Lesson 5-6 Add Expressions

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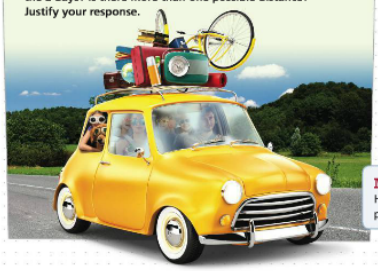
I can...
add expressions that represent real-world problems.

Solve & Discuss It!

The Smith family took a 2-day road trip. On the second day, they drove $\frac{3}{4}$ the distance they traveled on the first day. What is a possible distance they could have traveled over the 2 days? Is there more than one possible distance? Justify your response.



Make Sense and Persevere
How are the quantities in the problem related?

Focus on math practices

Use Structure How can two different expressions be used to represent the total distance?

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Essential Question How can properties of operations be used to add expressions?

EXAMPLE 1 Add Expressions by Using Properties

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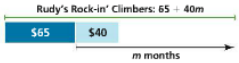
Delilah signs up for a health club and a rock-climbing gym. What expression represents her total fitness cost after m months?

Model with Math Each bill can be represented with an expression.

Use bar diagrams to represent the situation and write an expression for the cost of each club.

Ace Health Club: $80 + 50m$

Rudy's Rock-in' Climbers: $65 + 40m$



Add the expressions to find the combined cost.

$(80 + 50m) + (65 + 40m)$

$= (80 + 65) + (50m + 40m)$ Use the Commutative and Associative Properties.

$= 145 + 90m$

The expression $145 + 90m$ can be used to determine the total cost for the health club and rock-climbing gym after m months.

Try It!

Sophia and Ollie each deposit $120 to open a joint account. They each make monthly deposits as shown. What expression represents the amount in the account after m months?

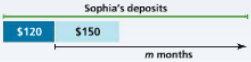
Sophia's deposits Ollie's deposits

(☐ + ☐ m) + (☐ + ☐ m)

= ☐ + ☐ + ☐ m + ☐ m

The amount of money in the joint account after m months is ☐ + ☐.

Sophia's deposits



Ollie's deposits

Convince Me! Explain why the initial deposits and monthly deposits are not combined into one term?

EXAMPLE 2 Add Expressions with More Than One Variable

Cindy spent $125 on ingredients for muffins and $92.40 on ingredients for bagels. Write an expression to represent Cindy's profit for m muffins and b bagels.

muffin income: $2.40m$ — cost of ingredients: 125

bagel income: $1.80b$ — cost of ingredients: 92.40

$(2.40m - 125) + (1.80b - 92.40)$

$= 2.40m + 1.80b + (-125 - 92.40)$ Use the Commutative and Associative Properties.

$= 2.40m + 1.80b - 217.4$

The expression $2.40m + 1.80b - 217.4$ represents the profit from selling the muffins and bagels.

EXAMPLE 3 Add More Complex Expressions

Add the expressions.

$\left(\frac{1}{2}x - 3 - 2y\right) + \left(\frac{1}{4}x - 2y + 5\right)$

$= \left(\frac{1}{2}x + \frac{1}{4}x\right) + (-2y + (-2y)) + (-3 + 5)$ Use the Commutative and Associative Properties to reorder and group like terms.

$= \frac{3}{4}x + (-4y) + 2$

$= \frac{3}{4}x - 4y + 2$

Try It!

Find each sum.

a. $(9.74c - 250.50) + (-5.48p + 185.70)$

b. $\left(\frac{2}{11}x - 3 - 5y\right) + \left(-\frac{3}{11}x + 5y + 5.5\right)$

c. $(-14.2b - 97.35) + (6.76d - 118.7 - 3.4d)$

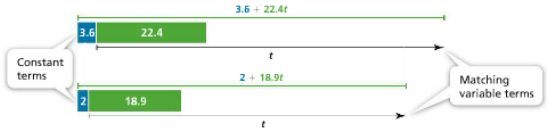
d. $\left(\frac{3}{8} - \frac{1}{6}m + 5t\right) + \left(\frac{7}{10}m + 9t + \frac{1}{4}\right)$

KEY CONCEPT

Adding expressions may require combining like terms.

Terms with the same variables are added together and constants are added together.

When adding terms with the same variables, the rules for adding rational numbers apply to their coefficients.



$(3.6 + 22.4t) + (2 + 18.9t) = 5.6 + 41.3t$

Do You Understand?

1. **Essential Question** How can properties of operations be used to add expressions?

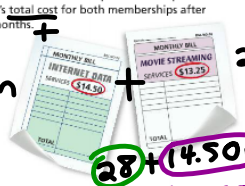
2. **Reasoning** Explain whether the coefficients of two terms with different variables can be added to make one new term.

3. **Be Precise** Which properties of operations could be used to show that $(-5p + 9) + (-2 + p)$ is equivalent to $(-5p) + p + 9 - 2$?

Do You Know How?

4. Dillon says that $4b$ and $-2b$ are not like terms because $4b$ is positive and $-2b$ is negative. Is he correct? Explain.

5. Joel spent $28 for an Internet data service and pays $14.50 per month. He spent $24.50 to join an online movie streaming site and pays $13.25 per month. Write an expression to represent Joel's total cost for both memberships after m months.



6. Add $\frac{1}{3}n + \frac{2}{3}$ and $-\frac{1}{6}n + \frac{1}{8}m$.

7. Find the sum.
$(-3.5t - 4s + 4.5) + (-7.1 - 0.3s + 4.1t)$

2A + 8 + 4A + 5

(2A + 4A) + (8 + 5)

6A + 13

Name: _____

Practice & Problem Solving

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Leveled Practice For 8–9, fill in the boxes to add the expressions.

8. $(2a + 8) + (4a + 5)$

$= (2a + \boxed{4a}) + (8 + \boxed{5})$

$= \boxed{6a} + 13$

9. $\left(\frac{2}{3}x + 7\right) + \left(\frac{1}{3}x + 8\right)$

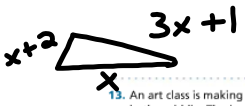
$= (\square + \square) + (-7 + \square)$

$= \square x + \square$

10. Find the sum.
$(8b + 7) + (6x + 4) + (5c + 8)$

11. Combine like terms.
$(-3x + 5) + (5m + 7y) + (6 + 9m)$

12. Felipe is going to plant b sunflower seeds in one garden and $5b + 10$ sunflower seeds in another. How many seeds is Felipe going to plant altogether?



13. An art class is making a mural for the school that has a triangle drawn in the middle. The length of the bottom of the triangle is x. Another side is 1 more than three times the length of the bottom of the triangle. The last side is 2 more than the bottom of the triangle. Write and simplify an expression for the perimeter of the triangle.

$(x + 2) + (3x + 1) + x$

$4 + 1n + 7m$

14. On a math test, Sarah has to identify all the coefficients and constants of the expression $4 + n + 7m$. Sarah identifies the only coefficient as 7 and the only constant as 4.

a. Identify all the coefficients of the expression.

b. Identify all the constants of the expression.

c. What error did Sarah likely make?

coefficients: 7, 1

constants: 4

variables: m, n

15. The width of a rectangle is $5x - 2.5$ feet and the length is $2.5x + 8$ feet. Find the perimeter of the rectangle.

see notes

16. Nina has x coins. Clayton has 5 fewer coins than six times the number of coins Nina has. Write an expression for the total number of coins Nina and Clayton have altogether. Then simplify the expression.

17. Use the expression $(8x + 2) + (-9x + 7)$.

a. Find the sum.

b. **Reasoning** Explain how you know when to combine terms with variables.

18. Gabe goes to the mall. He bought k model planes and spent $24 on books. Then he spent another $25 at another store.

a. Write an expression that represents the amount Gabe spent at the mall.

b. How much did Gabe spend in all if he bought 3 model planes?

Assessment Practice

19. A middle school with x students ran a survey to determine the students' favorite activities. The table indicates the number of students who enjoy each activity.

PART A Write an expression in the table for each activity to represent the number of students who enjoy that activity most.

Activity	Dance	Soccer	Baseball
Word Description	25 more than one-tenth of the students	20 fewer than three-tenths of the students	21 more than one-tenth of the students
Expression			

PART B Write a simplified expression to represent students whose favorite activity is either dance or baseball.

15) $P_{\square} = 2l + 2w$ or $2(l+w)$

$A = l \cdot w$

$l = (2.5x + 8)$

$w = (5x - 2.5)$

$P = 2l + 2w$

$P = 2(2.5x + 8) + 2(5x - 2.5)$

$P = 2(2.5x) + 2(8) + 2(5x) + 2(-2.5)$

$P = 5x + 16 + 10x + -5$

$P = (5x + 10x) + (16 + -5)$

$P = 15x + 11$

The perimeter of the rectangle is $(15x + 11)$ ft.