Lesson Title: Symbolize and Solve Equations **Grade Level:** 7

Lesson Objectives:

- Students will be able to translate words into an equation.
- Students will be able to translate an equation into words.

Learning Modalities Targeted:

☑ Visual ☑ Auditory ☑ Kinesthetic/Tactile

Warm-Up:

- Ask students what operation is represented by the following words: increased by, less than, each, decreased by, equally grouped, sum, difference, product, and quotient. Go over each operation with the students to prepare them for the lesson.

Materials Needed: paper, pencils, Independent Practice Activity, index cards

Procedure:

1. Create a list of words that is an extension of the discussion started in the Warm-Up activity. Ask students to call out words and phrases that are commonly used in word problems to represent an operation. Keep this list visible where students can see it throughout the lesson. Prompt students will some of the following examples if they get stuck:

Procedure:

Addition (+)	Subtraction (-)	Multiplication (×)	Division (÷)
plus	minus	times	divided by
sum	difference	product	quotient
increased by	decreased by	multiplied by	share
added to	subtracted from	each	

2. Next, show the students how to translate a sample problem. For example: "*Three less than what number is eight?*" Break apart the word problem with the students to write the equation. "*Three less*": - 3; "*what number*": *x*; "*is*": =; "*eight*": 8. So, the equation is $x - 3 = 8$.
3. Discuss with the students that subtraction and division are not commutative. The order of the numbers changes the meaning and value of the equation. Be sure to show a couple of examples of why this is. For example, $7 - 2 \neq 2 - 7$ and $8 \div 2 \neq 2 \div 8$.
4. Have students work in pairs to discuss and translate the following problems.
    - *Three times what number, plus five, is the product of six and eight?*
    - *What number divided by four is three times that number, increased by two?*
    - Translate into words: $3(x - 5) = 2x$
    - Translate into words: $4x \div 6 = 9$
5. Discuss the problems and how students translated them. Be sure they know that the placement of a comma can change the order of operations and the equation.

Independent Practice:

- Have students complete the Independent Practice Activity.

Closing Activity:

- Go over the answers to the Independent Practice Activity as a class.

Advanced Learner Option

Procedure:

1. Have students translate the following: *What number plus five multiplied by itself is eight?*
2. Discuss with students that this problem uses the distributive property and exponents:
   - $(x + 5)^2 = 8$
3. Make a list of ways to describe the distributive property, exponents, and square roots.
4. Have students write problems of their own using the distributive property, exponents, and/or square roots. Have students exchange and translate each other's problems, discussing the strategies they used.

Struggling Learner Option

Procedure:

1. Review the list from the beginning of the lesson for the four basic operations.
2. Have students translate the following: *What number plus four is nine?*
3. Discuss the meaning of each part of the sentence: the variable, the operation, and "*is*" as the equal sign.
4. Have students write problems that they are sure they can translate, using one or two operations. Have students exchange and translate each other's problems, discussing the strategies they used.

Extension Activities

- Have students read the following newspaper headlines, and discuss how and why the words can be misinterpreted:
  - Brothers Reunited after 10 years at the Library
  - Police Help Dog Bite Victim
  - Kids Make Nutritious Snacks
- Have students make their own Memory game. Using index cards, have students write a word problem on one card and the translated equation on another card. Do this for about 7-10 problems. When finished, have the students shuffle the cards, place them facedown, and play the Memory game, matching the correct pairs.

ELL Teaching Tips

- **Key Lesson Vocabulary**: **academic** – translate, variable, operation
- **L1 support** – Allow students to use their home language with a bilingual dictionary or a native language text. Let students use their bilingual dictionary throughout the lesson to look up unfamiliar words, especially for the first Extension Activity.
- **Wall charts** – Create a chart with language structures and samples and post it in the room to provide reminders and support for students. Create a wall chart with key words and the operation they refer to based on the Warm-Up and main Procedure section discussions. Encourage students to refer to the chart throughout the lesson as a reference.

Name: _____

Independent Practice: Symbolize Problem Situations

Directions: Read each problem. Circle the letter of the best answer.

1. Translate the following sentence into a mathematical equation:

   The product of three and a number, plus six, is eighteen.

   A. $3(n + 6) = 18$

   B. $3n + 6 = 18$

   C. $3n + 4 = 18$

   D. $3 + n + 6 = 18$

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2. Translate the following equation into words.

   $5c – 3 = 12$

   A. Five, times a number minus three, is twelve.

   B. A number, times five minus three, is twelve.

   C. Five times a number, subtracted from three, is twelve.

   D. Three less than the product of five and a number, is twelve.

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3. Which equation represents the following situation?

   Sarah and four friends share some cookies. If each person gets three cookies, how many cookies were shared?

   A. $\frac{c}{5} = 3$

   B. $5c = 3$

   C. $\frac{c}{4} = 3$

   D. $4c = 3$

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4. Which statement is the clearest translation of $5 + 6z = 17$?
   A. Five plus six, times a number, is seventeen.
   B. Five plus six times a number is seventeen.
   C. Five, plus six times a number, is seventeen.
   D. Five plus six times, a number is seventeen.

5. Which equation is the correct translation of the following:
   Five less than a number is ten.
   A. $5 - x = 10$
   B. $10 - 5 = x$
   C. $10 - x = 5$
   D. $x - 5 = 10$

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6. Which equation is the correct translation of the following?
   A number added six times is eighteen.
   A. $6 + 6x = 18$
   B. $6x = 18$
   C. $18x = 6$
   D. $18 - x = 6$

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7. Which statement is the clearest translation of $5p + 3 = 13$?
   A. Five times a number plus three is thirteen.
   B. Five times a number, plus three, is thirteen.
   C. Five, times a number plus three, is thirteen.
   D. Five times, a number, plus three, is thirteen.

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8. Translate the following into words: 4(6x + 3) = 60.

   A. Three more than six times a number, multiplied by four, is sixty.

   B. Three more than six times a number multiplied by four, is sixty.

   C. Four times a number multiplied by six plus three, is sixty.

   D. Four times a number, multiplied by six plus three, is sixty.

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9. Which equation is the correct translation of the following?

   Four more than a number divided by six, is seven.

   A. $\frac{4}{6} + x = 7$

   B. $\frac{6}{x} + 4 = 7$

   C. $\frac{6 + 4}{x} = 7$

   D. $\frac{x}{6} + 4 = 7$

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10. Which equation is the correct translation of the following?

    A number multiplied by itself five times is 32.

    A. $5x = 32$

    B. $5 + x = 32$

    C. $x^5 = 32$

    D. $5^x = 32$

Name: _____

Symbolize Problem Situations – Answer Key

Directions: Read each problem. Circle the letter of the best answer.

1. Translate the following sentence into a mathematical equation:

   The product of three and a number, plus six, is eighteen.

   A. $3(n + 6) = 18$

   B. $3n + 6 = 18$

   C. $3n + 4 = 18$

   D. $3 + n + 6 = 18$

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2. Translate the following equation into words.

   $5c – 3 = 12$

   A. Five, times a number minus three, is twelve.

   B. A number, times five minus three, is twelve.

   C. Five times a number, subtracted from three, is twelve.

   D. Three less than the product of five and a number, is twelve.

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3. Which equation represents the following situation?

   Sarah and four friends share some cookies. If each person gets three cookies, how many cookies were shared?

   A. $\frac{c}{5} = 3$

   B. $5c = 3$

   C. $\frac{c}{4} = 3$

   D. $4c = 3$

4. Which statement is the clearest translation of $5 + 6z = 17$?

   A. Five plus six, times a number, is seventeen.

   B. Five plus six times a number is seventeen.

   C. Five, plus six times a number, is seventeen.

   D. Five plus six times, a number is seventeen.

5. Which equation is the correct translation of the following:

   Five less than a number is ten.

   A. $5 - x = 10$

   B. $10 - 5 = x$

   C. $10 - x = 5$

   D. $x - 5 = 10$

6. Which equation is the correct translation of the following?

   A number added six times is eighteen.

   A. $6 + 6x = 18$

   B. $6x = 18$

   C. $18x = 6$

   D. $18 - x = 6$

7. Which statement is the clearest translation of $5p + 3 = 13$?

   A. Five times a number plus three is thirteen.

   B. Five times a number, plus three, is thirteen.

   C. Five, times a number plus three, is thirteen.

   D. Five times, a number, plus three, is thirteen.

8. Translate the following into words: 4(6x + 3) = 60.

   A. Three more than six times a number, multiplied by four, is sixty.

   B. Three more than six times a number multiplied by four, is sixty.

   C. Four times a number multiplied by six plus three, is sixty.

   D. Four times a number, multiplied by six plus three, is sixty.

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9. Which equation is the correct translation of the following?

   Four more than a number divided by six, is seven.

   A. $\frac{4}{6} + x = 7$

   B. $\frac{6}{x} + 4 = 7$

   C. $\frac{6 + 4}{x} = 7$

   D. $\frac{x}{6} + 4 = 7$

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10. Which equation is the correct translation of the following?

    A number multiplied by itself five times is 32.

    A. $5x = 32$

    B. $5 + x = 32$

    C. $x^5 = 32$

    D. $5^x = 32$