

The Value of a Number



Strand D: Algebraic Thinking

Benchmark MA.D.2.1.2: The student uses informal methods to solve real-world problems requiring simple equations that contain one variable.

Grade Level Expectations: The student:

- uses concrete objects, paper and pencil, or mental mathematics to solve real-world equations with one unknown (e.g., there are 28 children in the room, and 16 brought their lunches. How many are buying lunch?).

Overview:

Students are immersed in activities that give them ideas about solving equations that contain one variable. An equation is a mathematical sentence. It always indicates that two expressions are equal. Some equations have only one variable. Whenever you solve an equation, you find values for the variable that makes the equation true. Sometimes there is only one solution and sometimes there is more than one solution. Students are actively engaged in exploring the value of missing variables. Engage students in the Variable Machines where they cut two strips of lined notebook paper to match letters of the alphabet to numbers 0-25 and find the value of their names.

Materials:

- Linker Cubes, Color Counters, or Snap Cubes
- Sentence Strips
- *Value of a Number Worksheet*

Procedures:

1. Display 9 overhead counters on the overhead. Distribute three counters to a student in the class. Only that student knows the number of counters given. Inform students that there are 12 counters altogether. Ask, "How many counters does that student have hidden? How did you figure it out?" Continue to give more examples in the same fashion and have the students guess the missing addend.

2. Have students find the value of the variable (circle) in the next problem. Each \bigcirc has the same value.

$$\bigcirc + \bigcirc = 18 \quad \text{What is the value of } \bigcirc?$$

3. Use three different variables in the next problem.

$$\bigcirc + \blacklozenge = 10$$

$$\odot + \blacklozenge = 14$$

$$\odot + \odot = 20$$

What is the value of each shape?

$$\bigcirc = 6 \quad \blacklozenge = 4 \quad \odot = 10$$

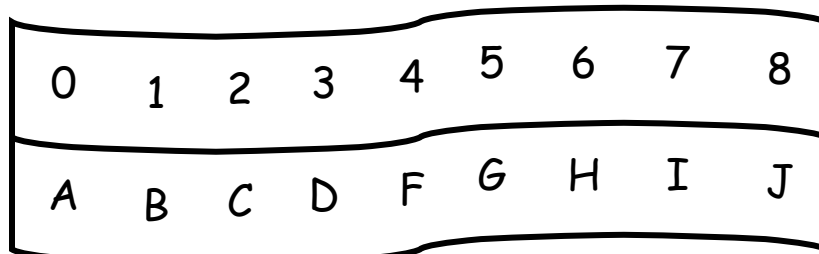
4. Group students in pairs for the Variable Machine activity.
5. Explain to students that they are going to create a Variable Machine to discover the value of words.
6. Give each pair of students two sentence strips. Have the students write the letters of the alphabet in order on the sentence strip.



7. Have students write the numbers 0-25 on the second sentence strip.



8. Have students attach the ends of the number strip together with a piece of tape or a paper clip. Then wrap the letter strip around the number wheel, matching the letters to the corresponding numbers (e.g., A-0, B-1, C-2), and tape the ends of the letter strip together.



9. Using the number/letter strip, have students explore ways of modifying equations using informal methods to solve real-world problems (e.g., if Dennis has the word "cat" and the word "dog", what is the value of his words?).

10. Have students rotate the letter strip and change the value of the letters. Compare the value of the word "cat" and the word "dog" to the previous value of these words.

2	3	4	5	6	7	8	9	10
A	B	C	D	F	G	H	I	J

Literature Connection: *What's Next Nina?* by Sue Kassirer (ISBN: 1-57565-106-8)

Assessment:

- Have students complete the *Value of a Number* worksheet.

Extension:

- Have students find the value of their first or last name using the Variable Machine (e.g., Sandy = 63).
- Have students find words with a value of 100.

The Value of a Number

1. $\bigcirc + \blacklozenge = 10$

$$\odot + \blacklozenge = 14$$

$$\odot + \odot = 20$$

What is the value of each shape?

$$\bigcirc = \underline{\quad} \quad \blacklozenge = \underline{\quad} \quad \odot = \underline{\quad}$$

2. $\blacklozenge + \blacklozenge = 16$

$$\odot + \bigcirc = 18$$

$$\blacklozenge + \odot = 12$$

What is the value of each shape?

$$\bigcirc = \underline{\quad} \quad \blacklozenge = \underline{\quad} \quad \odot = \underline{\quad}$$

3. $\blacklozenge + \odot + \bigcirc = 20$

$$\odot + \bigcirc = 18$$

$$\bigcirc + \bigcirc = 6$$

What is the value of each shape?

$$\bigcirc = \underline{\quad} \quad \blacklozenge = \underline{\quad} \quad \odot = \underline{\quad}$$

4. $\odot + \bigcirc = 18$

$$\bigcirc + \bigcirc = 14$$

$$\blacklozenge + \odot + \bigcirc = 23$$

What is the value of each shape?

$$\bigcirc = \underline{\quad} \quad \blacklozenge = \underline{\quad} \quad \odot = \underline{\quad}$$