4.3 Solve $x^2 + bx + c = 0$ by Factoring

Goal • Solve quadratic equations.

Your Notes

VOCABULARY

Monomial

Binomial

Trinomial

Quadratic equation

Root of an equation

Zero of a function

Example 1 ***Factor trinomials of the form $x^2 + bx + c$***

Factor the expression $x^2 + 7x - 8$.

Solution

You want $x^2 + 7x - 8 = (x + m)(x + n)$ where $mn =$ ____ and $m + n =$ ___.

Factors of -8 (m, n)	-1, ___	1, _____
Sum of factors ($m + n$)	___	_____

Factors of -8 (m, n)	-2, ___	2, _____
Sum of factors ($m + n$)	___	_____

Notice that $m =$ _____ and $n =$ ___. So,
$x^2 + 7x - 8 =$ (_____)(_____).

Your Notes

SPECIAL FACTORING PATTERNS

Pattern Name	
Difference of Two Squares	$a^2 - b^2 =$ (_____)(_____) $x^2 - 4 = (x + 2)(x - 2)$
Perfect Square Trinomial	$a^2 + 2ab + b^2 =$ (_____)^2 $x^2 + 6x + 9 = (x + 3)^2$
Perfect Square Trinomial	$a^2 - 2ab + b^2 =$ (_____)^2 $x^2 - 4x + 4 = (x - 2)^2$

Example 2 ***Factor with special patterns***

Factor the expression.

a. $x^2 - 25 = x^2 -$ ____ = (_____)(_____) **Difference of two squares**

b. $m^2 - 22m + 121$ **Perfect square trinomial**

$= m^2 - 2(m)($____$) +$ ____^{2}

= (_____)^2

✔ ***Checkpoint*** **Factor the expression. If it cannot be factored, say so.**

1. $x^2 + 7x + 12$	**2.** $x^2 - 81$

ZERO PRODUCT PROPERTY

Words If the _____ of two expressions is zero, then _____ or _____ of the expressions equals zero.

Algebra If A and B are expressions and $AB =$ ___, then $A =$ ___ or $B =$ ___.

Example If $(x + 5)(x + 2) = 0$, then $x + 5 = 0$ or $x + 2 = 0$. That is, $x =$ _____ or $x =$ _____.

Your Notes

Example 3 ***Find the roots of an equation***

Find the roots of the equation $x^2 - 2x - 15 = 0$.

Solution

$x^2 - 2x - 15 = 0$	**Original equation**
(_____)(_____) $= 0$	**Factor.**
_____ $= 0$ or _____ $= 0$	**Zero product property**
$x =$ ___ or $x =$ _____	**Solve for x.**

The roots are ___ and _____.

Example 4 ***Find the zeros of a quadratic function***

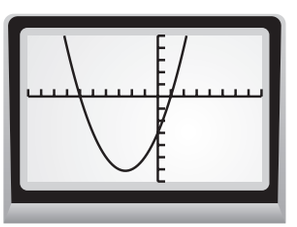
Find the zeros of the function $y = x^2 + 5x - 6$ by rewriting the function in intercept form.

Solution

$y = x^2 + 5x - 6$	**Write original equation.**
$=$ (_____)(_____)	**Factor.**

The zeros of the function are _____ and ___.

CHECK Graph $y = x^2 + 5x - 6$. The graph passes through (_____, 0) and (___, 0).



✔ ***Checkpoint*** **Complete the following exercises.**

3. Find the roots of the equation $x^2 - 3x + 2 = 0$.

4. Find the zeros of the function $y = x^2 + 3x - 40$ by rewriting the function in intercept form.

Homework