Question number	Scheme	Marks
7 (a)	$16-4k(2k-7)\geq 0$	M1
	$2k^2-7k-4\leq 0$	M1
	$(2k+1)(k-4)\leq 0$	M1
	$-\frac{1}{2}\leq k\leq 4$ Accept $-\frac{1}{2}<k<4$	A1 (4)
(b)	$\alpha+\beta=\frac{4}{k}$ $\alpha\beta=\frac{2k-7}{k}$	B1
	$\frac{\alpha+1}{\alpha}+\frac{\beta+1}{\beta}=\frac{2\alpha\beta+\alpha+\beta}{\alpha\beta}=\frac{2\left(\frac{2k-7}{k}\right)+\frac{4}{k}}{\frac{2k-7}{k}}$	M1 M1
	$\frac{4k-10}{k}\times\frac{k}{2k-7}=\frac{2(2k-5)}{2k-7}$	A1
	$\frac{\alpha+1}{\alpha}\times\frac{\beta+1}{\beta}=\frac{\alpha\beta+\alpha+\beta+1}{\alpha\beta}=\frac{\frac{2k-7}{k}+\frac{4}{k}+1}{\frac{2k-7}{k}}$	M1 M1
	$\frac{3k-3}{k}\times\frac{k}{2k-7}=\frac{3(k-1)}{2k-7}$	A1
	$(2k-7)x^2-2(2k-5)x+3(k-1)=0$	A1 (8)
	ALTERNATIVE METHOD	
	Let $w=\frac{x+1}{x}$	B1
	$x=\frac{1}{w-1}$	M1
	Hence $k\left(\frac{1}{w-1}\right)^2-4\left(\frac{1}{w-1}\right)+2k-7=0$	M1
	$\frac{k}{(w-1)^2}-\frac{4}{w-1}+2k-7=0$	A1
	$k-4(w-1)+(2k-7)(w-1)^2=0$	M1
	$k-4w+4+(2k-7)(w^2-2w+1)=0$	M1
	$k-4w+4+2kw^2-4kw+2k-7w^2+14w-7=0$	A1
	$(2k-7)x^2-2(2k-5)x+3(k-1)=0$	A1 (8) **[12]**

	Notes
(a)	
M1	For use of $b^2 - 4ac$ (Ignore inequality for this mark)
M1	For a 3 TQ ≤ 0 oe
M1	For solving their 3TQ (Ignore inequality for this mark) May be implied by $-\frac{1}{2}$ and 4 seen as critical values
A1	For $-\frac{1}{2} \leq k \leq 4$ Allow < instead of $\leq$ Accept $-\frac{1}{2} < k < 4$
(b)	
B1	For $\alpha + \beta = \frac{4}{k}$ and $\alpha\beta = \frac{2k-7}{k}$
M1	For $\frac{\alpha+1}{\alpha} + \frac{\beta+1}{\beta} = \frac{2\alpha\beta + \alpha + \beta}{\alpha\beta}$
M1	For substitution into $\frac{2\alpha\beta + \alpha + \beta}{\alpha\beta}$ with some attempt to simplify
A1	For $\frac{2(2k-5)}{2k-7}$
M1	For $\frac{\alpha+1}{\alpha} \times \frac{\beta+1}{\beta} = \frac{\alpha\beta + \alpha + \beta + 1}{\alpha\beta}$
M1	For substitution into $\frac{\alpha\beta + \alpha + \beta + 1}{\alpha\beta}$ with some attempt to simplify
A1	For $\frac{3(k-1)}{2k-7}$
A1	For $(2k-7)x^2 - 2(2k-5)x + 3(k-1) = 0$
	Alternative
B1	For $w = \frac{x+1}{x}$
M1	For rearranging to make x the subject
M1	For substitution of $x = \frac{1}{w-1}$ into the quadratic
A1	For $\frac{k}{(w-1)^2} - \frac{4}{w-1} + 2k - 7 = 0$
M1	For multiplying by $(w-1)^2$
M1	For expanding brackets
A1	For $k - 4w + 4 + 2kw^2 - 4kw + 2k - 7w^2 + 14w - 7 = 0$
A1	For $(2k-7)x^2 - 2(2k-5)x + 3(k-1) = 0$