

# Completing the Square

Std Form  $\rightarrow$  Vertex Form

$$y = x^2 + 4x + 8$$
$$(x^2 + 4x + 4) - 4 + 8$$
$$y = (x+2)^2 + 4$$

\* Now it's an equation — we can work with both sides

$$\textcircled{1} x^2 + 16x - 100 = -3$$
$$+100 \quad +100$$

$$x^2 + 16x = 97$$
$$x^2 + 16x + 64 = 97 + 64$$
$$\sqrt{(x+8)^2} = \sqrt{161}$$
$$x+8 = \pm \sqrt{161}$$
$$\underline{-8} \quad \underline{-8}$$

$$\boxed{x = -8 \pm \sqrt{161}}$$

$$\textcircled{2} k^2 + 4k - 56 = 10$$
$$+56 \quad +56$$

$$k^2 + 4k = 66$$
$$k^2 + 4k + 4 = 66 + 4$$
$$\sqrt{(k+2)^2} = \sqrt{70}$$
$$k+2 = \pm \sqrt{70}$$
$$\underline{-2} \quad \underline{-2}$$

$$\boxed{k = -2 \pm \sqrt{70}}$$

$$\textcircled{3} 8x^2 - 16x - 88 = 7x^2$$
$$\underline{-7x^2} \quad \underline{+88} \quad \underline{-7x^2 + 88}$$

$$x^2 - 16x = 88$$
$$x^2 - 16x + 64 = 88 + 64$$
$$\sqrt{(x-8)^2} = \sqrt{152}$$
$$x-8 = \pm 2\sqrt{38}$$
$$\underline{+8} \quad \underline{+8}$$

$$\boxed{x = 8 \pm 2\sqrt{38}}$$

$$\sqrt{(m+2)^2} = \sqrt{36}$$
$$m+2 = \pm 6$$
$$\underline{-2} \quad \underline{-2}$$

$$m = -2 \pm 6$$

$$\boxed{m = 4, -8}$$