Activity

# 7-6 Factoring $ax^2 + bx + c$

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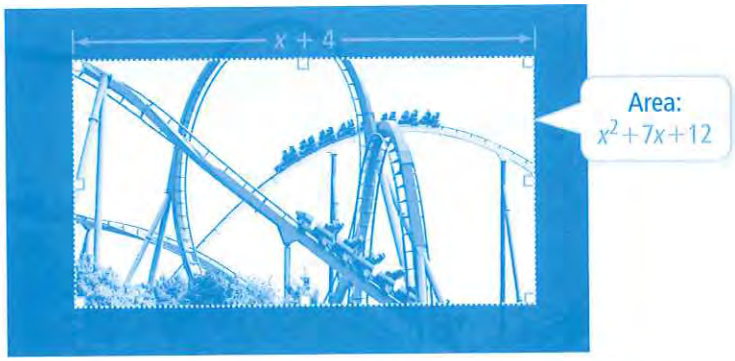
## EXPLORE & REASON

**A website design company resizes rectangular photos so they fit on the screens of different devices.**




**A.** What expression represents the width of the photo?

**B.** Write three possible lengths and corresponding widths of the photo by substituting different values for $x$.

**C.** Make Sense and Persevere Why would the company use an expression to represent the area? Explain. MP.1

### HABITS OF MIND

Make Sense and Persevere Can you factor all trinomials of the form $ax^2 + bx + c$ as $(px + q)(sx + t)$, when $a$, $b$, $c$, $p$, $q$, $s$, and $t$ are integers? Explain. MP.1

Notes

Assess

**EXAMPLE 1** **Try It! Factor Out a Common Factor**

1. Factor each trinomial.

a. $5x^2 - 35x + 50$

b. $6x^3 + 30x^2 + 24x$

**EXAMPLE 2** **Try It! Understand Factoring by Grouping**

2. Factor each trinomial.

a. $10x^2 + 17x + 3$

b. $2x^2 + x - 21$

**HABITS OF MIND**

**Use Appropriate Tools** Why is it helpful to factor out a GCF from a trinomial before factoring it as the product of binomials? Is it essential? Explain. MP.5

## EXAMPLE 3 Try It! Factor a Trinomial Using Substitution

3. Factor each trinomial using substitution.

a. $2x^2 - x - 6$

b. $10x^2 + 3x - 1$

**HABITS OF MIND**

**Use Structure** How does using substitution help make the process of factoring simpler? MP.7

## Do You UNDERSTAND?

1. ESSENTIAL QUESTION How is factoring a quadratic trinomial when $a \neq 1$ similar to factoring a quadratic trinomial when $a = 1$?

2. Error Analysis A student says that for $ax^2 + bx + c$ to be factorable, $b$ must equal $a + c$. Explain the error in the student's thinking. MP.3

3. Reason Suppose you can factor $ax^2 + bx + c$ as $(px + q)(sx + t)$, where $p$, $q$, $s$, and $t$ are integers. If $c = 1$, what do you know about the two binomial factors? MP.2

4. Reason When factoring $ax^2 + bx + c$ by substitution, why is it acceptable to multiply the polynomial by $a$ to start? MP.2

5. Construct Arguments Felipe is factoring the expression $2x^2 - x - 28$. He knows $-x$ should be rewritten as $7x$ plus $-8x$, but he is not sure which order to place the terms in the expression. Explain to Felipe why it does not matter what order the terms are in. MP.3

## Do You KNOW HOW?

**List the factor pairs of $ac$ for each trinomial.**

6. $2x^2 + 7x + 4$

7. $12x^2 - 5x - 2$

**Tell whether the terms of each trinomial share a common factor other than 1. If there is a common factor, identify it.**

8. $15x^2 - 10x - 5$

9. $3x^3 - 2x^2 - 1$

**Rewrite the $x$-term in each trinomial to factor by grouping.**

10. $35x^2 + 17x + 2$

11. $12x^2 + 20x + 3$

**Factor each trinomial to find possible dimensions of each rectangle.**

12. $A = 5x^2 + 17x + 6$

13. $A = 6x^2 + 7x - 5$