. Can be as shown or any integer multiple of this.