Exercise 2A

1 a $x^2 + 3x + 2 = 0$
$(x + 1)(x + 2) = 0$
$x + 1 = 0$ or $x + 2 = 0$
So $x = -1$ or $x = -2$

b $x^2 + 5x + 4 = 0$
$(x + 1)(x + 4) = 0$
$x + 1 = 0$ or $x + 4 = 0$
So $x = -1$ or $x = -4$

c $x^2 + 7x + 10 = 0$
$(x + 2)(x + 5) = 0$
$x + 2 = 0$ or $x + 5 = 0$
So $x = -2$ or $x = -5$

d $x^2 - x - 6 = 0$
$(x - 3)(x + 2) = 0$
$x - 3 = 0$ or $x + 2 = 0$
So $x = 3$ or $x = -2$

e $x^2 - 8x + 15 = 0$
$(x - 3)(x - 5) = 0$
$x - 3 = 0$ or $x - 5 = 0$
So $x = 3$ or $x = 5$

f $x^2 - 9x + 20 = 0$
$(x - 4)(x - 5) = 0$
$x - 4 = 0$ or $x - 5 = 0$
So $x = 4$ or $x = 5$

g $x^2 - 5x - 6 = 0$
$(x - 6)(x + 1) = 0$
$x - 6 = 0$ or $x + 1 = 0$
So $x = 6$ or $x = -1$

h $x^2 - 4x - 12 = 0$
$(x - 6)(x + 2) = 0$
$x - 6 = 0$ or $x + 2 = 0$
So $x = 6$ or $x = -2$

2 a $x^2 = 4x$
$x^2 - 4x = 0$
$x(x - 4) = 0$
$x = 0$ or $x - 4 = 0$
So $x = 0$ or $x = 4$

b $x^2 = 25x$
$x^2 - 25x = 0$
$x(x - 25) = 0$
$x = 0$ or $x - 25 = 0$
So $x = 0$ or $x = 25$

2 c $3x^2 = 6x$
$3x^2 - 6x = 0$
$3x(x - 2) = 0$
$x = 0$ or $x - 2 = 0$
So $x = 0$ or $x = 2$

d $5x^2 = 30x$
$5x^2 - 30x = 0$
$5x(x - 6) = 0$
$x = 0$ or $x - 6 = 0$
So $x = 0$ or $x = 6$

e $2x^2 + 7x + 3 = 0$
$(2x + 1)(x + 3) = 0$
$2x + 1 = 0$ or $x + 3 = 0$
$2x = -1$ or $x = -3$
So $x = -\frac{1}{2}$ or $x = -3$

f $6x^2 - 7x - 3 = 0$
$(3x + 1)(2x - 3) = 0$
$3x + 1 = 0$ or $2x - 3 = 0$
So $x = -\frac{1}{3}$ or $x = \frac{3}{2}$

g $6x^2 - 5x - 6 = 0$
$(3x + 2)(2x - 3) = 0$
$3x + 2 = 0$ or $2x - 3 = 0$
So $x = -\frac{2}{3}$ or $x = \frac{3}{2}$

h $4x^2 - 16x + 15 = 0$
$(2x - 3)(2x - 5) = 0$
$2x - 3 = 0$ or $2x - 5 = 0$
So $x = \frac{3}{2}$ or $x = \frac{5}{2}$

3 a $3x^2 + 5x = 2$
$3x^2 + 5x - 2 = 0$
$(3x - 1)(x + 2) = 0$
$3x - 1 = 0$ or $x + 2 = 0$
So $x = \frac{1}{3}$ or $x = -2$

b $(2x - 3)^2 = 9$
$2x - 3 = \pm 3$
$2x = \pm 3 + 3$
$x = \dfrac{\pm 3 + 3}{2}$
So $x = 3$ or $x = 0$

3 c $(x-7)^2 = 36$
$x - 7 = \pm 6$
$x = \pm 6 + 7$
So $x = 1$ or $x = 13$

d $2x^2 = 8$
$x^2 = 4$
$x = \pm 2$
So $x = 2$ or $x = -2$

e $3x^2 = 5$
$x = \pm\sqrt{\frac{5}{3}}$
So $x = \sqrt{\frac{5}{3}}$ or $x = -\sqrt{\frac{5}{3}}$

f $(x-3)^2 = 13$
$x - 3 = \pm\sqrt{13}$
$x = 3 \pm \sqrt{13}$
So $x = 3 + \sqrt{13}$ or $x = 3 - \sqrt{13}$

g $(3x-1)^2 = 11$
$3x - 1 = \pm\sqrt{11}$
$3x = 1 \pm \sqrt{11}$
$x = \frac{1 \pm \sqrt{11}}{3}$
So $x = \frac{1+\sqrt{11}}{3}$ or $x = \frac{1-\sqrt{11}}{3}$

h $5x^2 - 10x^2 = -7 + x + x^2$
$-6x^2 - x + 7 = 0$
$6x^2 + x - 7 = 0$
$(x-1)(6x+7) = 0$
$x - 1 = 0$ or $6x + 7 = 0$
So $x = 1$ or $x = -\frac{7}{6}$

i $6x^2 - 7 = 11x$
$6x^2 - 11x - 7 = 0$
$(3x-7)(2x+1) = 0$
$3x - 7 = 0$ or $2x + 1 = 0$
So $x = \frac{7}{3}$ or $x = -\frac{1}{2}$

j $4x^2 + 17x = 6x - 2x^2$
$6x^2 + 11x = 0$
$x(6x+11) = 0$
$x = 0$ or $6x + 11 = 0$
So $x = 0$ or $x = -\frac{11}{6}$

4 Area of shape = 44
$x \times x + x(x+3) = 44$
$x^2 + x^2 + 3x = 44$
$2x^2 + 3x - 44 = 0$
$(2x+11)(x-4) = 0$
Then either $2x + 11 = 0 \Rightarrow x = -\frac{11}{2}$
or $x - 4 = 0 \Rightarrow x = 4$
x represents a length, so it can't be negative, thus $x = 4$.

5 $5x + 3 = \sqrt{3x+7}$
$(5x+3)^2 = 3x + 7$
$(5x+3)(5x+3) = 3x + 7$
$25x^2 + 15x + 15x + 9 = 3x + 7$
$25x^2 + 27x + 2 = 0$
$(25x+2)(x+1) = 0$
Then either $25x + 2 = 0 \Rightarrow x = -\frac{2}{25}$
or $x + 1 = 0 \Rightarrow x = -1$