Activity 36 The general quadratic formula

1.

$$x^2 - 3x + 1 = 0$$
$$x^2 - 3x = -1$$
$$x^2 - 3x + \frac{9}{4} = \frac{5}{4} \qquad \text{add } \frac{9}{4}\left(\left(\frac{3}{2}\right)^2\right) \text{ to both sides}$$
$$\frac{(2x-3)^2}{4} = \frac{5}{4} \qquad \text{Complete the square } \left(x - \frac{3}{2}\right)^2$$
$$(2x-3)^2 = 5$$
$$2x - 3 = \pm\sqrt{5} \qquad \text{square root of both sides}$$
$$x = \frac{3 \pm \sqrt{5}}{2}$$

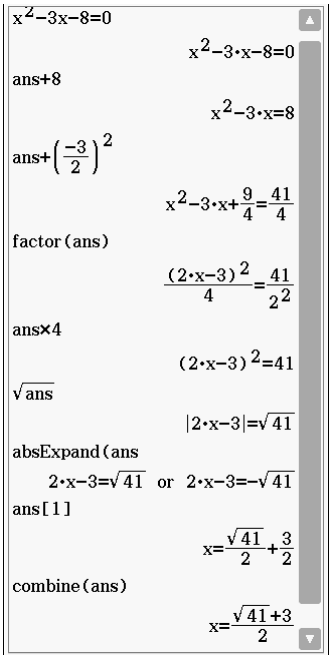
2.

a)

$$x^2 - 3x - 8 = 0$$
$$x^2 - 3x = 8$$
$$x^2 - 3x + \frac{9}{4} = \frac{41}{4}$$
$$\left(x - \frac{3}{2}\right)^2 = \frac{41}{4}$$
$$x - \frac{3}{2} = \pm\frac{\sqrt{41}}{2}$$
$$x = \frac{3 \pm \sqrt{41}}{2}$$

b)

$$z^2 + 5z - 8 = 0$$
$$z^2 + 5z = 8$$
$$z^2 + 5z + \frac{25}{4} = \frac{57}{4}$$
$$\left(z + \frac{5}{2}\right)^2 = \frac{57}{4}$$
$$z + \frac{5}{2} = \pm\frac{\sqrt{57}}{2}$$
$$z = \frac{-5 \pm \sqrt{57}}{2}$$



3. a)

$$x^2 + 5x + c = 0$$
$$x^2 + 5x = -c$$
$$x^2 + 5x + \frac{25}{4} = \frac{25}{4} - c$$
$$\left(x + \frac{5}{2}\right)^2 = \frac{25}{4} - c$$
$$x + \frac{5}{2} = \pm\sqrt{\frac{25}{4} - c}$$
$$x = \frac{-5}{2} \pm \frac{\sqrt{25 - 4c}}{2}$$

b)

$$x^2 + bx + c = 0$$
$$x^2 + bx = -c$$
$$x^2 + bx + \frac{b^2}{4} = \frac{b^2}{4} - c$$
$$\left(x + \frac{b}{2}\right)^2 = \frac{b^2}{4} - c$$
$$x + \frac{b}{2} = \pm\sqrt{\frac{b^2 - 4c}{4}}$$
$$x = \frac{-b \pm \sqrt{b^2 - 4c}}{2}$$

4.

$$x^2 + \frac{b}{a}x + \frac{c}{a} = 0$$

$$x^2 + \frac{b}{a}x + \left(\frac{b}{2a}\right)^2 = \left(\frac{b}{2a}\right)^2 - \frac{c}{a} = \frac{b^2 - 4ac}{4a^2}$$

$$\left(x + \frac{b}{2}\right)^2 = \frac{b^2 - 4ac}{4a^2}$$

$$x + \frac{b}{2} = \frac{\pm\sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$