

Today's lesson is on Simplifying Expressions.

Gather these materials:

Clicker

Notebook

Pen

Get ready for the warm-up questions



A mathematical phrase with at least one variable is called an

_____.

Text in the word that correctly completes the sentence.



Solve $2c + t$ for $c = 1/2$ and $t = 5$

Text in your number answer.

2-2

Simplifying Expressions

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7.EE.1

What You'll Learn

To simplify algebraic expressions using properties of operations
🔊 **New Vocabulary** like terms, coefficient

Why Learn This?

You evaluate algebraic expressions by substituting values for variables. Scientists often substitute data from experiments into formulas with several variables to interpret their results.



Like terms are terms that have the same variable factors. For example, $12x$ and $3x$ are like terms, but $4a$ and $5b$ are not like terms. You can use the properties of operations to order, group, and combine like terms.

A **coefficient** is a numerical factor of a term with a variable. In each of the terms below, the coefficients are highlighted.

Coefficients —
↓ ↓ ↓ ↓
 $12x$, $5b$, $3xy^2$, $(5 + 2)m$

1 EXAMPLE Combine like terms in the expression

$$8p + 13p + p.$$

$$8p + 13p + p = 8p + 13p + 1p \quad \leftarrow \text{Rewrite } p \text{ as } 1p.$$

$$= (8 + 13 + 1)p \quad \leftarrow \text{Distributive Property}$$

$$= 22p \quad \leftarrow \text{Combine like terms by adding.}$$

EXAMPLE Using Properties to Add and Subtract

- 1 Simplify $5x + 9 + 2x - 4$.

$$5x + 9 + 2x - 4 \quad \leftarrow \text{Identify which parts of the expression are like terms.}$$

$$= 5x + 2x + 9 - 4 \quad \leftarrow \text{Commutative Property of Addition}$$

$$= (5 + 2)x + 9 - 4 \quad \leftarrow \text{Distributive Property}$$

$$= 7x + 9 - 4 \quad \leftarrow \text{Simplify the coefficient.}$$

$$= 7x + 5 \quad \leftarrow \text{Simplify.}$$

The simplified expression is $7x + 5$.

Quick Check

1. Simplify each expression.

a. $2x + 8 + 4x - 5$

Simplify:

$$10r - 5 + 3 + r$$



Simplify $k - 2 + 7 - 9k$

(A) $10k + 9$

(B) $-8k + 5$

(C) $-10k - 5$

(D) $-8k - 5$

Sometimes an expression should be expanded before it is simplified.

EXAMPLE Expanding Expressions

2 Simplify $\frac{2}{3}(12y + 9) + 4$.

$$\begin{aligned} & \frac{2}{3}(12y + 9) + 4 \\ &= (8y + 6) + 4 && \leftarrow \text{Distributive Property} \\ &= 8y + (6 + 4) && \leftarrow \text{Associative Property of Addition} \\ &= 8y + 10 && \leftarrow \text{Simplify} \end{aligned}$$

The simplified expression is $8y + 10$.

Simplify:

$9 - 4(3z + 2)$

Quick Check

2. Simplify each expression.

a. $6(2x + 3) - 4$



Simplify: $8 - 2(6s + 1)$

(A) $36s + 9$

(B) $-12s + 9$

(C) $6 - 12s$

(D) $-36s + 9$

You can use the Distributive Property to rewrite an addition expression as a product of two factors. This process is called factoring. Use the greatest common factor (GCF) so the expression is factored completely.

EXAMPLE Factoring Expressions

3 a. Factor $4x + 14$.

GCF of 4 and 14 is 2.

← Identify the GCF.

$$4x + 14 = 2 \cdot 2x + 2 \cdot 7$$

← Factor each term by the GCF.

$$= 2(2x + 7)$$

← Distributive Property

The factored expression is $2(2x + 7)$.

b. Factor $12y - 6$

GCF of 12 and 6 is 6.

← Identify the GCF.

$$12y - 6 = 6 \cdot 2y - 6 \cdot 1$$

← Factor each term by the GCF.

$$= 6(2y - 1)$$

← Distributive Property

The factored expression is $6(2y - 1)$.

3 Factoring Expressions Factor $21x + 35$.

GCF of 21 and 35 is 7 . ← Identify the GCF.

$21x + 35 = 7 \cdot 3x + 7 \cdot 5$. ← Factor each term by the GCF.

$= 7(3x + 5)$ ← Distributive Property

The factored expression is $7(3x + 5)$.

 **Quick Check**

3. Factor each expression completely.

a. $9x + 15$



Factor each expression completely:

$36 + 24t$





Factor the expression completely: $18 - 24m$

(A) $9(2 - 2m)$

(B) $6(3 - 4m)$

(C) $4(4 - 6m)$

(D) $6(3 - 8m)$

Check Your Understanding

1. **Vocabulary** Terms that have the same variable factors, such as $7y$ and $-3y$, are called like.



Extra practice

Simplify each expression.

2. $15 + 4$

3. $8n - 2n$

4. $30s + 7 + 3s$

5. $6 - 3r - 3$

6. $2y + 4 + 0.5$

7. $2(15 + 5w) -$

extra practice

Identify the greatest common factor of the terms in each expression.

8. $4n - 40$

9. $27 + 18v$

10. $15t + 25$

Power down your clickers and put them away.

You have an assignment worksheet.

Name _____ Class _____ Date _____

Practice 2-2 Simplifying Expressions

Simplify each expression.

1. $12 - \frac{3}{2}m + 4 - \frac{3}{4}m$

2. $a - 2 + 13 + 8a$

3. $10q - 2q + 3 - 9$

4. $8 - g - 2 + 5g$

5. $2.2k + 5 + 7.9k + 8$

6. $-4r - 2r - 6 - 4$

7. $0.2(15 - 3r) - 1.8$

8. $7x - 5(3x + 12)$

9. $\frac{1}{3}(9z - 27) + 12$

Factor each expression completely.

10. $42r - 18$

11. $100 - 50d$

12. $24x + 64$

13. $-9y - 39$

14. $60 - 24x$

15. $9w - 81$

16. $132 + 77r$

17. $16y - 56$

Use $>$, $<$, or $=$ to make each statement true.

18. $-4 + p + 2$ $4p + 2$ $4 - 3p$

19. $2m + 2n - 5$ $6 + 2(m + n) - 11$

20. $3x + 4 - 4x + 2$ $3(5 - x) + 2x$

21. Find the perimeter of a rectangle with length $3c - 5$ and width $2c$.
Simplify your answer.