

## LESSON 17: Writing Equivalent Expressions for Real-World Applications

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**Warm-Up**

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**Directions:** Simplify the following expressions by combining like terms or expanding them.

<b>1.</b> $4x - 2 + 5x$	<b>2.</b> $6x + 5x - 9 + x$
<b>3.</b> $-9(x + 10)$	<b>4.</b> $-5x + 10 + 3x - 1$
<b>5.</b> $6(x - 5) + 2x + 4$	<b>6.</b> $7(x + 3) - 4x + 8$
<b>7.</b> Factor: $8x + 24$	<b>8.</b> Simplify and Factor: $6x - 25 - x$

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**Directions:** Complete the following SOLVE problem with your teacher and partner.

Mario works for a landscaping company and earns \$17 per hour. Tina also earns an hourly pay of \$17. Tina received an extra \$50 bonus this week from sales commissions. If  $m$  represents the number of hours Mario worked this week and  $t$  represents the number of hours Tina worked this week, write an expression that represents the total amount of money earned by the two this week.

**S** Underline the question.

This problem is asking me to find \_\_\_\_\_  
\_\_\_\_\_.

**O** Identify the facts.

Eliminate the unnecessary facts.

List the necessary facts.

**L** Write in words what your plan of action will be.

Choose an operation or operations.

**V** Estimate your answer.

Carry out your plan.

**E** Does your answer make sense? (Compare your answer to the question.)

Is your answer reasonable? (Compare your answer to the estimate.)

Is your answer accurate? (Check your work.)

Write your answer in a complete sentence.

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**Directions:** Complete this page with your teacher and partner.

<p><b>1.</b> What are we trying to find in the SOLVE problem on S223?</p>		
<p><b>2.</b> How much does Mario earn hourly? What variable represents the number of hours Mario works?</p>		
<p><b>3.</b> How can we find the expression that represents Mario’s earnings?</p>		
<p><b>4.</b> What expression represents Mario’s weekly earnings?</p>		
<p><b>5.</b> What is Tina’s hourly rate? What variable represents the number of hours Tina works?</p>		
<p><b>6.</b> How can we find the expression that represents Tina’s earnings?</p>		
<p><b>7.</b> What expression represents Tina’s weekly earnings?</p>		
<p><b>8.</b> What operation can we use to find their total earnings? Explain your thinking.</p>		
<p><b>9.</b> What expression will represent their total earnings?</p>		

By answering all of the questions above, we created a plan for our L Step and we completed the V Step to find a solution.

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**Directions:** Complete this page your teacher and your partner.

<p><b>1.</b> In Ms. Johnson’s class, a student wrote the following answer as her solution to the same SOLVE problem: <math>17(m + t) + 50</math>. Do you think the student should receive credit for her answer? Explain your answer.</p>	
<p><b>2.</b> If you had to write an L Step that the student used to arrive at this expression, how would you write the L Step?</p>	
<p><b>3.</b> How can we check to see if the solution the student found matches the solution we found in Question 9?</p>	
<p><b>4.</b> What property are we using to expand the expression?</p>	
<p><b>5.</b> Expand the student’s expression using the distributive property.</p>	
<p><b>6.</b> Were you able to prove that the student’s answer matches our solution from Question 9? Explain your thinking.</p>	
<p><b>7.</b> What if we knew that the student’s answer was correct, but we weren’t sure of our answer? Explain and defend your answer.</p>	
<p><b>8.</b> Why was it important for us to show our work and explain our plan for this SOLVE problem? Explain your thinking and defend your answer.</p>	

Complete the rest of the SOLVE problem on S223. You may use one of the L Steps we already discussed or try a slightly different approach. Be sure that your work in Step V matches the plan in Step L.

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**Directions:** Complete the following SOLVE problem with your teacher and partner.

Lena is shopping for a dress to wear to her formal dance. She had her eye on one that she saw at the department store last time she was shopping. She has been waiting a couple of weeks to see if it would go on sale, and it did! The dress she is purchasing originally cost  $c$  dollars but is now discounted by 10%. What expression represents the cost of the dress after the discount is applied?

**S** Underline the question.

This problem is asking me to find \_\_\_\_\_  
\_\_\_\_\_.

**O** Identify the facts.

Eliminate the unnecessary facts.

List the necessary facts.

**L** Write in words what your plan of action will be.

Choose an operation or operations.

**V** Estimate your answer.

Carry out your plan.

**E** Does your answer make sense? (Compare your answer to the question.)

Is your answer reasonable? (Compare your answer to the estimate.)

Is your answer accurate? (Check your work.)

Write your answer in a complete sentence.

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**Directions:** Complete this page with your teacher and partner.

1. What are we trying to find in the SOLVE problem on S226?	
2. How much is the discount on the dress? How can we write the discount percentage as a decimal?	
3. How can we find an expression that represents the amount of the discount?	
4. What expression represents the amount of the discount?	
5. Using the discount amount, how can we find the amount that must be paid after the discount is applied?	
6. What expression will represent the cost of the dress after the discount is applied?	
By answering the questions above, you have generated a plan for the L Step and followed through for the V Step for the SOLVE problem on S203. Continue exploring another plan below.	
7. What does it mean for a 10% discount to be applied?	
8. If the store is offering a 10% discount, then what percentage of the cost is left to pay?	
9. Is there another plan we could use for Step L of the SOLVE problem of the percentage that we know we will pay? Explain.	
10. What is the new expression that shows the percentage paid?	

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**Directions:** Complete this page with your teacher and partner.

<p><b>1.</b> On S204, we wrote a new expression to represent the cost we will pay. How do you think this expression relates to the expression from Question 6?</p>	
<p><b>2.</b> What was the first expression we found?</p>	
<p><b>3.</b> What was the second expression we found?</p>	
<p><b>4.</b> What do you notice about the first expression?</p>	
<p><b>5.</b> In the first expression, what is the coefficient of the first term?</p>	
<p><b>6.</b> How do we combine the like terms for the first expression?</p>	
<p><b>7.</b> What is the difference of the coefficients of the like terms?</p>	
<p><b>8.</b> What is the expression that is left?</p>	
<p><b>9.</b> How does the simplified first expression compare to the second?</p>	
<p><b>10.</b> Why is it important for us to show our work and explain our plan for this SOLVE problem?</p>	

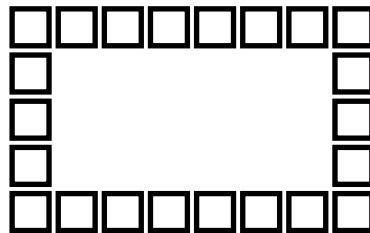
Taking a look at both expressions, we are able to see that there is more than one way to solve this problem. Knowing how to manipulate expressions helps us become more efficient mathematicians.

Complete the rest of the SOLVE problem on S226. Again, you may use one of the L Steps we already discussed or try a slightly different approach. Be sure that your work in Step V matches the plan in Step L.

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**Directions:** Complete this SOLVE problem with your partner.

Jocelyn laid mosaic tiles around the patio in her yard. Each of the tiles was purchased at the home improvement store for \$5 per tile. She provided a picture that shows the number of tiles that are used to create the outline of her patio. Use an expression to show how to find the total number of tiles used to outline the patio.



**S** Underline the question.  
This problem is asking me to \_\_\_\_\_  
\_\_\_\_\_.

**O** Identify the facts.  
Eliminate the unnecessary facts.  
List the necessary facts.

**L** Write in words what your plan of action will be.

Choose an operation or operations.

**V** Estimate your answer.  
Carry out your plan.

**E** Does your answer make sense? (Compare your answer to the question.)

Is your answer reasonable? (Compare your answer to the estimate.)

Is your answer accurate? (Check your work.)  
Write your answer in a complete sentence.



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**Directions:** Complete the following SOLVE problem with your partner.

Leslie purchased 4 bags of snacks for \$2.50 each. She also purchased 4 cups of strawberry yogurt for \$0.50 each, 3 cups of lemon yogurt for \$0.50, and 2 cups of vanilla yogurt, which also cost \$0.50 per cup. What is the total amount that Leslie spent on groceries?

**S** Underline the question.

This problem is asking me to find \_\_\_\_\_  
\_\_\_\_\_.

**O** Identify the facts.

Eliminate the unnecessary facts.

List the necessary facts.

**L** Write in words what your plan of action will be.

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**Directions:** Complete the following SOLVE problem with your partner.

Tavon is buying a new skateboard. He has been saving his allowance for several weeks. The original cost of the skateboard is represented by the variable  $s$ . When he went to the store to buy the skateboard, all the boards in the store were discounted 15%. Write an expression that can be used to determine the sale price of the skateboard.

**S** Underline the question.

This problem is asking me to find \_\_\_\_\_.

**O** Identify the facts.

Eliminate the unnecessary facts.

List the necessary facts.

**L** Write in words what your plan of action will be.

Choose an operation or operations.

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**Directions:** Complete the following SOLVE problem with your partner.

Sonya baked 2 cobblers and 4 breads today. Tomorrow she will bake 3 cobblers and one bread. Each cobbler takes  $c$  cups of flour, and each bread takes  $b$  cups of flour. Write an expression that will represent the total amount of flour Sonya will use.

**S** Underline the question.

This problem is asking me to find \_\_\_\_\_  
\_\_\_\_\_.

**O** Identify the facts.

Eliminate the unnecessary facts.  
List the necessary facts.

**L** Write in words what your plan of action will be.

Choose an operation or operations.

**V** Estimate your answer.

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**E** Does your answer make sense? (Compare your answer to the question.)

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**Directions:** Complete the tables below with your partner.

In the table below, identify at least two ways that we can solve each of the questions listed. Place an asterisk next to the plan that you feel is the most efficient for solving the problem.

Note: You do not need to solve the problem. You are only writing plans for how to solve the problems.

<p><b>1.</b> Purchasing: 2 Apple Juices: \$2.00 ea. 3 Orange Juices: \$2.00 ea. 1 Milk Carton: \$1.00 ea.</p> <p>How can I find the total cost of the purchase?</p>	<p><b>2.</b> Three areas are provided for the sides of a rectangular prism: 12 in.<sup>2</sup>, 14 in.<sup>2</sup>, &amp; 42 in.<sup>2</sup></p> <p>How can I find the surface area of the rectangular prism?</p>
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**Homework**

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**Name** \_\_\_\_\_ **Date** \_\_\_\_\_

**Directions:** Complete the following SOLVE problem.  
 Daniella makes \$7 per hour at her job at the restaurant. Each week she works a different number of hours. With most of her time being spent serving this week, she made some extra money in tips. This week, she made \$74 in tips. If  $x$  represents the number of hours she worked last week and  $y$  represents the number of hours she worked this week, write an expression that represents the total amount of money she earned in the two weeks combined.

**S** Underline the question.  
 This problem is asking me to find \_\_\_\_\_  
 \_\_\_\_\_.

**O** Identify the facts.  
 Eliminate the unnecessary facts.  
 List the necessary facts.

**L** Write in words what your plan of action will be.

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**V** Estimate your answer.  
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