6.AF.1: Define and use multiple variables when writing expressions to represent real-world and other mathematical problems, and evaluate them for given values. (E)	
Reporting Category: Algebra and Functions	**Subdomain**: Expressions and Data Analysis
6.AF.1 Instructional Framework	
Assessed On: ☐ Checkpoint 1 ☑ Checkpoint 2 ☐ Checkpoint 3 ☑ Summative	
Content Limits: ● Limit expressions to three or fewer unique variables. ● Exponents must be whole numbers. ● Items should be limited to whole numbers with common fractions and decimals used sparingly.	
Clarifications: ● Students may be required to write expressions representing phrases or real-world situations. ● The keypad in the ILEARN testing system does not allow students to enter a comma between each period in a multi-digit number. (Example: 13,323 would be entered as 13323.)	
Calculator Availability: Not Allowed	
Expected Academic Vocabulary: algebraic expression, value, sum, difference, product, quotient, raised to the __ power, double	

Examples of Context at Varying Difficulty Levels	
Easy	Only whole numbers are used.
Medium	A mixture of whole numbers and decimals are used. Exponents may be used.
Difficult	Only decimals are used; exponents may be used.

Proficiency Level Descriptors and Example Items	
Looking Back: This concept is not specifically addressed in the Indiana Academic Standards prior to this grade level.	**Looking Ahead**: This concept is not specifically addressed in the Indiana Academic Standards in the subsequent grade levels.
Below Proficiency: Define and use expressions with one variable and one operation to represent a given verbal description.	
A description of an expression is given.	This is a DOK 1 item because the student

"7 less than the product of 2 and a number" Choose the expression that represents the description. **a.** $2n - 7$ b. $7 - 2n$ c. $7 \bullet 2 - n$ d. $2 + n - 7$ **Answer:** a	must identify the expression that is defined by the given description. This is an easy item because only whole numbers are used.
A description of an expression is given. "the product of x raised to the second power and the difference of x and 14" Write the expression that is described. **Answer:** $x^2(x - 14)$	This is a DOK 2 item because the student must analyze the given description and write the corresponding expression.
Approaching Proficiency: Define and use expressions with one variable to represent a given real-world situation. Evaluate the expression for a given specific value.	
A book of postage stamps costs $14.60. Each stamp costs $0.73. Which expression can be used to determine how many stamps, *s*, are in one book of stamps? a. 14.60 - s b. 0.73 + s c. 14.60s **d. 0.73s** **Answer:** d	This is a DOK 2 item because students must identify an expression that can be used to represent the real-world problem. This is a medium difficulty item because a mixture of whole numbers and decimals are used.
A movie theater charges $200 to rent a party room and $7 per person. The total cost for the rental can be modeled by the expression 200 + 7p. What is the total cost if p = 18? a. $126 **b. $326** c. $3600 d. $3726 **Answer:** b	This is a DOK 1 item because the student must use the given value of the variable to calculate the total of the expression. This is an easy item because only whole numbers are used.

<table>
<tr><td colspan="2">At Proficiency: Define and use expressions with two variables to represent real-world and mathematical problems. Evaluate the expression for a given specific value.</td></tr>
<tr><td>A baker sets up a booth at a carnival to sell muffins and cookies.

● The booth rental costs $55.
● Each muffin, m, sells for $3.50.
● Each cookie, c, sells for $2.00.

Part A:
Identify the expression that models the total amount, in dollars, the baker will earn at the carnival.

a. 3.5m + 2c
b. 3.5m - 2c
c. 55 - (3.5m + 2c)
d. (3.5m + 2c) - 55

Part B:
What is the total amount, in dollars, the baker will earn if m = 60 and c = 42?

Answers:
Part A: d
Part B: $239</td><td>This is a DOK 2 item because the student must identify the correct expression to model the real-world problem and calculate the total using given values of the variables.

This is a medium difficulty item because a mixture of decimals and whole numbers are used.</td></tr>
<tr><td colspan="2">Above Proficiency: Solve real-world problems by substituting given values for multiple variables in a given expression.</td></tr>
<tr><td>A zoo is building an enclosure for penguins. The area of the enclosure is given in the model.</td><td>This is a DOK 2 item because students are substituting in values for three different variables to solve a real-world problem.

This is a difficult item because only decimals and an exponent are used.</td></tr>
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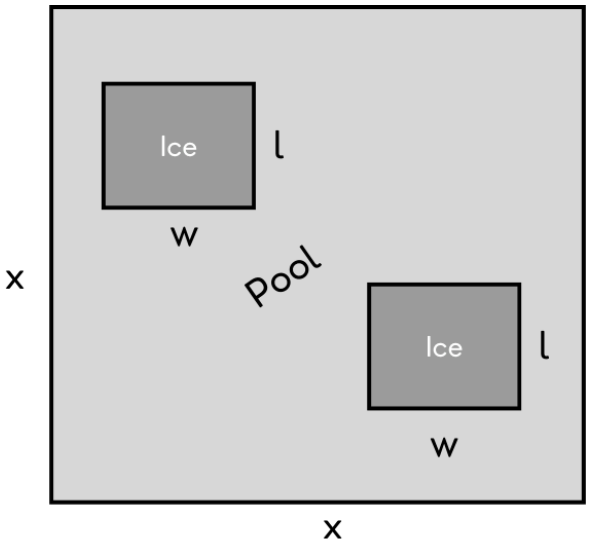

- The area of the pool, without the two ice areas, can be found using the expression $x^2 - 2lw$, in square units.

What is the area of the pool, in square units, if x = 30.5, l = 5.25, and w = 6.5?

Answer: 862 square units