Name _____ Date _____

The Quadratic Formula

1 ON YOUR OWN By completing the square we will solve **any** quadratic equation. The left column shows the steps in general. Follow them and fill in the right column for $2x^2 + 3x - 2 = 0$.

step	in general	$2x^2 + 3x - 2 = 0$
divide by a, move c to the right	$x^2 + \frac{b}{a}x = -\frac{c}{a}$	$x^2 + \frac{3}{2}x = \square$
add $\left(\frac{b}{2a}\right)^2$ to both sides	$\left(x + \frac{b}{2a}\right)^2 = \frac{b^2}{4a^2} - \frac{c}{a}$	$\left(x + \frac{3}{4}\right)^2 = \square + 1$
right side over a common denominator	$\left(x + \frac{b}{2a}\right)^2 = \frac{b^2 - 4ac}{4a^2}$	$\left(x + \frac{3}{4}\right)^2 = \square$
square root; two signs	$x + \frac{b}{2a} = \pm\frac{\sqrt{b^2 - 4ac}}{2a}$	$x + \frac{3}{4} = \pm\square$
get x on its own	$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$	$x_1 = \square\ x_2 = \square$

Remember

The **quadratic formula** for $ax^2 + bx + c = 0$: $x_{1,2} = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$. Before substituting, rearrange the equation into the form $= 0$ and read off a, b and c **together with their signs**.

Example

$x^2 - 7x + 10 = 0$: $a = 1$, $b = -7$, $c = 10$

$x_{1,2} = \frac{7 \pm \sqrt{49 - 40}}{2} = \frac{7 \pm 3}{2} \Rightarrow x_1 = 5\ ,\ x_2 = 2$

Names (pair) _____ Date _____

2 ON YOUR OWN Solve using the formula.

$x^2 - 5x + 6 = 0$

$a = \square\ b = \square\ c = \square$

$x_1 = \square\ x_2 = \square$

$2x^2 + x - 3 = 0$

$a = \square\ b = \square\ c = \square$

$x_1 = \square\ x_2 = \square$

$x^2 + 2x - 2 = 0$

$a = \square\ b = \square\ c = \square$

$x_1 = \square\ x_2 = \square$

$3x^2 - 2x - 1 = 0$

$a = \square\ b = \square\ c = \square$

$x_1 = \square\ x_2 = \square$

$x^2 - 6x + 9 = 0$

$a = \square\ b = \square\ c = \square$

$x_1 = \square\ x_2 = \square$

$x^2 + x + 1 = 0$

$a = \square\ b = \square\ c = \square$

$x_1 = \square\ x_2 = \square$

3 IN PAIRS **Find the mistake.** Ana solved $x^2 - 4x - 5 = 0$ like this: $x = \frac{-4 \pm \sqrt{16 + 20}}{2} = \frac{-4 \pm 6}{2}$, so $x_1 = 1, x_2 = -5$. Check by substituting, find the mistake and solve it correctly.

4 IN PAIRS What happened in the last equation of task 2? What can you say about the number under the square root?

★ ON YOUR OWN **Exit card.** Solve using the formula: $2x^2 - 5x + 2 = 0$.