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M A T H E M A T I C S

Grade 6

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Lesson 6: Algebraic Expressions

Focus Standard: 6.EE.2a, 6.EE.2b

Additional Standards: 6.EE.1

Standards for Mathematical Practice: SMP.4, SMP.7, SMP.8

Estimated Time: 60 minutes

Resources and Materials:

- Cardstock for sentence strip
- Copy paper for foldable
- Personal white boards-1 per student
- Dry erase markers-1 per student
- Scissors
- Glue
- Index card
- Handout 6.1: Writing Expressions
- Handout 6.2: Algebraic Expression Cards
- Handout 6.3: Expression Charades Cards

Learning Target:

- Students will identify and use terms for mathematical operations.
- Students will translate words into algebraic expressions.

Guiding Questions:

- What is an algebraic expression?
- How can a variable be used in an algebraic expression?

Vocabulary		
Academic Vocabulary: • Algebraic expression • Coefficient • Constant • Factor • Quotient • Term • Variable	Instructional Strategies for Academic Vocabulary: ☐ Model how to use the words in discussion. ☐ Read and discuss the meaning of word in a mathematical context ☐ Students write/discuss using the words	
Symbol	Type of Text and Interpretation of Symbol	
	Instructional support and/or extension suggestions for students who are EL, have disabilities, or perform well below the grade level and/or for students who perform well above grade level.	
✓	Assessment (Pre-assessment, Formative, Self, or Summative)	
Instructional Plan		
Understanding Lesson Purpose and Student Outcomes: Students will explore new vocabulary using thinking maps. Students will translate written language into algebraic expressions and practice creating algebraic expressions through a hands-on activity.		
Anticipatory Set/Introduction to the Lesson: Display these word categories:		
A backfield end zone sack turnover	B arch herkie backwards load in dismount	C fake paint drive basket

Explain to students that certain words and terms are associated with certain activities or events. Ask students to identify what activity each category goes with (A: football, B: cheerleading, and C: basketball).

Ask students to name some words and phrases that they associate with electronic games or other activities related to their interests.

Note: Use terms for activities your students would be familiar with.

Activity 1: Classifying Key Words in Operations, Teacher Guided Instruction

Explain each vocabulary word using the algebraic expression $4n + 7$.

- A constant is a fixed value, a number on its own, whose value does not change. A constant may either be positive or negative. Based on the definition, what is the constant in this example? How do you know 7 is a constant?
- A variable is any letter or symbol that represents a changeable or unknown value. Based on the definition, what is the variable in this example? Do we know what x is?
- A coefficient is the number multiplied by the variable. It's located in front of the variable. Based on the definition, what is the coefficient in this example? Why is the coefficient 4?
- A term may consist of variables and coefficients, or constants. Terms are separated by the plus or minus signs. How many terms does the example have? What are the terms?
- An algebraic expression is one or more algebraic terms in a phrase. It can include variables, constants, and operating symbols, such as plus and minus signs. It's only a phrase, not the whole sentence, so it doesn't include an equal sign.
- Is the example an algebraic expression? Why?

Create an anchor chart of a 3-tab foldable while students make their own.

Distribute copy paper for vocabulary foldable. Model how to create the foldable and have students complete the foldable following the instructions as you discuss the vocabulary words. Encourage students to restate the definitions in their own words.

T: Turn your paper portrait style.

Fold the paper in half, hamburger style leaving about 1" at the bottom (See Figure A).

Cut as indicated by the red dotted lines. You have created 3 flaps. (See Figure A)

Fold the flaps in (See Figure B).

Write the algebraic expression across the outside of the 3 flaps (See Figure B).

Write one vocabulary word on the inside of each flap to match what is written on the outside (see Figure C).

On the inside of each flap, write the corresponding definition. Encourage students to use their own words.

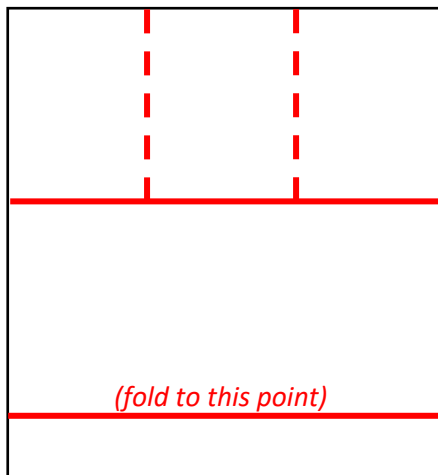


Figure A

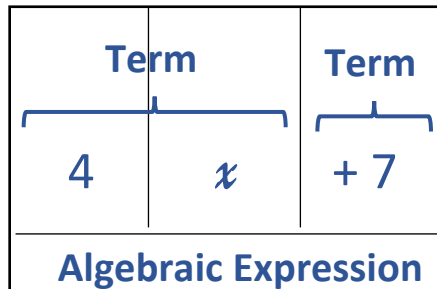


Figure B

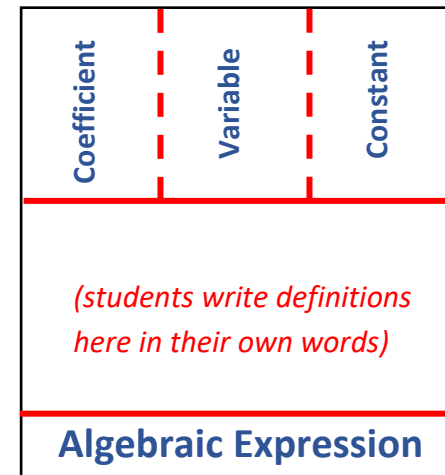


Figure C

Activity 2: Algebraic Expressions, Teacher Guided Instruction, Student Pair and Share

T: At the beginning of our lesson we identified common terms for football, cheerleading, basketball, and some of your own. In mathematics, we also have a common language that is particular to math (SMP.4). Specific words represent particular symbols or numbers. What words or phrases can be used to represent the math operations addition, subtraction, multiplication and division?

- ✓ Distribute **Handout 6.1: Writing Expressions**. Instruct students to complete the chart on the top of the handout while creating an anchor chart for the students' responses.

Possible key words include:

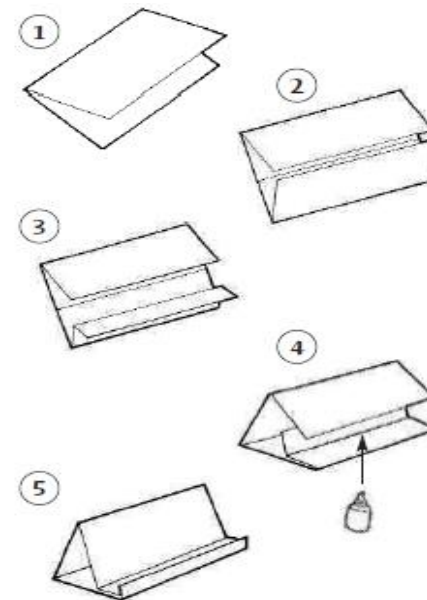
- Addition: sum, increase, plus, total, more, add
- Subtraction: difference between, subtract, fewer, decrease, minus, take from, difference, take away, reduce
- Multiply: multiplied by, product, groups of, times, double, twice
- Division: divided by, share, divide, share equally, divisible by, divide into, group

For students who are EL, have disabilities, or perform well below grade-level:

- Students will be able to have their personal chart available at their desk throughout the rest of the unit.

Distribute cardstock for sentence strip foldable. Model how to create a sentence strip foldable following the instructions:

- Fold your paper hamburger style (See Figure 1).
- Open the paper and fold the two outer edges toward the fold line. This forms a shutter fold (See Figure 2).
- Fold one of the inside edges of the shutter back to the outside fold. This fold forms a floppy L-tab (See Figure 3).
- Glue the floppy L-tab down to the base so that it forms a strong stright L-Tab (See Figure 4).
- Glue the other shutter side to the front of this L-tab. This forms a tent that is the backboard for the expression cards (See Figure 4).
- Fold the edge of the L-tab up one quarter to one-half inch to form a lip that will keep the student work from slipping off the holder (See Figure 5).



Distribute **Handout 6.2: Algebraic Expression Cards** and instruct students to cut them out on the dotted lines to create 10 cards to use for the following activity (SMP.8).

Instruct students to use their cards to create an algebraic expression for “7 and some more.”

Possible answers:

$$7 + n \text{ or } n + 7$$

- ✓ Ask students to identify any constants, coefficients, variables, and/or terms in the algebraic expression by holding up the corresponding card.

Instruct students to use their cards to create an algebraic expression for “the product of 2 and another number.”

Possible answers:

$$2 \cdot n \text{ or } n \cdot 2 \text{ or } 2n$$

- ✓ Ask students to identify any constants, coefficients, variables, and/or terms in the algebraic expression by holding up the corresponding cards.

Instruct students to use their cards to create an algebraic expression for “10 less than another number.”

Possible answers:

$$n - 10 \text{ or } n + (-10)$$

- ✓ Ask students to identify any constants, coefficients, variables, and/or terms in the algebraic expression by holding up the corresponding cards.

Instruct students to use their cards to create an algebraic expression for “10 divided into some groups.”

Possible answers:

$$10 \div n \text{ or } \frac{10}{n}$$

- ✓ Ask students to identify any constants, coefficients, variables, and/or terms in the algebraic expression by holding up the corresponding cards.

Note: Have students look for patterns and make use of structure as they apply the terms for operations to writing algebraic expressions (SMP.7). If students make several mistakes on any of the given expressions, provide multiple opportunities for them to practice with the verbal expression.

- ✓ Instruct students to work with a partner. One student says an algebraic expression while the other students builds it with Algebraic Expression Cards and their Sentence Strip foldable. Change roles and repeat.

Activity 3: Expressions Charades, Partner Activity, Student Exploration

Distribute the **Handout 6.3: Expressions Charades Cards** one set per pair. Instruct students to cut out the cards and place the cards face down between them. Students turn over a card and race to display the algebraic expression with their dry erase boards. The first student to correctly display the algebraic expression gets a point. Students keep a tally of points, and the student with the most points when the cards have all been played is the winner.

- ✓ This game is an opportunity for students to analyze the structure of a sentence to translate it into a mathematical expression (SMP.7).

Reflection and Closing:

Recall the terms used for sports and gaming activities. Review the words used to express mathematical operations.

Exit Ticket:

- ✓ Distribute an index card to each student. Tell students to write an algebraic expression for seven less than three times a certain number and identify each part of the expression [$3n - 7$ or $3n + (-7)$ or $-7 + 3n$] [3 – coefficient, n – variable, 7 or -7 – constant, and $3n - 7$ or $3n + (-7)$ or $-7 + 3n$ – term].

Homework

Complete **Handout 6.1: Writing Expressions**

For students who are EL, have disabilities, or perform well below grade-level:

- Have students use Algebraic Expression Cards and sentence strips.

Extensions for students with high interest or working above grade level:

- Students will extend activity by creating algebraic expressions with 3 or more operations.

Handout 6.1: Writing Expressions

Name: _____

Date: _____

Words & phrases often suggest addition, subtraction, multiplication, & division.

Let's come up with some of those words

Addition or Subtraction		Multiplication or Division	

Homework

Ex. 1) Write each phrase as an algebraic expression.

- a. The sum of four and b
- b. 5 more than the difference of a number and 8
- c. The product of 5 and a number plus 7.08.
- d. 2 more than one half of a number
- e. Six less than the sum of 3.7 and m

Handout 6.1: Writing Expressions – Key

This table will be filled in based on the responses in the lesson.

Addition or Subtraction		Multiplication or Division	

Ex. 1) Write each phrase as an algebraic expression.

- a. The sum of four and b

$$4 + b \text{ or } b + 4$$

- b. 5 more than the difference of a number and 8

$$(n - 8) + 5 \text{ or } 5 + (n - 8)$$

- c. The product of 5 and a number plus 7.08.

$$5(n + 7.08)$$

- d. 2 more than one half of a number

$$\frac{1}{2}n + 2 \text{ or } \frac{n}{2} + 2$$

- e. Six less than the sum of 3.7 and m

$$(3.7 + m) - 6$$

Handout 6.2: Algebraic Expression Cards

(	)
+	-
•	÷
2	7
10	<i>n</i>

4

3

6

9

12

15

8

2

14

20

Handout 6.3: Expression Charades Cards

10 shared
equally by y
groups

The addition of
4 and half of m

The sum of 3
and c

The product of
6 and b

4 times a plus 9

The product of
12 and t

b divided by 3

12 decreased by
the quotient of
15 divided by w

10 less than the
product of 3
and k

f decreased by 2

8 more than the
sum of v and 7

20 less than w

For training or questions regarding this unit,
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