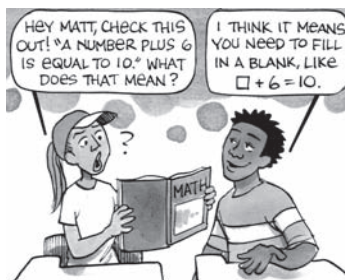


VARIABLES
Today's Destination
What is a variable?
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Vocabulary
Equation A number sentence relating two expressions that are equal in value

Variable A letter or symbol that represents an unknown value or a value that can change

Problem of the Day

 What is the answer to Marta's math problem? 4

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VARIABLES
Objectives

By the end of this lesson:

- Students will know that a variable stands for an unknown quantity.
- Students will be able to use variables in equations.

Vocabulary

 Students will learn these terms during the lesson. However, you may wish to assess their prior knowledge before beginning the lesson. Ask them to write the following number sentences and label each *equation*. Have students circle the box and label the *variable*.

$$\square + 2 = 3 \qquad x + 2 = 3$$


Problem of the Day
Invite students to try this problem; assess their responses.

 Explain that a number is missing from the number sentence. Students should recognize that $4 + 6$ is 10; therefore, the missing number is 4.

Introduce the lesson question: "What is a variable?"

Connect the Problem of the Day to the lesson by emphasizing that a box can represent a missing number in a number sentence. In this lesson, students will use letters, or variables, to represent unknown quantities.

RULES OF THE ROAD Instruction

approx. 20 min. 

Delivery

Explain that a box can represent an unknown number.

- Read the introductory text with students.
- Explain that a box stands for a number whose value you don't know.

Teacher's Note

Students may have also seen an “underline” or a question mark used in place of a missing number. Tell students that these are other ways to represent an unknown number in a number sentence.

Guide students through Matt and Marta's example problem.

- Ask, “How did Matt know what number belonged in the box?” *He knew that $5 + 7 = 12$.*
- Emphasize that when the correct number is placed in the box, it makes the number sentence true.

Monitor students while they complete the Try It Out exercise.

Refer students to the example problem as needed. After students find the missing number, encourage them to perform the operation indicated in the number sentence to verify that the number sentence is true.

Strategies for Differentiation

Support for English Language Learners and Students with Special Needs



Discuss the term *variable* with students. Help students understand that a variable is any letter or symbol that stands for an unknown value or a value that can change.



Use counters to help students find the missing number represented by the variable. Use a small box or paper cup to represent the variable. Then cut out an equal sign (=) from paper. Represent an equation, such as $5 + \square = 12$, with five counters and the box on one side of the equal sign and 12 counters on the other. Ask, “How many counters must be in the box to have the same number of counters on both sides?”

A RULES OF THE ROAD

In mathematics, we sometimes use a box to stand for a number whose value we don't know.



What number could go in the box to make the number sentence true?

$$5 + \square = 12$$

WHEN I ADD THE NUMBER TO 5, I GET 12.
I KNOW WHAT NUMBER PLUS 5 IS 12!

Compute It! $5 + 7 = 12$

THAT MEANS THAT THE UNKNOWN
NUMBER IS 7.

Write It! $5 + 7 = 12$



Try It Out!

Write the number that makes each number sentence true.

1) $114 - \square = 106$

2) $6 \times \square = 30$

3) $42 \div \square = 7$

4) $5 + \square = 14$

5) $8 \times \square = 56$

VARIABLES AND NUMBER PROPERTIES **UNIT 4**

Often, we use a letter to stand for an unknown number, instead of a box. These letters are called **variables**. A variable can represent a number whose value you don't know.

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Find the value of h if $7 - h = 3$.



7 MINUS THE UNKNOWN NUMBER GIVES ME 3. 7 MINUS WHAT NUMBER IS 3?

Compute It! $7 - 4 = 3$

THAT MEANS THE VARIABLE h STANDS FOR 4.

Write It! $h = 4$


Try It Out!

If $10 + b = 17$, what is b ?

Compute It! $10 + 7 = 17$

Write It! $b = 7$

CHECKPOINT

Circle the number sentence below in which the value of p is NOT 10.

$7 + 3 = p$ $5 + p = 15$ $p + 10 = 10$

What is the value of p in the number sentence you circled?

Write It! $p = 0$

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Delivery

Explain that a letter, or variable, can be used to represent an unknown number.

- Read the introductory text with students.
- Explain that using a box to stand for a number is like using a letter, or variable, to stand for a number.
- Emphasize that students can use any letter to stand for a number.

Guide students through Marta and Matt's example problem.

- Ask, "What does the variable h stand for?" *a number whose value we don't know*
- Explain that h is actually not a letter when it is used in a number sentence like this. Instead, it is a number, but an *unknown* number. Like the box, the variable represents an unknown value.

Monitor students while they complete the Try It Out exercise.

If students have trouble, say, "I'm thinking of a number. If you add 10 to my number, you get 17. Can you figure out my number?" Relate this to the equation.

Checkpoint

Assessment and Reteaching

Have students complete the Checkpoint independently.

Redirect struggling students with effective questions, such as:

- In the first number sentence, p is the value you get when you add 7 and 3; what is that value? 10
- In the second number sentence, p is the value you add to 5 to get 15; what is that value? 10
- In the third number sentence, p is the value you add to 10 to get 10; what is that value? 0


If students circle the wrong number sentence...

Have students write 10 in place of p and then perform the operation to see whether the number sentence is true. Help students understand that, if the number sentence is *not* true, then 10 cannot be the number represented by the variable in the number sentence.

If students circle the right number sentence, but cannot find the value of the variable in $p + 10 = 10$...

Ask, "What number plus 10 gives you 10?" Some students may find it easier to use a box to replace the letter. Tell students that the letter has the same meaning as the box, and gradually help them make the transition to using variables.

 **IN THE DRIVER'S SEAT**
Independent Practice

approx. 10 min. 

Delivery

Have students complete the problems independently or in pairs. As students work, circulate and ask them about their thinking.

After students find the missing value in Exercises 1–3, have them perform the operation in the number sentence to verify they have found the correct value.

In Exercises 4–9, students can use guess and check to find the unknown number. Do not introduce inverse operations at this time.

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 **IN THE DRIVER'S SEAT**

Write the number in the box that would make each number sentence true.

1) $32 \div \boxed{4} = 8$

2) $\boxed{9} + 10 = 19$

3) $10 \times \boxed{8} = 80$

Find the value of the variable.

4) $8 \times a = 8$

Compute It! $a = \underline{1}$

5) $x + 8 = 9$

Compute It! $x = \underline{1}$

6) $17 + w = 22$

Compute It! $w = \underline{5}$

7) $40 \div b = 5$

Compute It! $b = \underline{8}$

8) $y - 7 = 8$

Compute It! $y = \underline{15}$

9) $3 \times m = 21$

Compute It! $m = \underline{7}$