Name _____ Date _____

When a Product Is Zero

Example

A product is zero only if **at least one factor is zero** : if $a \times b = 0$, then $a = 0$ or $b = 0$.

$(x-2)(x+5)=0 \Rightarrow x-2=0$ or $x+5=0 \Rightarrow x_1=2$, $x_2=-5$

$x^2-3x=0 \Rightarrow x(x-3)=0 \Rightarrow x_1=0$, $x_2=3$

1 ON YOUR OWN Solve.

$(x-3)(x-4)=0$

$x_1=$ ☐ $x_2=$ ☐

$(x+1)(x-6)=0$

$x_1=$ ☐ $x_2=$ ☐

$x(x-7)=0$

$x_1=$ ☐ $x_2=$ ☐

$(2x-1)(x+3)=0$

$x_1=$ ☐ $x_2=$ ☐

$(x+2)(x+2)=0$

$x_1=$ ☐ $x_2=$ ☐

$5(x-8)=0$

$x_1=$ ☐ $x_2=$ ☐

2 ON YOUR OWN Factor out the common factor and solve. If needed, first move everything to the left side.

$x^2-5x=0$

$x_1=$ ☐ $x_2=$ ☐

$x^2+4x=0$

$x_1=$ ☐ $x_2=$ ☐

$3x^2-12x=0$

$x_1=$ ☐ $x_2=$ ☐

$2x^2+7x=0$

$x_1=$ ☐ $x_2=$ ☐

$x^2=6x$

$x_1=$ ☐ $x_2=$ ☐

$4x^2=x$

$x_1=$ ☐ $x_2=$ ☐

Names (pair) _____ Date _____

Remember

We solve $ax^2 + bx = 0$ by factoring out: $x(ax + b) = 0$, so $x_1 = 0$ and $x_2 = -\frac{b}{a}$. **Do not divide by x**: that loses the solution $x = 0$. The rule only works when the product equals **zero**.

3 IN PAIRS **Find the mistake.** Luka solved $x^2 = 5x$ like this: he divided both sides by x and got $x = 5$. Which solution did he lose? Why?

4 IN PAIRS **Find the mistake.** Petra wrote: $(x - 2)(x - 3) = 6$, so $x - 2 = 6$ or $x - 3 = 6$, that is $x = 8$ or $x = 9$. Check by substituting $x = 8$. Then multiply out the brackets and solve correctly.

5 IN PAIRS Write an equation of the form $(x - \square)(x - \square) = 0$ with the given solutions.

2 and 7 : ☐ -1 and 4 : ☐

0 and -3 : ☐ only 5 : ☐

★ ON YOUR OWN **Exit card.** Solve: $x^2 + 9x = 0$ and $(x + 4)(3x - 6) = 0$.