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vertex form
x-intercepts

Use Completing the square to describe the graph each function. Then use the quadratic formula to find the x-intercepts

a) $f(x) = x^2 + 6x - 11$

$a=1 \quad b=6 \quad c=-11$

x-intercepts

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

$x = \frac{-6}{2(1)} \pm \frac{\sqrt{6^2-4(1)(-11)}}{2(1)}$

$x = -3 \pm \frac{\sqrt{36+44}}{2}$

$x = -3 \pm \frac{\sqrt{80}}{2}$

$\sqrt{80} = \sqrt{4}\sqrt{20}$

$\sqrt{80} = \sqrt{4 \cdot 20} = \sqrt{4}\sqrt{20} = \frac{2\sqrt{20}}{2}$

① get the x terms on one side by themselves

② Cut b term in half

③ Take that answer and square it

④ Add that answer to both sides

$y = x^2 + 6x - 11$

$+11 \qquad +11$

$y + 11 = x^2 + 6x$

$y + 11 + 9 = x^2 + 6x + 9$

$y + 20 = (x+3)(x+3)$

$y + 20 = (x+3)^2$

$-20 \qquad -20$

$y = (x+3)^2 - 20$

Vertex $(-3, -20)$

b) $f(x) = x^2 - 5x - 2$

$a=1 \quad b=-5 \quad c=-2$

$x = \frac{-(-5)}{2(1)} \pm \frac{\sqrt{(-5)^2-4(1)(-2)}}{2(1)}$

$x = \frac{5}{2} \pm \frac{\sqrt{33}}{2}$

$y = x^2 - 5x - 2$

$+2 \qquad +2$

$y + 2 = x^2 - 5x$

$\frac{-5}{2}$

$\left(\frac{-5}{2}\right)^2 = \frac{25}{4}$

$y + 2 + \frac{25}{4} = x^2 - 5x + \frac{25}{4}$

$y + \frac{33}{4} = \left(x - \frac{5}{2}\right)\left(x - \frac{5}{2}\right)$

$y + \frac{33}{4} = \left(x - \frac{5}{2}\right)^2$

$y = \left(x - \frac{5}{2}\right)^2 - \frac{33}{4}$

Vertex $\left(\frac{5}{2}, \frac{-33}{4}\right)$

A.O.S: $x = \frac{5}{2}$

open up