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MATHEMATICS

Grade 6

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Lesson 7: Evaluate Numeric and Algebraic Expressions Work Stations

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

Additional Standards: 6.EE.1, 6.EE.2c

Standards for Mathematical Practice: SMP.1, SMP.2, SMP.3, SMP.4, SMP.6

Estimated Time: 120 minutes

Resources and Materials:


- Four-Function calculators
- Chart paper for posters
- Scissors
- Handout 7.1: Algebraic Expressions Scavenger Hunt Posters
- Handout 7.2: Algebraic Expressions Scavenger Hunt Recording Sheet
- Handout 7.3: Algebraic & Numerical Expressions
- Handout 7.4: Do Words Make a Difference? Cards
- Handout 7.5: Do Words Make a Difference? Recording Sheet
- Handout 7.6: Self Evaluation
- Algebraic & Numerical Expressions worksheet: www.mathworksheetsland.com

Learning Target:

- ✓ Students will translate verbal expressions to algebraic expressions.
- ✓ Students will apply order of operations to calculate volume and area.

Guiding Questions:

- Is the placement of parentheses important when translating a verbal expression to an algebraic expression?
- What formulas do we use for calculating volume and area?

Vocabulary	
<p>Academic Vocabulary:</p> <ul style="list-style-type: none"> • Algebraic expression • Coefficient • Constant • Exponent • Numerical expression • Term • Variable 	<p>Instructional Strategies for Academic Vocabulary:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Model how to use the words in discussion. <input type="checkbox"/> Read and discuss the meaning of word in a mathematical context <input type="checkbox"/> 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	
<p>Understanding Lesson Purpose and Student Outcomes: Students will translate verbal expressions to algebraic expressions during a scavenger hunt game and work stations as well as reflect on their understanding of algebraic expressions and exponents.</p> <p>Anticipatory Set/Introduction to the Lesson: Display this story: Miko rides his bike to and from school every day if it does not rain. Over a 3-week period he rode his bike 9 days. The letter n represents how far it is from his house to school. Choose each expression that represents how far Miko rode in 3 weeks. Display these algebraic expressions and tell students to write on their personal white board each expression that matches the story.</p>	

$2(9n)$ $9 \cdot 2n$ $(9 \cdot 2)n$ $9(2n)$ $n(2+9)$ $9 \cdot n$ Correct answers include: $2(9n)$ $9(2n)$ $9 \cdot 2n$

- ✓ Have students present and justify their choices (SMP.3).

Note: Remind students that n represents the distance one-way so round trip is $2n$. This is a good opportunity to reinforce the commutative and associative properties.

Note: This lesson can be extended to two days depending on the conceptual mastery of the students.

Activity 1: Work Stations

Divide class into 4 groups. Tell students that they will be rotating through 4 different stations.

- ✓ **Station 1 Independent Practice: Writing Algebraic Expressions Scavenger Hunt**

Before class, use **Handout 7.1: Algebraic Expressions Scavenger Hunt Posters** to make posters for the scavenger hunt. Distribute **Handout 7.2: Algebraic Expressions Scavenger Hunt Recording Sheet**. Show the posters to the students pointing out that each poster has a description of an algebraic expression and an algebraic expression. The two expressions on the posters do not match. Tell students they will start at any poster (no 2 students can start on the same poster). Instruct students to record the expression in the corresponding section of their sheet, find the poster that has matching expression, and write the name of the image on their recording sheet. Repeat these steps until they get back to the poster where they began. They will have solved all the expressions (SMP.6).

- ✓ **Station 2 Independent Practice: Algebraic and Numerical Expressions**




Distribute Handout 7.3: Algebraic and Numerical Expressions. Tell students they will write an algebraic expression for 5 situations and write numerical expressions for the volume of two cubes and the area of three squares. Instruct students to calculate the volume and area for situation 6 & 7 and show all their calculations on the back of the handout (SMP.2).

✓ **Station 3 Independent Practice/Partners: Do Words Make a Difference?**

Before class, print **Handout 7.4: Do Words Make a Difference? Cards** and cut out the cards. Distribute **Handout 7.5: Do Words Make a Difference Recording Sheet**. Place the “Words” cards in the center of the table. Tell students they will each draw a card from the stack. On their “Do Words Make a Difference? Recording Sheet, they will write algebraic expressions for the 2 situations on the card. Each pair of expressions will have similar, but different wording which leads to a different algebraic expression. Instruct students to use highlighters for this activity. Students highlight the parts of the two verbal expressions that vary in the same color. For example, the phrases “less than and less a” will be highlighted to denote they cause the change in the algebraic expression. They will write a sentence justifying their work. Tell them to exchange their card and the work with a partner and evaluate their partner’s work, asking questions and clarifying any mistakes (SMP.3).

✓ **Station 4: Teacher Center: Self-Evaluation and Remediation**

Distribute **Handout 7.6: Self-Evaluation** and tell students to complete the activity and respond to each of the “I Can” statements by choosing from these symbols:

I can do it -  I need a more practice -  I still have questions - 

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

- Students will use their list of terms for the operations and their order of operations cards.

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

- Students will create additional cards and posters to add to stations 1 and 3.

Reflection and Closing:

- ✓ Review students’ Scavenger Hunt Recording Sheets with students using 4-function calculators. Check for accuracy answer any questions, and clarify any misconceptions. Check for understanding for Station 3 by asking questions about creating algebraic expressions from words.

Prompting Questions:

- What is the difference between “3 less than a number” and “3 less the number?”
- Can the placement of parentheses in an algebraic expression change the value?

Exit Ticket

- ✓ Instruct students to translate “*the product of a number and 5 increased by 10*” into an algebraic expression.

Homework

No homework.

Handout 7.1: Algebraic Expressions Scavenger Hunt Posters



A number decreased by three times seventy

$$\frac{n}{45} + 70$$



Eight times a number increased by seventy

$$70 + \frac{5}{3}n$$



A number split into forty-five groups and then increased by seventy more

$$(n \div 3)70$$



One half of a number increased by three times the number

$$n - 3 \cdot 70$$



A number decreased by one fourth of seventy

$$(70 + n) + \frac{1}{3}n$$



Seventy more than five thirds of a number

$$n - \frac{1}{4}(70)$$



A number divided by three times seventy

$$8n + 70$$



Seventy and a number increased by one third of the number

$$\frac{1}{2}n + 3n$$

Handout 7.2: Algebraic Expressions Scavenger Hunt Recording Sheet

Name: _____

Date _____



A number decreased by three times seventy

Expression: _____

Symbol: _____



Eight times a number increased by seventy

Expression: _____

Symbol: _____



A number split into forty-five groups and then increased by seventy more

Expression: _____

Symbol: _____



One half of a number increased by three times the number

Expression: _____

Symbol: _____



A number decreased by one fourth of seventy

Expression: _____

Symbol: _____



Seventy more than five thirds of a number

Expression: _____

Symbol: _____



A number divided by three times seventy

Expression: _____

Symbol: _____



Seventy and a number increased by one third of the number.

Expression: _____

Symbol: _____

Handout 7.2: Algebraic Expressions Scavenger Hunt Recording Sheet Key

Name: _____

Date: _____



A number decreased by three times seventy

Expression: $n - 3 \cdot 70$

Symbol: **Stop Watch**



Eight times a number increased by seventy

Expression: $8n + 70$

Symbol: **Headphones**



A number split into forty-five groups and then increased by seventy more

Expression: $\frac{n}{45} + 70$

Symbol: **Plane**



One half of a number increased by three times the number

Expression: $n \div 2 + 3n$

Symbol: **Saturn**



A number decreased by one fourth of seventy

Expression: $n - \frac{1}{4}(70)$

Symbol: **Heart**



Seventy more than five thirds of a number

Expression: $70 + \frac{5}{3}n$

Symbol: **Magnifying Glass**



A number divided by three times seventy

Expression: $(n \div 3)70$

Symbol: **Light Bulb**



Seventy and a number increased by one third of the number.

Expression: $(70 + n) + \frac{1}{3}n$

Symbol: **Cake**

Handout 7.3: Algebraic and Numerical Expressions

Name _____

Date: _____

Directions: Complete the following situations. Show your work on work paper and put your answers on the lines.

1. The king has 7 more crowns than the queen. The queen has q crowns. Write the expression that shows how many crowns king has. Ans: _____
2. Moore has 20 songs. His friend bought him m more songs. Write an expression that shows how many songs Moore has now. Ans: _____
3. There were y whales in the sea and 15 more whales came to the sea. Write an expression that shows how many whales are in the sea. Ans: _____
4. George earned 80 points in the subjects. Bruno earned b fewer points than George. Write an expression that shows how many extra points Bruno earned.
Ans: _____
5. Karen has k pens. Helen has 25 more pens than Karen. Write an expression for how many pens Helen has. Ans: _____

Calculate the following situations:

6. Find the volume of cube with the given sides:

a. 8 inches $V =$ _____

b. $\frac{2}{3}$ yards $V =$ _____

7. Find the area of square with the given sides:

a. $2\frac{1}{2}$ cm $A =$ _____

b. 6 inches $A =$ _____

c. 10 mm $A =$ _____



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Handout 7.3: Algebraic and Numerical Expressions – Key

1. The king has 7 more crowns than the queen. The queen has q crowns. Write the expression that shows how many crowns king has. **$k + 7$**
2. Moore has 20 songs. His friend bought him m more songs. Write an expression that shows how many songs Moore has now. **$20 + m$**
3. There were y whales in the sea and 15 more whales came to the sea. Write an expression that shows how many whales are in the sea. **$y + 15$**
4. George earned 80 points in the subjects. Bruno earned b fewer points than George. Write an expression that shows how many extra points Bruno earned. **$80 - b$**
5. Karen has k pens. Helen has 25 more pens than Karen. Write an expression for how many pens Helen has. **$k + 25$**

Calculate the following:

6. Find the volume of cube with the given sides:

a. 8 inches $V = 8^3 \text{ inches} = 512 \text{ inches}^3$

b. $\frac{2}{3}$ yards $V = \frac{8}{27} \text{ yards}^3$

1. Find the area of square with the given sides:

a. $\frac{3}{4}$ cm

$$A = \left(\frac{3}{4}\right)^2 = \frac{9}{16} \text{ cm}^2$$

b. 6 inches

$$A = 6^2 = 216 \text{ in}^2$$

c. 10 mm

$$A = 10^2 = 100 \text{ mm}^2$$



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Handout 7.4: Do Words Make a Difference? Cards

<p>#1) Three less than a number squared.</p> <p>Three less a number squared.</p>	<p>#2) A number decreased by four times seven.</p> <p>Four times seven decreased by a number.</p>
<p>#3) Eight times a number divided by two.</p> <p>A number divided by two, eight times.</p>	<p>#4) A number decreased by one-fourth the number.</p> <p>One-fourth a number decreased by the number.</p>

Handout 7.4: Do Words Make a Difference? Cards - Key

<p>#1) Three less than a number squared. $n^2 - 3$</p> <p>Three less a number squared. $3 - n^2$</p>	<p>#2) A number decreased by four times seven. $n - 4 \cdot 7$</p> <p>Four times seven decreased by a number. $4 \cdot 7 - n$</p>
<p>#3) Eight times a number divided by two. $8n \div 2$</p> <p>A number divided by two, eight times. $(n \div 2)8$</p>	<p>#4) A number decreased by one-fourth the number. $n - \frac{1}{4}n$</p> <p>One-fourth a number decreased by the number. $\frac{1}{4}n - n$</p>

Students explanations will vary.

Handout 7.5: Do Words Make a Difference? Recording Sheet

Name: _____ Date _____

Directions: Choose a card. Copy the words then write an algebraic expression. Repeat for the second set of words. Compare the expressions you wrote and identify what words caused you to write different expressions. Write a sentence to explain why the wording gave you two different expressions. Exchange cards and your recording sheet with a partner and check each other’s work. If time allows, choose another card and repeat the process.

Card Number: _____

Verbal Expression 1: _____

Algebraic Expression 1: _____

Verbal Expression 2: _____

Algebraic Expression 2: _____













What verbal expressions or phrases caused the algebraic expressions to be different?

Why did the wording give you two different expressions? _____













Handout 7.6: Self-Evaluation

Name: _____

Date _____

<p>Exponents</p> <p>Write 7^3 in expanded form and standard form.</p> <p>Expanded: _____</p> <p>Standard: _____</p>			<p>Evaluate Numerical Expressions</p> <p>$16 - (4^2 - 8 + 7) \div 5$</p> <p>Answer: _____</p>		
I can do it	I need more practice	I still have questions	I can do it	I need more practice	I still have questions
					
<p>Write an Expression</p> <p>Fifteen less than a number multiplied by itself three times</p> <p>Answer: _____</p>			<p>Name the Parts of an Expression</p> <p>$3n - 4^2 + 18 \div 9$</p> <p>Constant(s) _____</p> <p>Variable(s) _____</p> <p>Coefficient(s) _____</p> <p>Term(s) _____</p> <p>Base(s) _____</p> <p>Exponent(s) _____</p>		
I can do it	I need more practice	I still have questions	I can do it	I need more practice	I still have questions
					

Handout 7.6: Self-Evaluation - Key

<p style="text-align: center;">Exponents</p> <p>Write 7^3 in expanded form and standard form.</p> <p>Expanded: _____ $7 \times 7 \times 7$ _____</p> <p>Standard: _____ 98 _____</p>			<p style="text-align: center;">Evaluate Numerical Expressions</p> <p style="text-align: center;"> $16 - (4^2 - 8 + 7) \div 5$ $16 - (16 - 8 + 7) \div 5$ $16 - (8 + 7) \div 5$ $16 - 15 \div 5$ $16 - 3$ 13 </p> <p>Answer: _____ 13 _____</p>		
I can do it	I need more practice	I still have questions	I can do it	I need more practice	I still have questions
					
<p style="text-align: center;">Write an Expression</p> <p>Fifteen less than a number multiplied by itself three times</p> <p>Answer: _____ $n^3 - 15$ _____</p>			<p style="text-align: center;">Name the Parts of an Expression</p> <p style="text-align: center;">$3n - 4^2 + 18 \div 9$</p> <p>Constant(s) _____ $18, 9$ _____</p> <p>Variable(s) _____ n _____</p> <p>Coefficient(s) _____ 3 _____</p> <p>Term(s) _____ $3n, 4^2, 18$ _____</p> <p>Base(s) _____ 4 _____</p> <p>Exponent(s) _____ 2 _____</p>		
I can do it	I need more practice	I still have questions	I can do it	I need more practice	I still have questions
					

For training or questions regarding this unit,
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