Name _____ Date _____ Class _____

LESSON 7-7

Challenge

The Missing Binomial

Determine the missing binomial. Choose from the table below. Each binomial is used once.

$x + 4$	$x + 3$	$x - 3$
$x + 1$	$x + 6$	$x - 4$
$x + 2$	$x - 2$	$x - 6$

1. $(\_\_\_\_\_)(x + 2) = x^2 + 2x + 4x + 8 = x^2 + 6x + 8$

2. $(\_\_\_\_\_)(x + 5) = x^2 + 5x + x + 5 + = x^2 + 6x + 5$

3. $(\_\_\_\_\_)(x - 3) = x^2 - 3x + 2x - 6 = x^2 - x - 6$

4. $(\_\_\_\_\_)(x - 5) = x^2 - 2x - 15$

5. $(\_\_\_\_\_)(x + 1) = x^2 + 7x + 6$

6. $(\_\_\_\_\_)(x + 4) = x^2 + 2x - 8$

7. $(\_\_\_\_\_)(x + 6) = x^2 + 3x - 18$

8. $(\_\_\_\_\_)(x + 2) = x^2 - 2x - 8$

9. $(\_\_\_\_\_)(x - 5) = x^2 - 11x + 30$

The binomials missing from the following equations are not all listed in the table. Determine the missing binomials.

10. $(\_\_\_\_\_)(x + 7) = x^2 + 9x + 14$

11. $(\_\_\_\_\_)(x + 4) = x^2 + 7x + 12$

12. $(\_\_\_\_\_)(x - 2) = x^2 - 8x + 12$

13. $(\_\_\_\_\_)(x - 10) = x^2 - 14x + 40$

14. $(\_\_\_\_\_)(\_\_\_\_\_) = x^2 + 9x + 18$

15. $(\_\_\_\_\_)(\_\_\_\_\_) = x^2 - 3x - 4$

16. $(\_\_\_\_\_)(\_\_\_\_\_) = x^2 - 4x + 4$

17. $(\_\_\_\_\_)(x + 2) = 3x^2 + 5x - 2$

18. $(\_\_\_\_\_)(2x + 3) = 2x^2 - 11x - 21$

19. $(\_\_\_\_\_)(\_\_\_\_\_) = 6x^2 - x - 12$

LESSON 7-7

Reteach

Multiplying Polynomials (continued)

Use the Distributive Property to multiply binomials and polynomials.

Multiply $(x + 3)(x - 7)$.

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

$x(x - 7) + 3(x - 7)$ — *Distribute each term of the first binomial.*

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

$x^2 - 7x + 3x - 21$ — *Multiply.*

$x^2 - 4x - 21$ — *Combine like terms.*

Multiply $(x + 5)(x^2 + 3x + 4)$.

$(x + 5)(x^2 + 3x + 4)$

$x(x^2 + 3x + 4) + 5(x^2 + 3x + 4)$ — *Distribute each term of the first binomial.*

$(x)x^2 + (x)3x + (x)4 + (5)x^2 + (5)3x + (5)4$ — *Distribute again.*

$x^3 + 3x^2 + 4x + 5x^2 + 15x + 20$ — *Multiply.*

$x^3 + 8x^2 + 19x + 20$ — *Combine like terms.*

Fill in the blanks below. Then finish multiplying.

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

$\boxed{x}(x - 5) + \boxed{4}(x - 5)$

$x^2 - x - 20$

14. $(x - 2)(x + 8)$

$\boxed{x}(x + 8) - \boxed{2}(x + 8)$

$x^2 + 6x - 16$

15. $(x - 3)(x - 6)$

$\boxed{x}(x - 6) - \boxed{3}(x - 6)$

$x^2 - 9x + 18$

Multiply.

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

$x^2 - 5x + 6$

17. $(x - 7)(x + 7)$

$x^2 - 49$

18. $(x + 2)(x + 1)$

$x^2 + 3x + 2$

Fill in the blanks below. Then finish multiplying.

19. $(x + 3)(2x^2 + 4x + 8)$

$\boxed{x}(2x^2 + 4x + 8) + \boxed{3}(2x^2 + 4x + 8)$

$2x^3 + 10x^2 + 20x + 24$

20. $(x + 2)(6x^2 + 4x + 5)$

$\boxed{x}(6x^2 + 4x + 5) + \boxed{2}(6x^2 + 4x + 5)$

$6x^3 + 16x^2 + 13x + 10$

LESSON 7-7

Challenge

The Missing Binomial

Determine the missing binomial. Choose from the table below. Each binomial is used once.

$x + 4$	$x + 3$	$x - 3$
$x + 1$	$x + 6$	$x - 4$
$x + 2$	$x - 2$	$x - 6$

1. $(x + 4)(x + 2) = x^2 + 2x + 4x + 8 = x^2 + 6x + 8$

2. $(x + 1)(x + 5) = x^2 + 5x + x + 5 + = x^2 + 6x + 5$

3. $(x + 2)(x - 3) = x^2 - 3x + 2x - 6 = x^2 - x - 6$

4. $(x + 3)(x - 5) = x^2 - 2x - 15$

5. $(x + 6)(x + 1) = x^2 + 7x + 6$

6. $(x - 2)(x + 4) = x^2 + 2x - 8$

7. $(x - 3)(x + 6) = x^2 + 3x - 18$

8. $(x - 4)(x + 2) = x^2 - 2x - 8$

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

The binomials missing from the following equations are not all listed in the table. Determine the missing binomials.

10. $(x + 2)(x + 7) = x^2 + 9x + 14$

11. $(x + 3)(x + 4) = x^2 + 7x + 12$

12. $(x - 6)(x - 2) = x^2 - 8x + 12$

13. $(x - 4)(x - 10) = x^2 - 14x + 40$

14. $(x + 6)(x + 3) = x^2 + 9x + 18$

15. $(x + 1)(x - 4) = x^2 - 3x - 4$

16. $(x - 2)(x - 2) = x^2 - 4x + 4$

17. $(3x - 1)(x + 2) = 3x^2 + 5x - 2$

18. $(x - 7)(2x + 3) = 2x^2 - 11x - 21$

19. $(2x - 3)(3x + 4) = 6x^2 - x - 12$

LESSON 7-7

Problem Solving

Multiplying Polynomials

Write the correct answer.

1. A bedroom has a length of $x + 3$ feet and a width of $x - 1$ feet. Write a polynomial to express the area of the bedroom. Then calculate the area if $x = 10$.

$x^2 + 2x - 3$;

117 square feet

2. The length of a classroom is 4 feet longer than its width. Write a polynomial to express the area of the classroom. Then calculate the area if the width is 22 feet.

$w^2 + 4w$;

572 square feet

3. Nicholas is determining if he can afford to buy a car. He multiplies the number of months m by $i + p + 30f$ where i represents the monthly cost of insurance, p represents the monthly car payment, and f represents the number of times he fills the gas tank each month. Write the polynomial that Nicholas can use to determine how much it will cost him to own a car both for one month and for one year.

$i + p + 30f$; $12i + 12p + 360f$

4. A seat cushion is shaped like a trapezoid. The shorter base of the cushion is 3 inches greater than the height. The longer base is 2 inches shorter than twice the height. Write the polynomial that can be used to find the area of the cushion. (The area of a trapezoid is represented by $\frac{1}{2}h(b_1 + b_2)$.)

$\frac{3}{2}h^2 + \frac{1}{2}h$

The volume of a pyramid can be found by using $\frac{1}{3}Bh$ where B is the area of the base and h is the height of the pyramid. The Great Pyramid of Giza has a square base, and each side is about 300 feet longer than the height of the pyramid. Select the best answer.

5. Which polynomial represents the approximate area of the base of the Great Pyramid?

A $h^2 + 90{,}000$
B $2h + 90{,}000$
C $h^2 + 600h + 90{,}000$
D $2h^2 + 600h + 90{,}000$

6. Which polynomial represents the approximate volume of the Great Pyramid?

F $\frac{1}{3}h^3 + 200h^2 + 30{,}000h$
G $\frac{1}{3}h^2 + 200h + 30{,}000$
H $h^3 + 600h^2 + 90{,}000h$
J $3h^3 + 600h^2 + 90{,}000h$

7. The original height of the Great Pyramid was 485 feet. Due to erosion, it is now about 450 feet. Find the approximate volume of the Great Pyramid today.

A 562,500 ft^3
B 616,225 ft^3
C 84,375,000 ft^3
D 99,623,042 ft^3

LESSON 7-7

Reading Strategies

Follow a Procedure

There are several methods that can be used to multiply polynomials, depending on the number of terms. There is one procedure that can always be used, no matter how many terms there are. It is shown in the example below.

Multiply $(5x - 4)(3x^2 + x - 8)$.

$(5x - 4)(3x^2 + x - 8)$

$5x(3x^2 + x - 8) - 4(3x^2 + x - 8)$

$15x^3 + 5x^2 - 40x - 12x^2 - 4x + 32$

1 — Use the Distributive Proverty.

$15x^3 + 5x^2 - 40x - 12x^2 - 4x + 32$

$15x^3 + (5x^2 - 12x^2) + (-40x - 4x) + 32$

2 — Collect like terms.

$15x^3 + (5x^2 - 12x^2) + (-40x - 4x) + 32$

$15x^3 - 7x^2 - 44x + 32$

3 — Simplify by combining like terms.

Use the procedure shown above to answer each of the following.

1. Multiplication was used six times in step 1. How many times would it be used if two binomials were being multiplied?

4

2. In step 2, how do you know that $5x^2$ and $-12x^2$ are like terms?

They have the same exponent on the same variable.

3. In step 3, how do you know the expression is completely simplified?

There are no like terms.

Multiply the polynomials.

4. $-3x^3(2x^2 - 4x + 1)$

$-6x^5 + 12x^4 - 3x^3$

5. $(2x + 5)(9x^2 + 6x)$

$18x^3 + 57x^2 + 30x$

6. $(7x + 2)(x - 3)$

$7x^2 - 19x - 6$

7. $(2x^3 + 6x + 8)(x^2 - 5x + 1)$

$2x^5 - 10x^4 + 8x^3 - 22x^2 - 34x + 8$