7.5 Start Thinking

Standard Form	Factored Form
$x^2 + 8x + 12$	$(x + 6)(x + 2)$
$x^2 - 7x + 12$	$(x - 4)(x - 3)$
$x^2 - 2x - 15$	$(x + 3)(x - 5)$
$x^2 + 2x - 24$	$(x + 6)(x - 4)$

Examine the factored form of each polynomial. Find the sum of the constant terms in each set of parentheses (don't forget to use the given sign). Compare your answers to the Standard Form of each polynomial. Is there a pattern? If so, what is it? Find the product of the constant terms in each set of parentheses (again, be sure to use the correct sign). Compare your answers to the standard form of each polynomial. Is there a pattern? If so, what is it?

7.5 Warm Up

Make a list of factors for the number.

1. 42 **2.** 102 **3.** 28

4. 56 **5.** 60 **6.** 36

7.5 Cumulative Review Warm Up

Determine whether the equation represents a *linear* or *nonlinear* function. Explain.

1. $y = x^2 - 14$ **2.** $y = \sqrt{8} + x$

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7.5 Practice A

In Exercises 1–12, factor the polynomial.

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

2. $x^2 + 8x + 12$

3. $z^2 + 11z + 28$

4. $w^2 - 7w + 12$

5. $y^2 - 14y + 24$

6. $x^2 - 11x + 28$

7. $x^2 + x - 20$

8. $y^2 - 6y - 16$

9. $m^2 + 8m - 9$

10. $n^2 - 3n - 40$

11. $d^2 + 5d - 24$

12. $z^2 + 3z - 28$

13. A projector displays a rectangular image on a wall. The height of the wall is x feet. The area (in square feet) of the projection is represented by $x^2 - 12x + 32$. The width of the projection is $(x - 4)$ feet.

a. Write a binomial that represents the height of the projection.

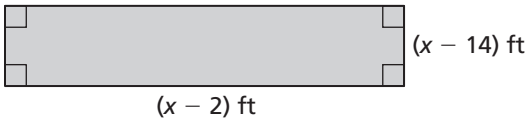
b. Find the perimeter of the projection when the height of the wall is 10 feet.

14. Describe and correct the error in factoring the polynomial.

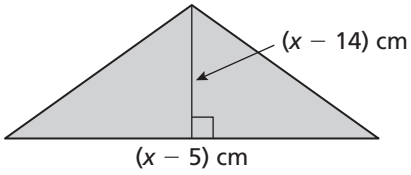
$$\times \quad x^2 - 11x + 18 = (x - 3)(x - 6)$$

In Exercises 15 and 16, find the dimensions of the polygon with the given area.

15. Area $= 45$ ft^2



16. Area $= 35$ cm^2



17. Write an equation of the form $x^2 + bx + c = 0$ that has the solutions $x = -3$ and $x = 8$. Explain how you found your answer.

Name_____ Date _____

7.5 Practice B

In Exercises 1–12, factor the polynomial.

1. $x^2 + 5x + 4$

2. $w^2 + 9w + 14$

3. $y^2 + 15y + 36$

4. $x^2 - 14x + 45$

5. $j^2 - 16j + 39$

6. $m^2 - 19m + 90$

7. $y^2 + 2y - 35$

8. $w^2 - 8w - 20$

9. $b^2 - b - 30$

10. $p^2 - 6p - 27$

11. $q + q^2 - 56$

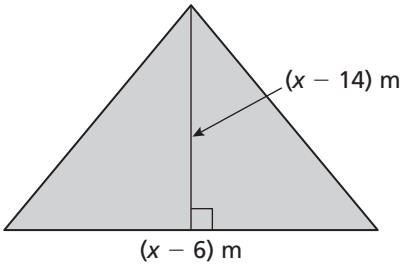
12. $-36 + t^2 + 5t$

13. Describe and correct the error in factoring the polynomial.

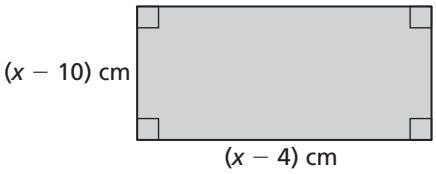
$$\times \quad x^2 + 4x - 96 = (x - 12)(x + 8)$$

In Exercises 14 and 15, find the dimensions of the polygon with the given area.

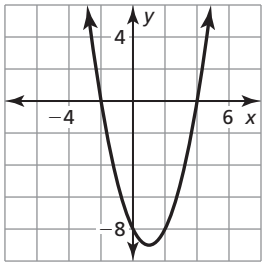
14. Area $= 120$ m^2



15. Area $= 55$ cm^2



16. The graph shows $y = x^2 - 2x - 8$.



a. Explain how you can use the graph to factor the polynomial.

b. Factor the polynomial.

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7.5 Enrichment and Extension

Factor by Grouping

Example: Factor $2x^3 - 5x^2 - 4x + 10$.

$2x^3 - 5x^2 - 4x + 10 = (2x^3 - 5x^2) + (-4x + 10)$ Group together first two terms and second two terms.

$= x^2(2x - 5) - 2(2x - 5)$ Factor a GCF out of each pair of terms. If polynomial is factorable, there will be a binomial GCF.

$= (2x - 5)(x^2 - 2)$ Factor out $(2x - 5)$.

In Exercises 1–8, factor completely.

1. $3xy - 6x + y - 2$

2. $12ab - 4bc - 15ac + 5c^2$

3. $25y^3 + 5y^2 + 30y + 6$

4. $12x^3 + 4x^2 - 30x - 10$

5. $4v^3 - 16v^2 + v - 4$

6. $15x^2y - 10xy^2 - 3x + 2y$

7. $16yz - 5xp + 4yp - 20xz$

8. $12xy + 12x + 16x^2 + 9y$

In Exercises 9 and 10, use the Distributive Property to multiply. Then show how to factor the answer by grouping. What is the final result?

9. $(3x - y)(4y - 5)$

10. $(x - 3)(2x - 3)$

11. Create your own set of binomials. Use the Distributive Property to multiply, and then show how to factor the answer by grouping, just as you did in Exercises 9 and 10. Will this method always prove effective?

12. Do you notice a difference between your results for Exercises 9 and 10? What does having one variable do to the problem?

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7.5 Puzzle Time

What Goes Into The Water Green But Comes Out Blue?

Write the letter of each answer in the box containing the exercise number.

Factor the polynomial.

1. $x^2 + 11x + 28$

2. $x^2 - 3x - 54$

3. $x^2 + 7x - 30$

4. $x^2 - 10x + 16$

5. $x^2 - 3x - 28$

6. $x^2 + 13x + 40$

7. $x^2 - 8x - 48$

8. $x^2 - 17x + 72$

Solve the equation.

9. $x^2 + 3x + 2 = 0$

10. $x^2 - 6x - 55 = 0$

11. $x^2 + 9x - 36 = 0$

12. $x^2 - 13x + 42 = 0$

13. $x^2 + 11x + 18 = 0$

14. $x^2 - x - 6 = 14$

15. The area of a rectangle is 63 square inches. The area of the rectangle can be represented by $A = x^2 - 16x + 126$. What are the possible values of x?

Answers

D. $(x - 12)(x + 4)$

O. $(x + 4)(x - 7)$

A. $(x + 8)(x + 5)$

N. $(x + 7)(x + 4)$

Y. $(x - 8)(x - 2)$

A. $(x - 9)(x + 6)$

R. $(x - 8)(x - 9)$

O. $(x + 10)(x - 3)$

G. 7, 9

D. $-2, -1$

L. $-4, 5$

F. $-9, -2$

C. $-5, 11$

A. 6, 7

O. $-12, 3$

6		13	8	11	15		5	1		2		10	3	14	7		9	12	4