Question Number	Scheme	Marks
6	$x^2+qx+r=0 \quad \dfrac{1}{\alpha}+\dfrac{1}{\beta}=\dfrac{1}{2} \quad \alpha^2+\beta^2=5$	
(a)	$\alpha+\beta=-q \quad \alpha\beta=r$	B1
		(1)
(b)	$\dfrac{\alpha+\beta}{\alpha\beta}=\dfrac{1}{2}\left\{=\dfrac{"-q"}{"r"}\right\}$	M1
	$(\alpha+\beta)^2-2\alpha\beta=5\left\{=("-q")^2-2"r"=5\right\}$	M1
	$\alpha+\beta=\dfrac{1}{2}\alpha\beta\Rightarrow\dfrac{1}{4}(\alpha\beta)^2-2\alpha\beta=5\Rightarrow(\alpha\beta)^2-8\alpha\beta-20=0$ **or** $-q=\dfrac{1}{2}r\Rightarrow\left(\dfrac{1}{2}r\right)^2-2r=5$ $\Rightarrow r^2-8r-20=0$	A1
		(3)
(c)	$(r+2)(r-10)=0$ or $(\alpha\beta+2)(\alpha\beta-10)=0$ $\Rightarrow r$ or $\alpha\beta=-2,\ 10$	M1
	$(r=-2,\ 10\Rightarrow q=1,\ -5$ or $\alpha\beta=-2,\ 10\Rightarrow\alpha+\beta=-1,\ 5)$	
	$\Rightarrow\{f(x)=\}\quad x^2+x-2,\quad x^2-5x+10$	M1 A1
		(3)
		Total 7

Notes

(a)

B1: Both correct, may be indicated by (i) and (ii) if not explicitly labelled.

(b)

M1: States or uses $\dfrac{1}{\alpha}+\dfrac{1}{\beta}=\dfrac{\alpha+\beta}{\alpha\beta}$

M1: States or uses $\alpha^2+\beta^2=(\alpha+\beta)^2-2\alpha\beta$ or equivalent work

A1: Obtains $r^2-8r-20=0$

(c)

M1: Solves their 3TQ (usual rules). Allow for solving a 3TQ in q if they eliminate r instead of q in (b).

M1: Finds a value of q or $\alpha+\beta$ for one of their non-zero r or $\alpha\beta$ values (or vice versa) **and** substitutes correctly into x^2+qx+r or $x^2-(\alpha+\beta)x+\alpha\beta$

A1: Correct expressions (and no others).