

Just In Time Quick Check
Standard of Learning (SOL) 5.19a

Strand: Patterns, Functions, and Algebra

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The student will investigate and describe the concept of variable.

Grade Level Skills:

- Describe the concept of a variable (presented as boxes, letters, or other symbols) as a representation of an unknown quantity.

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Supporting Resources:

- VDOE Mathematics Instructional Plans (MIPS)
 - [5.19a - Variables, Operations, Numbers, Oh my](#) (Word) / [\(PDF\)](#)
- VDOE Algebra Readiness Formative Assessments
 - [SOL 5.19a](#) (Word) | [\(PDF\)](#)
- VDOE Algebra Readiness Remediation Plans
 - [Verbal Quantitative Expressions and Equations](#) (Word) | [\(PDF\)](#)
- VDOE Word Wall Cards: Grade 5 [\(Word\)](#) | [\(PDF\)](#)
 - Patterns
 - Expressions
 - Variable Expressions

Supporting and Prerequisite SOL: N/A

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1. Michael mows lawns in his town. He earns \$10.00 per yard that he mows. Last week he earned \$160.00. Explain what x means in the equation $10x = \$160$
2. Which word describes the letter “ p ” in the expression? $9 \times p$
3. Which is the variable in the expression $6c$?
4. Which represents the variable in the following equation? $b + 2 = 12$
5. There are some tables in the library. Each table can seat 6 students. What does the \square represent in the expression $\square \times 6$?

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Common Errors/Misconceptions and their Possible Indications

1. Michael mows lawns in his town. He earns \$10.00 per yard that he mows. Last week he earned \$160.00. Explain what x means in the equation $10x = \$160$

A student may not know what a variable is or understand the concept of a variable. This question will indicate how much a student knows about the use of a variable and if further explanation is needed. The student may benefit from exposure to practice problems in which there is an unknown value and from questions on how or what can be used to represent the unknown value.

A student may identify “ x ” as multiplication in the equation, rather than as a variable. This may indicate that a student does not understand that “ x ” represents the number of lawns mowed. In addition, a student may not understand what implied operation occurs when a variable directly follows a quantity. The student may benefit from exposure to practice problems in which there is a quantity followed by a variable and question the student on how or what we can use to represent the unknown value.

Students should have experiences that focus on the use of variables in different ways. First, variables as unknown values, such as in an equation. Alternatively, in an expression, the variable represents a quantity that can change.

If students are struggling with describing the purpose and meaning of a variable, have students look at real-world contexts that show variables representing different quantities. For example, how are the following problems the same? How are they different? What is the variable and what does it represent?

- *Olivia gave 10 brownies to her sister. Then she gave more to her mom. All 23 brownies are gone! How many brownies (b) did Olivia give to her mom ($10 + b = 23$)?*
- *Olivia gave 10 brownies to her sister. Then she gave more to her mom. How many brownies did Olivia give to her mom and her sister ($10 + b$)? How many total brownies could there have been?*

Problems can also be accompanied by representations, such as number lines, to help students make sense of where the variable is in the story problem and its meaning. Is the variable an exact value or can it change? Can it be any number? Can you think of a number it cannot be? How do you know? Refer more to the other parts of this standard (5.19bcd) to help students connect contexts in developing meanings of variables.

2. Which word describes the letter “ p ” in the expression? $9 \times p$

A student may not be able to identify “ p ” as the variable in the expression. This indicates that the student does not understand that “ p ” represents an unknown quantity. The student may benefit from exposure to practice problems in which there is an unknown value and question the student on how or what we can use to represent the unknown value. The student can substitute in values of their choice to represent the letter “ p ” in the expression and complete the problem to assist with understanding the concept that the variable is unknown.

Use a variety of variables to include shapes, empty boxes, letters, and pictures. These should be used interchangeably throughout the year when working with variables with teaching points on how they all represent missing numbers.

3. Which is the variable in the expression $6c$?

A student may not be able to identify “ c ” as the variable in the expression. This indicates that the student does not understand that “ c ” represents an unknown quantity. The student may not understand what operation occurs when a variable directly follows a quantity. The student may benefit from exposure to practice problems in which there is a quantity followed by an unknown value and question the student on how or what we can use to represent the unknown value. The student can plug in values of their choice to represent the letter “ c ”

in the expression and complete the problem to assist with understanding the concept that the variable is unknown. Include using other symbols for multiplication (dots, parentheses) as part of instruction.

4. Which represents the variable in the following equation? $b + 2 = 12$

A student may not be able to identify “b” as the variable in the expression. This indicates that the student does not understand that “b” represents an unknown quantity. The student may benefit from exposure to similar practice problems in which there is an unknown value and question the student on how or what we can use to represent the unknown value. What kind of story would match this equation? How do you know? What part is unknown? How do you know? How does a variable connect to the story? Where does equality connect to the story?

As students build their understanding of variables through story contexts, encourage them to label each part of the equation and how those labels connect to the story.

5. There are some tables in the library. Each table can seat 6 students. What does the \square represent in the expression $\square \times 6$?

A student may not understand that unknown quantities can be represented using boxes or other symbols, as well as letters. This indicates that the student does not understand that “ \square ” represents a number of tables. The student may benefit from exposure to similar practice problems in which there is an unknown value represented using a variety of symbols and question the student on how or what else we can use to represent the unknown value. What part is unknown? How do you know? How does a variable connect to the story? Where does equality connect to the story?

A student may conclude that the “x” used to represent multiplication in the expression is the variable. This shows that the student is confusing “x” as the symbol for multiplication with “x” as variables. The student will benefit from exposure to practice problems in which “x” is used as multiplication, rather than the variable.