Translating Expressions and Equations

Strand:	Patterns, Functions, and Algebra
Topic:	Write verbal expressions and sentences as algebraic expressions and equations. Write algebraic expressions and equations as verbal expressions and sentences.
Primary SOL:	7.12 The student will solve two-step linear equations in one variable, including practical problems that require the solution of a two-step linear equation in one variable.
Related SOL:	7.11, 7.13

Materials

- Graphic Organizer for Mathematical Operations and Symbols (attached)
- Mathematical Translations Matching activity sheet (attached)
- Translating activity sheet (attached)

Vocabulary

equation, expression, variable (earlier grades)

algebraic expression, algebraic equation, numerical expression, variable expression, verbal expression, verbal sentence (7.12)

Student/Teacher Actions: What should students be doing? What should teachers be doing?

1. Write a common word or phrase on the board in another language and ask students to translate it into English. Compare this sort of translation to the process of translating words into numbers and mathematical symbols.

2. Have students review vocabulary terms by organizing their thoughts in the Graphic Organizers for Mathematical Operations and Symbols. A separate organizer is provided for each operation: addition, subtraction, multiplication, and division. For each operation, the students will discuss key words, symbols, examples and non-examples.

   o Sample key phrases: added to, increased by, sum, plus, difference, decreased by, less than, subtracted from, product, twice, double, times, quotient, half, split, divided equally, etc.

3. Discuss additional vocabulary terms as they arise throughout the lesson. Ask students to revise their graphic organizer as new ideas are presented. Be sure to have discussions as words are added. *Note: Some words may exist in a word problem without specifically indicating a specific operation.*

4. Distribute the Mathematical Translations Matching activity sheet. Have students cut out the squares and pair matching equations and expressions. After students make their matches, have them sort their piles into equations and expressions. Have students check their work by comparing with a partner. Discuss as a class.

5. Ask the students to complete the Translating activity sheet. There are multiple ways to translate the algebraic expressions and equations as verbal expressions and sentences. Discuss the various answers as a class.

Assessment

- **Questions**
  - What is the difference between an expression and an equation?
  - Why is it important to be able to write verbal expressions as algebraic expressions and sentences as equations and vice versa?

- **Journal/writing prompts**
  - Jack said, "Six less than twice a number is four" is written as $6 - 2n = 4$. Jane said he is incorrect and that it should be written as $2n - 6 = 4$. Identify who is correct, and explain why.
  - Explain to a classmate that has been absent how to translate expressions.

- **Other Assessments**
  - Have students create their own matching expressions and equations game and give it to a partner to check for accuracy.
  - Have students create a dominos-type game for evaluating expressions.
  - Provide numerical two-step equations and ask the students to develop a practical situation.
  - Provide practical problems and ask the students to write a numerical equation.

Extensions and Connections

- Play a bingo-type game in which students translate expressions and equations.
- Have students play an "I Have … Who Has?" game for translating.
- Have students create a poster that has at least two verbal expressions for each operation.

Strategies for Differentiation

- Use graphic organizers for vocabulary.
- Color code the various parts of an expression or equation written in words before translating it to mathematical symbols.
- Allow students to work with a partner for all learning activities.
- Provide students with completed examples of the graphic organizer, using mathematical terms with which students are familiar.

Note: The following pages are intended for classroom use for students as a visual aid to learning.

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Graphic Organizer for Mathematical Operations and Symbols

Key words	Examples
Addition	
Symbols	Non-Examples

Key words	Examples
Subtraction	
Symbols	Non-Examples

Key words   **Examples**

Multiplication

Symbols   **Non-Examples**

Key words   **Examples**

Division

Symbols   **Non-Examples**
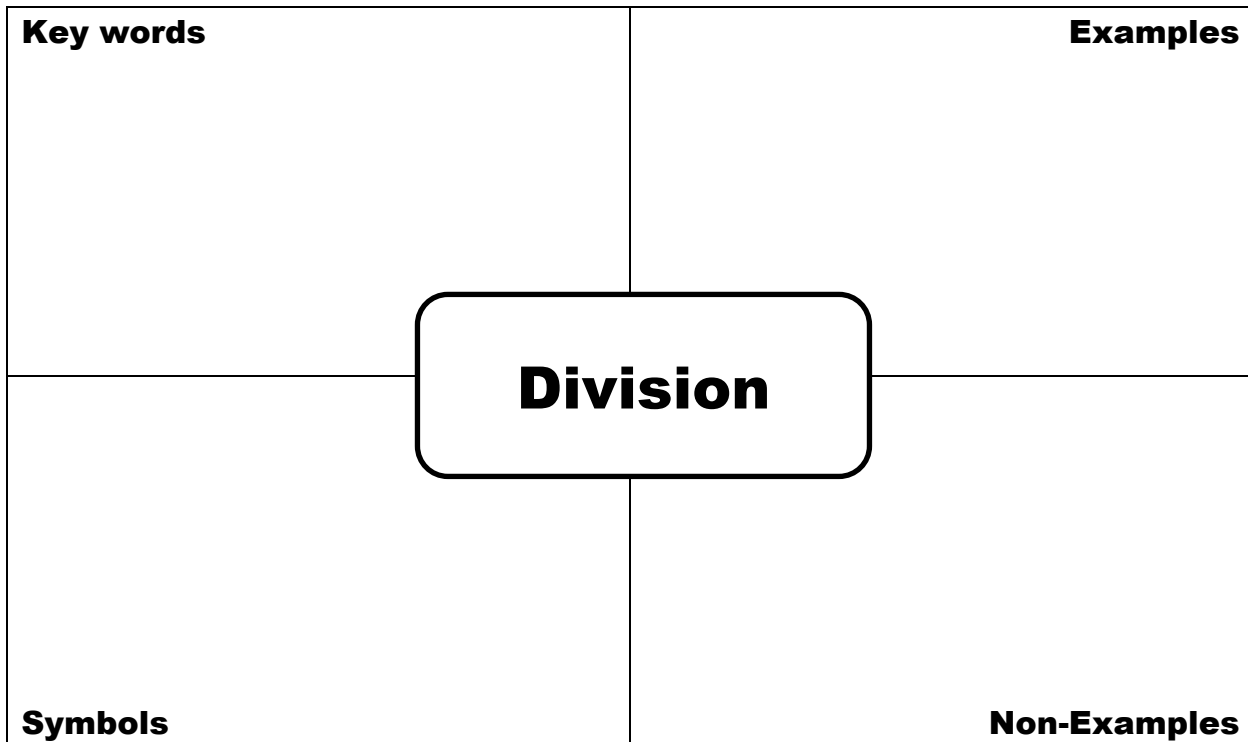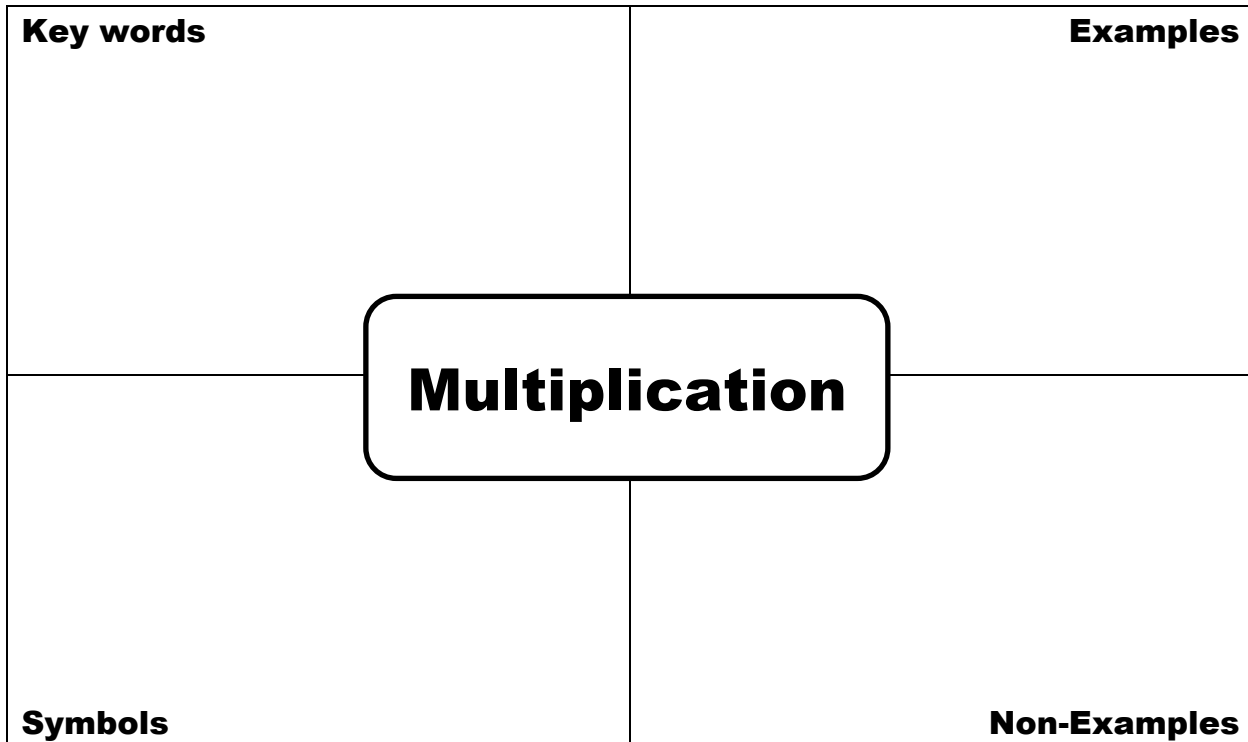
Mathematical Translations Matching

five more than twice a number	n + 5	n – 2	five less than two times a number is fifteen
twice a number diminished by five	five decreased by twice a number is fifteen	five times the sum of *n* and two	2n + 5
5n = 20	two less than a number	Five times a number is twenty	5n – 2
five more than two times a number is fifteen	5(n + 2)	2n – 5	2n – 5 =15
2n + 5 = 15	Five times a number minus two	the sum of five and a number	5 – 2n = 15

Translating

Directions: Write the following algebraic expressions and equations as verbal expressions and sentences.

1. $\frac{1}{2}x + 5.2 = 75$	2. $9 - 6x$
3. $-3(x + 7)$	4. $x - 3.4 = 9$
5. $-2.5 = x + 7$	6. $\frac{x - 18}{2}$
7. $140 - 38.2x$	8. $29 + x = 72$
9. $2.5x + 2$	10. $-9.7 - \frac{x}{4}$