1	$-\dfrac{1}{7}$ and $\dfrac{3}{2}$	B1	

2	**Alternative method 1**		
	$(x-5)^2$ or $(5-x)^2$ or $x^2 - 10x + 25\ (=0)$ or $b = -10$ or $c = 25$	M1	
	$b = -10$ and $c = 25$	A1	
	Alternative method 2 – using $b^2 - 4ac$		
	$b^2 - 4\ (\times 1) \times c = 0$ or $b^2 - 4\ (\times 1) \times (-25 - 5b) = 0$ or $b^2 + 100 + 20b = 0$ or $(b + 10)^2 = 0$	M1	
	$b = -10$ and $c = 25$	A1	
	Additional Guidance		
	Do not allow $c = 25$ from $(x+5)^2$ or $(5+x)^2$		

Question	Answer	Mark	Comments
3	$x^2 + 3ax + ax + 3a^2 \ (\equiv x^2 + bx + 75)$ or $x^2 + 4ax + 3a^2 \ (\equiv x^2 + bx + 75)$ or $3ax + ax + 3a^2 \equiv bx + 75$ or $4ax + 3a^2 \equiv bx + 75$ or $3a^2 = 75$	M1	
	$a = 5$ and/or $a = -5$	A1	implied by $(x + 5)(x + 15)$ or $(x - 5)(x - 15)$ implied by answer 20 and/or -20
	20 and -20	A1	oe ± 20

Q	Answer	Mark	Comments
	$\dfrac{731}{x} + \dfrac{287}{x-24} = 2$	M1	oe equation
	$731(x - 24) + 287x$ or $731x - 17\,544 + 287x$	M1dep	oe allow with denominator $x(x - 24)$ oe
	$2x^2 - 1066x + 17\,544\ (= 0)$ or $x^2 - 533x + 8772\ (= 0)$	A1	oe eg $x^2 - 533x = -8772$
4	$\dfrac{-(-1066) \pm \sqrt{(-1066)^2 - 4 \times 2 \times 17\,544}}{2 \times 2}$ or $\dfrac{1066 \pm \sqrt{1\,136\,356 - 140\,352}}{2 \times 2}$ or $\dfrac{1066 \pm \sqrt{996\,004}}{2 \times 2}$ or $\dfrac{1066 \pm 998}{2 \times 2}$ or $(2x - 34)(x - 516)$ or 17 and 516	M1	ft their 3-term quadratic oe eg $\dfrac{-(-533) \pm \sqrt{(-533)^2 - 4 \times 1 \times 8772}}{2 \times 1}$ or $\dfrac{533 \pm \sqrt{284\,089 - 35\,088}}{2 \times 1}$ or $\dfrac{533 \pm \sqrt{249\,001}}{2 \times 1}$ or $\dfrac{533 \pm 499}{2}$ or $(x - 17)(x - 516)$
	516	A1	must discard 17

Additional Guidance	
First M1 may be awarded for correct work, with no or incorrect answer, even if this is seen amongst multiple attempts	
3rd M1 Allow ft of their 3-term quadratic even if discriminant is $\leqslant 0$	
In quadratic formula, allow eg 1066^2 for $(-1066)^2$	

Q	Answer	Mark	Comments
5	$$\dfrac{-7 \pm \sqrt{7^2 - 4 \times 1 \times -11}}{2 \times 1}$$ or $$-\dfrac{7}{2} \pm \sqrt{\left(\dfrac{7}{2}\right)^2 + 11}$$	M1	oe eg $\dfrac{-7 \pm \sqrt{49 + 44}}{2}$ or $\dfrac{-7 \pm \sqrt{93}}{2}$ or $-\dfrac{7}{2} \pm \sqrt{\dfrac{49}{4} + 11}$ or $-\dfrac{7}{2} \pm \sqrt{\dfrac{93}{4}}$
	1.3(2...) and −8.3(2...)	A1	

Additional Guidance

$-3.5 \pm \sqrt{12.25 + 11}$ or $-3.5 \pm \sqrt{23.25}$	M1
For M1 allow solutions given separately eg $\dfrac{-7 + \sqrt{93}}{2}$ and $\dfrac{-7 - \sqrt{93}}{2}$	M1
Both solutions correct	M1A1
One solution correct does not imply M1	
Not using ± is M0 unless recovered eg1 $\dfrac{-7 + \sqrt{7^2 - 4 \times 1 \times -11}}{2 \times 1}$ followed by 1.32	M0A0
eg2 $\dfrac{-7 + \sqrt{7^2 - 4 \times 1 \times -11}}{2 \times 1}$ followed by 1.3 and −8.3	M1A1
A short dividing line or a short square root symbol is M0 unless recovered eg by a correct solution	
Condone if their square root symbol is above any part of −11	
$\sqrt{(7^2 - 4 \times 1 \times -11)}$ is correct for $\sqrt{7^2 - 4 \times 1 \times -11}$	
Both decimal solutions seen in working but only one on answer line	M1A0

Q	Answer	Mark	Comments
6(a)	−1 and 5	B1	either order

Additional Guidance

Ignore $x =$ written before answers	
(−1, 0) or (5, 0)	B0

Q	Answer	Mark	Comments
7(a)	$4x^2 + 28x + 45 \ (= 0)$	M1	must be correct
	$(2x + 5)(2x + 9) \ (= 0)$ or $(2x + 7)^2 - 49 + 45 \ (= 0)$ or $\dfrac{-28 \pm \sqrt{28^2 - 4 \times 4 \times 45}}{2 \times 4}$ or $\dfrac{-28 \pm \sqrt{64}}{8}$ or $\dfrac{-28 \pm 8}{8}$ or $\dfrac{-7 \pm \sqrt{4}}{2}$	M1dep	oe implies first M1
	$(x =) -2.5$ and $(x =) -4.5$	A1	oe fraction or decimal SC2 $(x =)$ [−1.63, −1.629] and $(x =)$ [−5.371, −5.37]

Additional Guidance	
SC2 from using $4x^2 + 28x + 35 \ (= 0)$	
Trial and improvement with both answers correct and chosen from any list	M1M1A1
Trial and improvement with one answer correct	M0M0A0

Q	Answer	Mark	Comment
	Alternative method 1		
	$(x + 15)^2$	M1	
	$x^2 + 15x + 15x + 225$ or $x^2 + 30x + 225$ or $b = 30$ or $c = 225$	M1dep	
	$b = 30$ and $c = 225$	A1	
	Alternative method 2: simultaneous equations using $x = -15$ and $b^2 - 4ac = 0$		
	$(-15)^2 - 15b + c = 0$ or $b^2 - 4 \,(\times 1) \times c = 0$	M1	oe do not allow missing brackets unless recovered
8	$b^2 - 4 \,(\times 1) \times (15b - 225) = 0$ or $b^2 - 60b + 900 = 0$ or $(b - 30)^2 = 0$ or $b = 30$ or $c = 225$	M1dep	oe method to eliminate one unknown eg $\left(\dfrac{225 + c}{15}\right)^2 - 4c = 0$
	$b = 30$ and $c = 225$	A1	
	Alternative method 3: using $b^2 - 4ac = 0$ in the quadratic formula		
	$-15 = \dfrac{-b}{2(\times 1)}$	M1	oe
	$b = 30$	M1dep	
	$b = 30$ and $c = 225$	A1	
	Additional Guidance		
	30 and 225 may come from incorrect working eg do not allow $c = 225$ from $(x - 15)^2$		

Q	Answer	Mark	Comments
	5	B1	
	3	B1	
9(a)	**Additional Guidance**		
	Mark the answer lines only		
	Do not allow eg (0, 5)		