8-3 Factoring $x^2 + bx + c$

Warm Up

Lesson Presentation

Lesson Quiz

8-3 Factoring $x^2 + bx + c$

Answers to Factoring By Grouping

1) $(6a+7)(2b-3a)$
2) $(8a+b)(3z+8h^2)$
3) $(4m-7)(n+6)$
4) $(8a-5b)(7h-5k)$
5) $(7m^2-2n)(h+2k)$
6) $(2x+y^3)(4y+3)$
7) $(4x-7)(7y-3)$
8) $(3x-7)(y-3)$
9) $(3u-8)(7v-6)$
10) $(3a-2)(7b+2a)$
11) $(7x-6y^2)(2y-3)$
12) $(5u+8)(7v+2u^2)$
13) $(4v^2+5)(4v+5)$
14) $(2x^2+1)(5x+2)$
15) $(4k^2+3)(k+1)$
16) $(3n^2+5)(3n-1)$
17) $(5n^2+4)(4n+1)$
18) $(2x^2+5)(5x+3)$
19) $(4b^2+1)(5b+4)$
20) $(a^2+1)(3a-5)$

8-3 Factoring $x^2 + bx + c$

Warm Up

1. Which pair of factors of 8 has a sum of 9? 1 and 8

2. Which pair of factors of 30 has a sum of −17? −2 and −15

Multiply.

3. $(x + 2)(x + 3)$ $x^2 + 5x + 6$

4. $(r + 5)(r - 9)$ $r^2 - 4r - 45$

8-3 Factoring $x^2 + bx + c$

Objective

Factor quadratic trinomials of the form $x^2 + bx + c$.

8-3 Factoring $x^2 + bx + c$

In Chapter 7, you learned how to multiply two binomials using the Distributive Property or the FOIL method. In this lesson, you will learn how to factor a trinomial into two binominals.

8-3 Factoring $x^2 + bx + c$

Notice that when you multiply $(x + 2)(x + 5)$, the constant term in the trinomial is the product of the constants in the binomials.

$$(x + 2)(x + 5) = x^2 + 7x + 10$$

You can use this fact to factor a trinomial into its binomial factors. Look for two numbers that are factors of the constant term in the trinomial. Write two binomials with those numbers, and then multiply to see if you are correct.

8-3 Factoring $x^2 + bx + c$

Example 1A: Factoring Trinomials by Guess and Check

Factor $x^2 + 15x + 36$ by guess and check.

(■ + ■)(■ + ■) *Write two sets of parentheses.*

(x + ■)(x + ■) *The first term is x^2, so the variable terms have a coefficient of 1.*

$(x + 3)(x + 12)$

The constant term in the trinomial is 36.

Find the Factors of 36

~~1 & 36~~

~~2 & 18~~

3 & 12

~~4 & 9~~

~~6 & 6~~

Which of these factors can become 15?

8-3 Factoring $x^2 + bx + c$

Remember!

When you multiply two binomials, multiply:

First terms

Outer terms

Inner terms

Last terms

8-3 Factoring $x^2 + bx + c$

Check It Out! Example 1a

Factor each trinomial by guess and check.

$x^2 + 10x + 24$

~~1 24~~
2 12
~~3 8~~
4 6

$(x+12)(x-2)$

$x^2 - 2x + 12x - 24$

$x^2 + 10x - 24$ ✗

$(x+4)(x+6)$

$x^2 + 4x + 6x + 24$

$x^2 + 10x + 24$ ✓

8-3 Factoring $x^2 + bx + c$

Check It Out! Example 1b

Factor each trinomial by guess and check.

$x^2 + 7x + 12$

1 12
2 6
3 4

$(x+3)(x+4)$

8-3 Factoring $x^2 + bx + c$

Which is bigger

sign the same?

	Larger Constant	Smaller Constant
$(x^2 + x + c)$	$(x + c)$	$(x + c)$
$(x^2 - x + c)$	$(x - c)$	$(x - c)$
$(x^2 + x - c)$	$(x + c)$	$(x - c)$
$(x^2 - x - c)$	$(x - c)$	$(x + c)$

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Example 2A: Factoring $x^2 + bx + c$ When c is Positive

Factor each trinomial. Check your answer.

$x^2 + 6x + 5$ 1 5

$(x+1)(x+5)$

8-3 Factoring $x^2 + bx + c$

Example 2B: Factoring $x^2 + bx + c$ When c is Positive

Factor each trinomial. Check your answer.

$x^2 + 6x + 9$

$(x+3)(x+3)$

$(x+3)^2$

8-3 Factoring $x^2 + bx + c$

Example 2C: Factoring $x^2 + bx + c$ When c is Positive

Factor each trinomial. Check your answer.

$x^2 - 5x + 6$

$1 - 6 = -5$

$-2 - 3 = -5$

$(x-2)(x-3)$

8-3 Factoring $x^2 + bx + c$

Check It Out! Example 2c

Factor each trinomial. Check your answer.

$x^2 + 13x + 42$

$(x+6)(x+7)$

1 42
2 21
3 14
6 7

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Example 3A: Factoring $x^2 + bx + c$ When c is Negative

Factor each trinomial.

$x^2 + x - 20$ 1 20
2 10
4 5

$(x+5)(x-4)$

$x^2 + 2x - 15$ 1 & 15
-3 & 5

$(x-3)(x+5)$

$x^2 - 6x + 8$ 1 & 8

$(x-2)(x-4)$ 2 & 4

$x^2 - 3x - 18$ 1, 18
2, 9
3, 6

$(x+3)(x-6)$

8-3 Factoring $x^2 + bx + c$

Lesson Quiz: Part I

-15 2

Factor each trinomial.

1. $x^2 - 11x + 30$ $(x-5)(x-6)$

2. $x^2 + 10x + 9$ $(x+1)(x+9)$

3. $x^2 - 6x - 27$ $(x-9)(x+3)$

4. $x^2 + 14x - 32$ $(x+16)(x-2)$

1 6
2 3

$6x^2 - 11x - 35$

1 35
5 7

2·5
10

3·7
-21

$(3x+5)(2x-7)$