TOPIC 7

LESSON 7.2b

Mathematics Gymnastics

Objective

Rewriting Expressions Using the Distributive Proproperty

Warm-Up

Write a numeric expression for the opposite of each given expression.

1. −5 − 3

2. 4 − 12

3. −7 + 10

4. 7 − (−10)

EXPLORE 3

Factoring Linear Expressions

You can use the Distributive Property to expand expressions, as you did in the previous activity, and to factor linear expressions, as Meaghan did. Consider the expression:

$$7(26) + 7(14)$$

Since both 26 and 14 are being multiplied by the same number, 7, the Distributive Property says you can add 26 and 14 together first, and then multiply their sum by 7 just once.

$$7(26) + 7(14) = 7(26 + 14)$$

You have factored the original expression.

The number 7 is a common factor of both 7(26) and 7(14).

1. Factor each expression using the Distributive Property.

a. $4(33) - 4(28)$

b. $16(17) + 16(13)$

The Distributive Property can also be used to factor algebraic expressions. For example, the expression $3x + 15$ can be written as $3(x) + 3(5)$, or $3(x + 5)$. The factor, 3, is the greatest common factor to both terms.

When factoring algebraic expressions, you can factor out the greatest common factor from all the terms.

WORKED EXAMPLE

Consider the expression $12x + 42$.

The greatest common factor of $12x$ and 42 is 6. Therefore, you can rewrite the expression as $6(2x + 7)$.

It is important to pay attention to negative numbers. When factoring an expression that contains a negative leading coefficient it is preferred to factor out the negative sign.

WORKED EXAMPLE

Consider the expression −2x 1 8. You can think about the greatest common factor as being the coefficient of −2.

$$-2x + 8 = (-2)x\ 1\ (-2)(-4)$$

$$= -2(x - 4)$$

2. Rewrite each expression by factoring out the greatest common factor.

a. 7x + 14

b. 9x − 27

c. 10y − 25

d. 8n + 28

e. −3x − 27

f. −6x + 30

Often, especially in future math courses, you will need to factor out the coefficient of the variable, so that the variable has a coefficient of 1.

3. Rewrite each expression by factoring out the coefficient of the variable.

a. 10x − 45

b. −2x + 3

c. −x + 4

d. −x − 19

4. Rewrite each expression by factoring out the GCF.

a. $-24x + 16y$

b. $-4.4 - 1.21z$

c. $-27x - 33$

d. $-2x - 9y$

e. $4x + (-5xy) - 3x$

5. Evaluate each expression for the given value. Then factor the expression and evaluate the factored expression for the given value.

a. $-4x + 16$ for $x = 2\frac{1}{2}$

b. $30x - 140$ for $x = 5.63$

c. Which form—simplified or not simplified—did you prefer to evaluate? Why?

Show You KNOW

Flexible Expressions

As you have seen, you can rewrite expressions by factoring out a GCF or by factoring out the coefficient of the variable. You can also rewrite expressions by factoring out any value. For example, some of the ways 6x + 8 can be rewritten are provided.

$2(3x + 4)$ $\quad 6(x + \frac{4}{3})$ $\quad -2(-3x - 4)$

$-6(-x - \frac{4}{3})$ $\quad \frac{1}{2}(12x + 16)$ $\quad -\frac{1}{2}(-12x - 16)$

Rewrite each expression in as many ways as you can by factoring the same value from each term.

1. $4x - 12$

2. $-3x + 15$

3. $10 - 20y$

4. $-8y + 9$

Name: _____ Date: _____ Class: _____

Homework HW

LESSON 7.2b

Mathematics Gymnastics

Objective Rewriting Expressions Using the Distributive Proproperty

Practice

Answer each question. Use 3.14 for π. Round your answer to the nearest hundredth, if necessary.

1. Although she's only in middle school, Tameka loves to drive go-carts! Her favorite place to drive go-carts, Driver's Delight, has 3 circular tracks. Track 1 has a radius of 60 feet. Track 2 has a radius of 85 feet. Track 3 has a radius of 110 feet.
   a. Compute the circumference of Track 1.
   b. Compute the circumference of Track 2.
   c. Compute the circumference of Track 3.
   d. Driver's Delight is considering building a new track. They have a circular space with a diameter of 150 feet. Compute the circumference of the circular space.
2. Tameka wants to build a circular go-cart track in her backyard.
   a. If she wants the track to have a circumference of 150 feet, what does the radius of the track need to be?
   b. If she wants the track to have a circumference of 200 feet, what does the radius of the track need to be?
   c. If she wants the track to have a circumference of 400 feet, what does the diameter of the track need to be?