[OBJECTIVE]

The student will apply writing equivalent expressions to solve real-world problems.

[PREREQUISITE SKILLS]

integers and integer operations, fractions and fraction operations, order of operations, decimal operations, percents, properties of operations

[MATERIALS]

Student pages S199-S211

[ESSENTIAL QUESTIONS]

- 1. Why is it important for us to show our work and explain our plan in word problems?
- 2. How does finding a more efficient way to solve a problem help us when answering questions?
- 3. How can we verify that two expressions are equivalent when they appear to be very different?

[Words For Word Wall]

distributive property

[GROUPING]

Cooperative Pairs (CP), Whole Group (WG), Individual (I)

*For Cooperative Pairs (CP) activities, assign the roles of Partner A and Partner B to students. This allows each student to be responsible for designated tasks within the lesson.

[LEVELS OF TEACHER SUPPORT]

Modeling (M), Guided Practice (GP), Independent Practice (IP)

[MULTIPLE REPRESENTATIONS]

SOLVE, Verbal Description, Graphic Organizer, Algebraic Formula

[WARM-UP] (IP, I, WG) S199 (Answers on T398.)

• Have students turn to S199 in their books to begin the Warm-Up. Students will apply their knowledge of adding, subtracting, expanding, and factoring expressions. Give students a few minutes to complete the problems and then review the answers as a whole group. **{Verbal Description, Algebraic Formula}**

[HOMEWORK]

Take time to go over the homework from the previous night.

[LESSON] [1 – 2 Days (1 Day = 80 minutes) – M, GP, WG, CP, IP]

SOLVE Problem

(WG, GP) S200 (Answers on T399.)

Have students turn to S200 in their books. The first problem is a SOLVE problem. Students will complete the S and O steps. After students complete the S and O steps, review the answers as a whole group. **{SOLVE, Graphic Organizer, Verbal Description}**

Exploring Multiple Expressions with the Distributive Property

(M, GP, IP, CP, WG) S200, S201, S202 (Answers on T399, T400, T401.)

M, WG, CP, GP: Students will be exploring how to use the distributive property to create equivalent expressions that can be used to solve real-world problems. Make sure that students know their designation as Partner A or Partner B. {SOLVE, Verbal Description, Graphic Organizer}

- MODELING -

Exploring Multiple Expressions with the Distributive Property

Step 1: Direct students' attention to the graphic organizer at the top of S201.

- Partner A, what are we trying to find in the SOLVE problem on S200? (an expression that represents Mario and Tina's total earnings for the week) Record.
- Partner B, how much does Mario earn hourly? (\$17 per hour) Record.
- Partner A, what variable represents the number of hours Mario works? (*m*) Record.
- Partner B, how can we find the expression that represents Mario's earnings? (Multiply his hourly rate by the variable that represents the number of hours he works.) Record. Explain your thinking. (When we see the expression per hour, we know to multiply the hours times the rate.)
- Partner A, what expression represents Mario's weekly earnings? (17*m*) Record.

Step 2: Let's look at Tina's earnings.

- Partner B, what is her hourly rate? (\$17 per hour) Record.
- Partner A, what variable represents the number of hours Tina works? (*t*) Record.
- Partner B, can we find the expression that represents Tina's earnings? (Multiply her hourly rate by the variable that represents the number of hours she works. Then, add the bonus she earned this week.) Record.
- Partner A, what expression represents Tina's weekly earnings? (17t + 50) Record.

| | Partner B, if we want the total of their earnings, what operation must we use? (addition) Record. Partner A, what expression will represent their total earnings? (17m + 17t + 50) Record. Explain your thinking. By answering all of the questions above, we have created one possible plan for our L Step and we completed the V Step to find a solution. |
|---------|---|
| Step 3: | Direct students' attention to the top of S202 to explore another solution to the SOLVE problem. Have student pairs discuss Question 1. In Ms. Johnson's class, a student wrote the following answer as her solution to the same SOLVE problem: 17(m + t) + 50 |
| | Partner A, do you think the student should receive credit for the answer? Explain your thinking. (If we can prove that this answer is equivalent to the correct answer, then the student should receive credit.) Record. Partner B, if you had to write an L Step that the student used to arrive at this expression, what would it involve? (Combine the total number of hours first by adding the variables <i>m</i> and <i>t</i>. Then, place this quantity in parentheses so that both variables would be multiplied by the hourly rate. Finally, add Tina's bonus.) Record. |
| Step 4: | Partner A, how can we check to see if the solution the student found matches the solution we found in Question 9 on S201? (We can expand the expression of the solution the student wrote to see if we can get the expressions to be identical.) Record. Partner B, what property are we using to expand the expression? (the distributive property) Record. Partner A, describe how to expand the student's expression. [17(m + t) + 50 = 17m + 17t + 50)] Record. Partner B, were you able to prove that the student's answer matches our solution from Question 9 on S201? Explain how you know that your answer is the same. (Yes, because the student's solution expands to the same solution we found in Question 9 on S201: 17m + 17t + 50.) Record. |
| Step 5: | Have student pairs discuss Question 7. Partner A, how could we manipulate our solution to try to match the solution the student got? [Seeing the common factor of 17 as the coefficient for each variable should be a sign to us that we can factor our 17 from those two terms. Factoring leaves us with 17 times the quantity of (<i>m</i> + <i>t</i>).] Record. |

| • | Partner B, why was it important for us to show our work and explain |
|---|--|
| | our plan for this SOLVE problem? Explain your thinking. (We saw |
| | that there is more than one way to solve this problem, and these two |
| | solutions looked a bit different from each other. Showing our work |
| | proved that the answers were equivalent.) Record. |

IP, CP, WG: Have students complete steps L, V, and E in the SOLVE problem on S200. They may choose to use one of the plans from S201 or S202 or work with their partners to try to think of an alternative solution. Regroup to discuss any new plans that we may not have mentioned already to solve this problem.{Verbal Description, Algebraic Formula, SOLVE, Graphic Organizer}

Manipulating and Comparing Expressions in Real-World Situations (M, WG, CP, IP, GP) S203, S204, S205 (Answers on T402, T403, T404.)

M, WG, CP, GP: Have students turn to S203 in their books. Students will work on the S and O steps of the SOLVE process for this problem. Then, guide students through the questions on S204 and S205 to help them create a plan to finish the problem on S203. {Verbal Description, SOLVE, Graphic Organizer, Algebraic Formula}

MODELING -

| Manipulating and Comparing Express | sions in Real-World Situations |
|--|---|
| Step 1: Direct students to the SOLVE problem Have students complete the S and the answers as a whole group. | on S203. O steps for the problem and then review |
| Step 2: Direct students' attention to the top of Partner A, what are we trying to (an expression that represents the applied) Record. | of S204. find in the SOLVE problem on S203? e cost of the dress after the discount is |
| Partner B, how much is the disco can we write the discount percent | unt on the dress? (10%) Record. How age as a decimal? (0.10) Record. |
| Partner A, how can we find an exp the discount? (Multiply the decim cost.) Record. | pression that represents the amount of al form of the discount by the original |
| Partner B, what expression repr (0.10c) Record. | esents the amount of the discount? |
| | |

| • | Partner A, using the discount amount, how can we find the amount that must be paid after the discount is applied? (Subtract the expression for the discount from the original cost.) Record. Partner B, what expression will represent the cost of the dress after the discount is applied? ($c - 0.10c$) Record. By answering the question above, you have generated a plan for the L Step and following through for the V Step for the SOLVE problem on S203. Continue exploring another plan below. |
|--|---|
| Step 3: Ha • • | ave students continue with the questions on S204. Partner A, what does it mean for a 10% discount to be applied? (A discount of 10% means that the store does not require you to pay 10% of the total original cost.) Record. Partner B, if the store is offering a 10% discount, then what percentage of the cost is left to pay? (90%) Record. Partner A, is there another plan we could use for Step L of the SOLVE problem based on the percentage we know we will pay? Explain. (Yes. We know we will pay 90% of the cost, therefore we could write an expression that represents this amount.) Record. Partner B, what is the new expression that shows the percentage paid? (0.90 <i>c</i>) Record. |
| Step 4: Di qu • • • • • • | rect students to the top of S205, where they will continue with the bestions related to the SOLVE problem on S203. Partner A, on S204, we wrote a new expression to represent the cost that we will pay. How do you think this expression relates to the expression from Question 6? (They are equivalent because we used mathematically sound plans to generate both.) Record. Both of the plans that we created seem mathematically sound. Let's explore the two expressions a bit more. Partner B, what was the first expression we found? ($c - 0.10c$) Record. Partner A, what was the second expression we found? ($0.90c$) Record. Partner B, what do you notice about the first expression? (Both of the terms have the variable c in them, which means that they are actually like terms and can be combined.) Record. Partner A, in the first expression, what is the coefficient of the first term? (1) Record. Partner A, how do we combine the like terms for the first expression? (We identify the coefficients of each like term, and we apply the operation between them, which is subtraction in this case.) Record. |

- Partner B, what is the difference of the coefficients of the like terms? (1 0.10 = 0.90) Record.
- Partner A, what is the expression that is left? (0.90c) Record.
- Partner B, how does the simplified first expression compare to the second expression? (They are identical; both are 0.90c.) Record.
- Partner A, why was it important for us to show our work and explain our plan for this SOLVE problem? (We saw that there was more than one way to set up the problem originally when we were thinking about the math that was involved.) Record.
- With this problem, identifying the second expression by using the reasoning of the percentage that we will pay makes the expression simpler. If we had the original cost of the dress, we would only need one operation which is multiplication. Finding different ways to solve a problem can save you time!
- Complete the rest of the SOLVE problem on S203. 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.

IP, CP, WG: Have students turn back to S203 and complete the SOLVE problem. They may work with their partners to try to think of an alternative solution. Regroup to discuss any new plans that we may not have already mentioned to solve this problem. **{Verbal Description, SOLVE, Graphic Organizer, Algebraic Formula}**

SOLVE – Using Expressions in Real-World Applications (CP, IP, WG) S206, S207, S208, S209 (Answers on T405, T406, T407, T408.)

CP, IP, WG: Students will be completing four SOLVE problems that are applications of expressions with real-world situations. Suggested answers are provided in the teacher pages, but there may be several correct answers for the expressions. Several strategies are offered on T396 - T397 for other ideas for using the SOLVE problems. **{Verbal Description, SOLVE, Graphic Organizer, Algebraic Formula}**

There are a variety of ways to complete these problems. Here are a few suggestions which are alternatives to having students complete all 4 problems in student pairs:

- Have students work in groups of 4 or 5 and assign them one of the SOLVE problems to complete as a group. Students can then transfer their answers to chart paper and present them to the whole group.
- Have students work in 4 different groups. Post each SOLVE problem on a chart around the room. Students can start at one poster and complete the S step. After a few minutes, have student groups move to the next poster, read the S step and then complete the O step. After a few minutes, have students move to

the next poster, read the S and O steps and complete the L step. Continue with this procedure until student groups have returned to their original problem. They can also present their problem to the whole group.

• Have a copy of one of the SOLVE problems at each table or group (4 groups). Have students complete the S Step and then pass the problem on to the next group when you give a signal. Students will continue this process until they get back their original problem.

If time permits...

Have students complete Questions 1-2 on S210.

(CP, IP) S210 (Answers on T409.)

[CLOSURE]

To wrap up the lesson, go back to the essential questions and discuss them with students.

- Why is it important for us to show our work and explain our plan in word problems? (By showing our work, we are explaining our thought process. Different people may have answers that are slightly different, but can also be correct. Being clear with explanations will verify that your answer may also be correct.)
- How does finding a more efficient way to solve a problem help us when answering questions? (Finding the most efficient way to solve a problem will save time and will also eliminate extra work that could allow for calculation errors.)
- How can we verify that two expressions are equivalent when they appear to be very different? (We can manipulate the expressions by using our knowledge of adding, subtracting, expanding, and factoring expressions to show equivalency.)

[HOMEWORK]

Assign S211 for homework. (Answers on T410.)

[QUIZ ANSWERS] T411 - T412

1. **B** 2. **D** 3. **A** 4. **A** 5. **B** 6. **A** 7. **C** 8. **D** 9. **C** 10. **D**

The quiz can be used at any time as extra homework or to see how students progress with manipulating expressions to solve real-world problems.

T398

LESSON 17: Writing Equivalent Expressions for Real-World Applications

Here is the key to **S199**.

| Directions: Simplify the following expressions by combining like terms or expanding them. | | |
|--|---|--|
| 1. $4x - 2 + 5x$ 2. $6x + 5x - 9 + x$ | | |
| 9x – 2 | 12x – 9 | |
| 3. −9(<i>x</i> + 10) | 4. -5 <i>x</i> + 10 + 3 <i>x</i> − 1 | |
| ⁻ 9x − 90 | -2x + 9 | |
| 5. 6(<i>x</i> – 5) + 2 <i>x</i> + 4 | 6 . 7(x + 3) - 4x + 8 | |
| 8 <i>x</i> – 26 | 3 <i>x</i> + 29 | |
| 7. Factor: 8 <i>x</i> + 24 | 8. Simplify and Factor: 6x - 25 - x | |
| 8(x + 3) | 5(x - 5) | |
| | | |

Here is the key to **S200**.

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 **an expression that represents the total amount of money earned by the two this week.**

O Identify the facts.

Eliminate the unnecessary facts.

List the necessary facts. Mario earns \$17 per hour Tina earns \$17 per hour and a bonus of \$50 m = Number of hours Mario works t = Number of hours Tina works

L Write in words what your plan of action will be. Add the number of hours Mario works to the number of hours Tina works and multiply this quantity by the hourly pay rate they share. Finally, add the bonus Tina earns to the expression. (Answers may vary.)

Choose an operation or operations. **Multiplication, addition**

- V Estimate your answer. An expression using multiplication and addition
 Carry out your plan.
 17(m + t) + 50
- E Does your answer make sense? (Compare your answer to the question.) Yes, because we wrote an expression that represents their total earnings.

Is your answer reasonable? (Compare your answer to the estimate.) Yes, because 17(m + t) + 50 is an expression representing their earnings.

Is your answer accurate? (Check your work.) Yes

Write your answer in a complete sentence. An expression that represents the total amount of money earned this week is 17(m + t) + 50.

Here is the key to **S201**.

Directions: Complete this page with your teacher and partner.

| 1. | What are we trying to find in the SOLVE problem on S200? | an expression that and Tina's earning | t represents Mario ngs for the week |
|----|--|---|--|
| 2. | How much does Mario earn hourly? What variable represents the number of hours Mario works? | \$17 per hour | т |
| 3. | How can we find the expression that represents Mario's earnings? | Multiply his ho variable that repre of hours l | urly rate by the esents the number he works. |
| 4. | What expression represents Mario's weekly earnings? | 17 | 'm |
| 5. | What is Tina's hourly rate? What variable represents the number of hours Tina works? | \$17 per hour | t |
| 6. | How can we find the expression that represents Tina's earnings? | Multiply her ho variable that repre of hours she wor bonus she ear | urly rate by the esents the number ks. Then, add the ned this week. |
| 7. | What expression represents Tina's weekly earnings? | 17t · | + 50 |
| 8. | What operation can we use to find their total earnings? Explain your thinking. | Addition. We kno because we are amount the two p comb | w to use addition trying to find the eople make when ined. |
| 9. | What expression will represent their total earnings? | 17 <i>m</i> + 1 | l7t + 50 |

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.

Here is the key to **S202**.

Directions: Complete this page your teacher and your partner.

| ent her equivalent to the corr em: then the student sho credit. her | In Ms. Johnson's class, a student wrote the following answer as her solution to the same SOLVE problem: $17(m + t) + 50$. Do you think the student should receive credit for her answer? Explain your answer. | can prove that this answer is valent to the correct answer, n the student should receive credit. |
|--|--|--|
| that this the the the the the the the the the the | If you had to write an L Step that the student used to arrive at this expression, how would you write the L Step? | oine the total number of hours t by adding the variables <i>m</i> <i>t</i> . Then, place this quantity in ntheses so that both variables Id be multiplied by the hourly e. Finally, add Tina's bonus. |
| the We can expand the exp hes solution to see if they 9? | How can we check to see if the solution the student found matches the solution we found in Question 9? | n expand the expression of the ion to see if they are identical. |
| to the distributive p | What property are we using to expand the expression? | the distributive property |
| sion $17(m + t) + 50 = 17n$ | Expand the student's expression using the distributive property. | (n + t) + 50 = 17m + 17t + 50 |
| the our expands to the same found in Question 9 or 17m + 17t + | Were you able to prove that the student's answer matches our solution from Question 9? Explain your thinking. | because the student's solution ands to the same solution we d in Question 9 on page S201: 17 <i>m</i> + 17 <i>t</i> + 50. |
| nt's Seeing the common f en't as the coefficient for e and should be a sign to us factor out 17 from thos Factoring leaves us w the quantity of (| What if we knew that the student's answer was correct, but we weren't sure of our answer? Explain and defend your answer. | ing the common factor of 17 e coefficient for each variable ld be a sign to us that we can r out 17 from those two terms. oring leaves us with 17 times the quantity of $(m + t)$. |
| NowWe saw that there is meanforway to solve this problemourtwo solutions looked afrom each other. Shwork proved that theequivalent | . 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. | aw that there is more than one o solve this problem, and these solutions looked a bit different om each other. Showing our c proved that the answers are equivalent. |

Complete the rest of the SOLVE problem on S200. 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.

Here is the key to **S203**.

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 **an expression that represents the cost of the dress after the discount is applied.**
- **O** Identify the facts.

Eliminate the unnecessary facts.

List the necessary facts. Original price: *c* dollars 10% discount is applied

L Write in words what your plan of action will be. Multiply the discount percentage in decimal form by the original cost. Then, subtract this product from the original cost to find the amount left that she must pay for the dress.

Choose an operation or operations. Multiplication, subtraction

V Estimate your answer. **An expression**

Carry out your plan. Discount amount: 0.10c Cost of dress minus the discount: c – 0.10c

E Does your answer make sense? (Compare your answer to the question.)Yes, because we found an expression that represents the cost of the dress after the discount is applied.

Is your answer reasonable? (Compare your answer to the estimate.) **Yes**, **because** *c* – **0.10***c* **is an expression for the cost of the dress**.

Is your answer accurate? (Check your work.) Yes

Write your answer in a complete sentence. An expression that represents the cost of the dress after the discount is applied is *c* – 0.10*c*.

Here is the key to **S204**.

Directions: Complete this page with your teacher and partner.

| What are we trying to find in the SOLVE problem on S203? | An expression that represents the cost of the dress after the discount is applied |
|---|---|
| 2. How much is the discount on the dress? How can we write the discount percentage as a decimal? | 10%; 0.10 |
| 3. How can we find an expression that represents the amount of the discount? | Multiply the decimal form of the discount by the original cost. |
| 4. What expression represents the amount of the discount? | 0.10 <i>c</i> |
| 5. Using the discount amount, how can we find the amount that must be paid after the discount is applied? | Subtract the expression for the discount from the original cost. |
| 6. What expression will represent the cost of the dress after the discount is applied? | <i>c</i> – 0.10 <i>c</i> |
| By answering the questions above, you followed through for the V Step fo exploring ar | have generated a plan for the L Step and r the SOLVE problem on S203. Continue nother plan below. |
| 7. What does it mean for a 10% discount to be applied? | A discount of 10% means that the store does not require you to pay 10% of the total original cost. |
| 8. If the store is offering a 10% discount, then what percentage of the cost is left to pay? | 90% |
| 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. | Yes, we know that we will pay 90% of the cost, therefore we could write an expression that represents this amount. |
| 10. What is the new expression that shows the percentage paid? | 0.90 <i>c</i> |

Here is the key to **S205**.

Directions: Complete this page with your teacher and partner.

| 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? | | |
|---|---|--|
| They are equivalent because we used mathematically sound plans to generate both. | | |
| 2. What was the first expression we found? | <i>c</i> – 0.10 <i>c</i> | |
| 3. What was the second expression we found? | 0.90 <i>c</i> | |
| 4. What do you notice about the first expression? | Both of the terms have the variable <i>c</i> in them, which means they are actually like terms and can be combined. | |
| 5. In the first expression, what is the coefficient of the first term? | 1 | |
| 6. How do we combine the like terms for the first expression? | We identify the coefficients of each like term, and we apply the operation between them, which is subtraction in this case. | |
| 7. What is the difference of the coefficients of the like terms? | 1 - 0.10 = 0.90 | |
| 8. What is the expression that is left? | 0.90 <i>c</i> | |
| 9. How does the simplified first expression compare to the second? | They are identical; both are 0.90 <i>c.</i> | |
| 10. Why is it important for us to show our work and explain our plan for this SOLVE problem? | There is more than one way to set up the problem when we are thinking about the math involved. | |

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 S203. 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.

Here is the key to **S206**.

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 write an expression that represents the total number of tiles used to outline the patio.

- Identify the facts.
 Eliminate the unnecessary facts.
 List the necessary facts. the diagram provided
- L Write in words what your plan of action will be. We will identify the length, *I*, and multiply by two and identify the width, *w*, and also multiply by two. Finally, we will add these two products together to get the total number of tiles. Note that the length will include the corner tiles and the width will not.

Choose an operation or operations. **Multiplication, subtraction**

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

Lengths: 2/ Widths: 2w

Total Tiles: 2/ + 2w

E Does your answer make sense? (Compare your answer to the question.)Yes, because we found an expression that represents the number of tiles that make up the perimeter of the patio.

Is your answer reasonable? (Compare your answer to the estimate.) **Yes,** because 2*I* + 2*w* is an expression that relates to perimeter.

Is your answer accurate? (Check your work.) Yes

Write your answer in a complete sentence. The total number of tiles can be found using the expression 2l + 2w and noting that the corners are included in the length and not the width.

Here is the key to **S207**.

Directions: Complete the following SOLVE problem with your partner.

Leslie purchased 4 bags of snacks representd by a cost of *s* cents per bag. | 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 **the expression to repesent the total amount that Leslie spent on groceries.**
- O Identify the facts. Eliminate the unnecessary facts. List the necessary facts.
 4 bags of snacks: Cost of each bag = s 4 strawberry yogurts: \$0.50 each 3 lemon yogurts: \$0.50 each
 - 2 vanilla yogurts: \$0.50 each
- L Write in words what your plan of action will be. Multiply the cost of one yogurt cup by the total number of yogurt cups and the variable representd by a cost of the snacks by the total number of bags. Then, add these two products together. (Answers may vary.) Choose an operation or operations. Multiplication, addition
- **V** Estimate your answer. **An expression** Carry out your plan.

 E Does your answer make sense? (Compare your answer to the question.)
 Yes, because we found the total amount Leslie spent at the store. Is your answer reasonable? (Compare your answer to the estimate.) Yes, because it is an expression.

Is your answer accurate? (Check your work.) **Yes**

Write your answer in a complete sentence. The expression 4s + 4.50 can be used to expressed the amount Leslie on groceries.

⁴ Snacks: 4 • s = 4s 9 Yogurts: 9 • 0.50 = 4.50 4s + 4.5 = 4s + 4.50

Here is the key to **S208**.

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 the expression that can be used to determine the sale price of the skateboard. |
| O Identify the facts. Eliminate the unnecessary facts. List the necessary facts. cost of skateboard represented by s discounted 15% |
| L Write in words what your plan of action will be. Write the discount of the skateboard as a decimal and then multiply it by the original cost of the skateboard. Then subtract that amount from the original price. Choose an operation or operations. Multiplication, subtraction |
| V Estimate your answer. An expression Carry out your plan. 0.15s s - 0.15s = the sale cost |
| E Does your answer make sense? (Compare your answer to the question.) Yes, because we wrote an expression to determine the sale cost of the skateboard. Is your answer reasonable? (Compare your answer to the estimate.) Yes, because it is an expression. Is your answer accurate? (Check your work.) Yes Write your answer in a complete sentence. The expression s – 0.15s can be used to determine the sale cost of the skateboard. |

Here is the key to **S209**.

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 **an expression that can be used to** represent the total amount of flour Sonya will use. **O** Identify the facts. Eliminate the unnecessary facts. List the necessary facts. cobbler – c; bread - b 2 cobblers, 4 breads, 3 cobblers, 1 bread **L** Write in words what your plan of action will be. **Write an expression to** show the amount of flour she needs to bake the breads. Choose an operation or operations. Multiplication, addition **V** Estimate your answer. **An expression** Carry out your plan. 2c + 4b + 3c + b = 2c + 3c + b + 4b = 5c + 5b = 5(c + b)**E** Does your answer make sense? (Compare your answer to the question.) **Yes**, because we wrote an expression to determine the amount of flour. Is your answer reasonable? (Compare your answer to the estimate.) **Yes**, because it is an expression. Is your answer accurate? (Check your work.) **Yes** Write your answer in a complete sentence. The expression 5 (c + b) can be used to represent the total amount of flour Sonya will use.

Here is the key to **S210**.

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.

| Purchasing: 2 Apple Juices: \$2.00 ea. 3 Orange Juices: \$2.00 ea. 1 Milk Carton: \$1.00 ea. | 2. Three areas are provided for the sides of a rectangular prism: 12 in.², 14 in.², & 42 in.² |
|--|--|
| How can I find the total cost of the purchase? | How can I find the surface area of the rectangular prism? |
| Multiply the number of apple juices by the cost of apple juice. Multiply the number of orange juices by the cost of orange juice. Multiply the number of milk cartons by the cost of a milk carton. Then, add all three of the products together. (*)Multiply the number of juices by the cost of a juice (which is the same for both types of juice) and then add the cost of the one container of milk. | Add all of the areas, including each area twice to represent its presence twice on the prism. Multiply each area by 2 and then add all of the products together for the total surface area. (*)Add all three of the areas together and then multiply the quantity by 2 for the total surface area. |

Here is the key to **S211**. Homework 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 **an expression that represents the** total amount of money earned the past two weeks. **O** Identify the facts. Eliminate the unnecessary facts. List the necessary facts. **Daniella makes \$7 per hour.** This week's tips \$74. x = Number of hours worked last week v = Number of hours worked this week **L** Write in words what your plan of action will be. **1. Multiply the number** of hours worked this week by her hourly rate. Then multiply the number of hours she worked last week by her hourly rate. Finally add these two together and then add the tips from this week. 2. Add to find the total number of hours and multiply by her hourly rate. Then, add the tips from this week. (Answers may vary.) Choose an operation or operations. Multiplication, addition **V** Estimate your answer. **An expression** Carry out your plan. 1. 7x + 7y + 742. 7(x + y) + 74**E** Does your answer make sense? (Compare your answer to the question.) Yes, because we wrote an expression that represents her earnings for both weeks. Is your answer reasonable? (Compare your answer to the estimate.) Yes, because 7(x + y) + 74 is an expression representing **their earnings.** Is your answer accurate? (Check your work.) **Yes** Write your answer in a complete sentence. An expression that represents the total amount of money earned this week is 7(x + y) + 74.

Name _____

Date _____

Quiz

Use the following SOLVE problem to answer the questions.

Alexa wanted to purchase some new supplies for making jewelry. She purchased some string that is priced for \$5.00. She also has chosen a set of jeweled beads that cost \$15.00. Finally, she chose a pack of clasps that were marked for \$2.50. Alexa clipped a coupon from the paper that will give her 40% off of each item she purchases. What is the total cost after the coupon is applied?

- **1.** What is this problem asking you to find?
 - A. The cost of the beads with a 40% discount
 - B. The total cost of the purchase after the coupon is applied
 - C. The total cost of the purchase before the coupon is applied
 - D. The cost of the beads and the string combined
- **2.** Which of the following is not a necessary fact?
 - A. The original price of string is \$5.00.
 - B. The coupon takes 40% off of each item.
 - C. The original price of the clasps is \$2.50.
 - D. Alexa wanted to purchase some new supplies for making jewelry.
- **3.** Which of the following would be a plan that would answer the question?
 - A. Find the total of the original costs. Then, find 40% of each of the individual items and deduct the individual discounts from the total of the original costs.
 - B. Find 40% of the cost of string and the cost of the clasps & add it to the cost of beads.
 - C. Deduct the cost of the clasps from the cost of the beads & multiply by 40%.
 - D. Add all of the original costs together.
- **4.** Which of the following would be the most efficient plan for solving this problem? A. Add all of the original costs together and multiply the total by 60%.
 - B. Add all of the original costs together and multiply the total by 40%. Then, subtract this product from the total of the original costs previously found.
 - C. Find 40% of each item. Deduct this amount from the original cost of each item. Add the difference of each original cost & each discount to get the total cost.
 - D. None of the above plans are efficient.
- **5.** If the total amount spent on jewelry supplies was unknown, but given to us as a variable, *x*, which of the following expressions would represent the calculation for a discount of 30%?
 - A. x + 0.30x
 - B. 0.30*x*
 - C. *x*
 - D. 0.30*x x*

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LESSON 17: Writing Equivalent Expressions for Real-World Applications

- **6.** If the total amount spent on jewelry supplies was unknown, but given to us as a variable, *x*, which of the following expressions would represent the total bill after a discount of 30% was applied?
 - A. 0.70*x*
 - B. 0.30*x* + *x*
 - С. х
 - D. 0.30*x x*
- 7. Which of the following is an additional solution to Question 6?
 - A. 0.30x + 1x
 - B. 0.70x + 0.30x
 - C. *x* 0.30*x*
 - D. None of the choices are additional solutions to Question 6.
- **8.** Referring to the information given in the word problem, what is the amount that represents the 40% discount received?
 - A. \$62.50
 - B. \$22.50
 - C. \$13.50
 - D. \$9.00
- **9.** Referring to the information given in the word problem, what is the amount of the total bill after the 40% discount is applied?
 - A. \$62.50
 - B. \$22.50
 - C. \$13.50
 - D. \$9.00
- **10.** Which of the following is a reason why it is important to show and explain your work with word problems?
 - A. Showing your work allows you to identify more efficient methods of solving a problem, eliminating more chances for errors.
 - B. Showing your work helps you to identify errors in calculations that you may have missed if you had not explained them.
 - C. Showing your work helps to explain a different method to solving a problem that someone else may not have originally thought of.
 - D. All of the above are important reasons to show and explain your work with word problems.