Lesson 1 Problem-Solving Practice

The Distributive Property

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1. Mr. Johannsen has a farm with 3 cows, 8 chickens, and some ducks. If the total number of farm animal legs is 40, how many ducks does Mr. Johannsen have on his farm?   **6 ducks**

2. Amy buys retired stamps from the U.S. Postal Service catalog. Last month, she bought 28 Candy Hearts stamps for $0.37 each. How much did Amy spend on stamps in all?   **$10.36**

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3. The table shows the cookie sales for Tina's troop. If each box costs $3.50, show two ways that Tina could find the troop's total cookie sales.

Kind of Cookie	Number of Boxes
Mint	60 boxes
Vanilla sandwich	42 boxes
Peanut butter	56 boxes

3.50(60 + 42 + 56) or (3.50 × 60) + (3.50 × 42) + (3.50 × 56) = $553.00

4. Jonah drew two squares with the same dimensions. He then added 2 inches to the length of one square to make it a rectangle. He also added 2 inches to the width of the other square to make it a rectangle. Compare the perimeters of the two rectangles.

$$P_1 = 2w + 2(\ell + 2) = 2w + 2\ell + 4$$
$$P_2 = 2(w + 2) + 2\ell = 2w + 4 + 2\ell$$

The perimeters are equal.

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5. Daniel wants to buy a bicycle that costs $200.00. He saves the same amount each month from the money he earns mowing lawns. He also saves $15.00 of his monthly allowance. If x represents the amount he earns mowing lawns each month, write an expression to show Daniel's total savings after 8 months.

8(x + 15) or 8x + 120

6. Refer to the information in Exercise 5. If Daniel earns $25 each month mowing lawns, how long will it take him to save enough money to buy his bicycle?
**5 months**

Lesson 2 Problem-Solving Practice

Simplifying Algebraic Expressions

1. There are 15 dogs, 22 cats, and 4 rabbits at a shelter. Each dog needs a collar, a bowl, and a toy. Each cat needs a collar and a bowl. In addition, one scratching post is needed for all of the cats. Each rabbit needs a bowl. Write an expression in simplest form to show the total number of collars c, bowls b, and toys t, that the animal shelter needs for its resident animals.

$37c + 41b + 15t$

2. Rangley's father is making a walkway in the backyard. He will use large tiles for the walkway like the one shown below. Write an expression in simplified form for the perimeter of one tile.
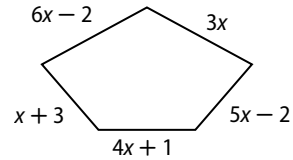
$19x$

3. Mr. Raphael needs to buy notebooks for his children to start the school year. His son Manny needs some notebooks. His daughter Daphne needs twice as many as does Manny. His other daughter Ophelia says she needs one fewer than 3 times as many as Manny needs. If Mr. Raphael buys x notebooks for Manny, how many notebooks will he need to buy in all? Write an expression in simplest form.

$6x - 1$

4. Three families recently ordered jeans from a catalogue. The Rodriguez family ordered twice as many jeans as the Gomez family, and the Jimenes family ordered 4 times as many jeans as the Gomez family. Write an expression in simplest form to show how many jeans the families bought all together.

$7a$

5. Three families went to an amusement park together. The number of people in each family is listed in the table.

Family	Adults	Children	Seniors
McGraw	2	3	1
Churchill	1	2	2
Sanchez	2	1	1

Write an expression in simplest form to show how much it costs all adults, children, and seniors from the three families to attend the amusement park when a is the cost of an adult ticket, c is the cost of a child ticket, and s is the cost of a senior ticket.   **$5a + 6c + 4s$**
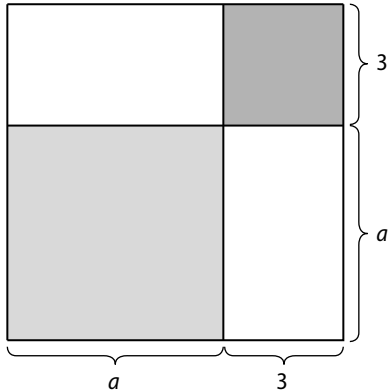
6. Refer to the table in Exercise 5. The admission ticket cost was $40 for adults, $25 for children, and $27 for seniors. Write an expression to find how much the three families spent in all for admission tickets.

$(5 \times \$40) + (6 \times \$25) + (4 \times \$27)$
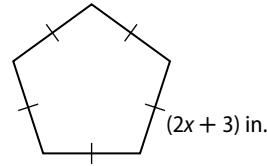
Lesson 3 Problem-Solving Practice

Adding Linear Expressions

**1.** Write an expression in simplest form to show the perimeter of the large square below.

4a + 12

2. Heather was building a scale model of the Pentagon for her history class.

$(2x + 3)$ in.

a. Write and simplify an expression to represent the perimeter of Heather's scale model.   **10x + 15**

b. Find the perimeter of the model if $x = 2$.
35 in.

3. A mailing supply company produces yellow mailing envelopes. The envelopes come in a variety of sizes, but the length is always 4 centimeters more than double the width. Write and simplify an expression to give the perimeter of any of the envelopes.
6x + 8

4. Find the simplest expression for the perimeter of the triangular roof truss.
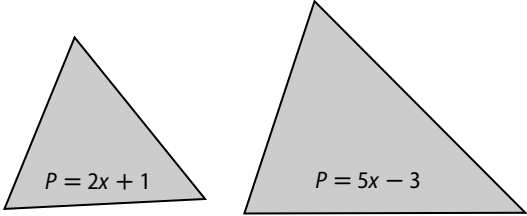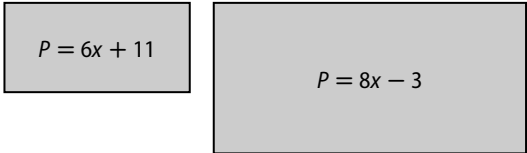**14a + 8**

$3a + 4$ $2a - 7$

$9a + 11$
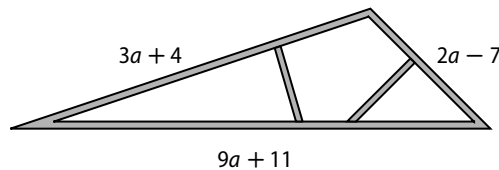
5. Kevin built a deck in his backyard. The length of the deck was $5x + 1$ units and the width of the deck was $4x - 1$ units. Write and simplify an expression to represent the perimeter of Kevin's deck.   **18x**

6. The cost to produce x monitors is represented by the expression $350x + 1500$. The cost to produce x chairs is represented by the expression $175x - 50$. Write and simplify an expression to represent the cost of x monitors and chairs.   **525x + 1450**

Lesson 4 Problem-Solving Practice

Subtracting Linear Expressions

1. The expression $5x + 10$ represents the amount of money in dollars the swim team earns by selling x school spirit shirts.

   a. If the team had to pay $2x + 3$ in expenses, write and simplify an expression to represent their profit.
   $3x + 7$

   b. If the team sold 25 shirts, what was their profit? **$82**

2. Find the difference in the perimeters of the triangles shown.

$P = 2x + 1$ $P = 5x - 3$

$3x - 4$ units

3. The expression $6x + 4$ represents the number of miles Sarah ran in x hours. The expression $9x$ represents the number of miles Libby ran in the same number of hours.

   a. Write an expression to show how many more miles Libby ran than Sarah.
   $3x - 4$

   b. If they each ran for 3 hours, how many more miles did Libby run? **5 miles**

4. Pete's Plumbing charges $25x + 50$ dollars for x hours of work. Plugged Pipes Plumbing charges $50x + 75$ dollars for the same number of hours.

   a. Write an expression to represent how much more Plugged Pipes Plumbing costs than Pete's Plumbing for x hours of work. **$25x + 25$**

   b. If they each worked for 2 hours, how much more expensive is Plugged Pipes Plumbing? **$75**

5. The cost to rent a car from Lou's Garage is $50 + 0.10m$ dollars for m miles. The cost to rent a car at Jerry's Garage is $25 + 0.05m$ dollars for the same number of miles.

   a. Write an expression to represent how much more Lou's Garage is than Jerry's for m miles. **$25 + 0.05m$**

   b. If Ainsley wanted to rent a car and drive 100 miles, how much more expensive would Lou's Garage be? **$30**

6. What is the difference in the perimeters of the rectangles shown?

$P = 6x + 11$ $P = 8x - 3$

$2x - 14$ units

Lesson 5 Problem-Solving Practice

Factoring Linear Expressions

1. A sidewalk has an area that can be represented by the expression $(8x + 24)$ square feet. Factor the expression $8x + 24$.
8(x + 3)

2. The cost of renting a speedboat can be represented by the expression $50x + 250$, where x is the number of hours it is rented. Factor the expression $50x + 250$.
50(x + 5)

3. The rectangle shown below has an area of $(28x + 49)$ square inches. Factor the expression $28x + 49$.   **7(4x + 7)**

4. Four friends went to a concert and paid $12 total for parking and $x per ticket. The expression $4x + $12 represents the total cost paid of all four friends. Factor $4x + 12$.
4(x + 3)

5. Marisa has $40 in her savings account and plans to save x dollars each month for 5 months. The expression $5x + 40$ represents the total amount in the account in dollars after 5 months. Factor the expression $5x + 40$.   **5(x + 8)**

6. A square picture frame has a perimeter of $(20x + 32)$ inches. What is the length of one side of the picture frame?
(5x + 8) in.