Name: Date:

**Student Exploration:** **Modeling Whole Numbers and Decimals**

**Vocabulary:** base-10 blocks, base-10 system, decimal, decimal point, whole number

**Prior Knowledge Questions** (Do these BEFORE using the Gizmo.)

1. Sally has 2 hundred-dollar bills, 6 ten-dollar bills, and 7 ones.

How much money does Sally have? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Buck has 91 one-dollar bills in his wallet. The wallet is so fat it barely fits into his pocket.

What is a better way to carry 91 dollars? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Morgan has 214 pennies in her purse. She makes a jingling sound as she walks.

What is a better way to carry 214 cents? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Gizmo Warm-up**

Most people in the world use a **base-10 system**. Each place in this system represents 10 times as much as the next place to the right. For example, 345 means 3 hundreds + 4 tens + 5 ones.

The *Modeling Whole Numbers and Decimals* Gizmo uses **base-10 blocks** to represent numbers. There are three types of blocks: *flats*, *rods*, and *cubes*.

1. Drag one flat, one rod, and one cube onto the yellow mat.
	1. How many cubes are in a rod? \_\_\_\_\_
	2. How many rods are in a flat? \_\_\_\_\_
	3. How many cubes are in a flat? \_\_\_\_\_
2. Click **Clear**. Drag a flat into the **Tens** area. What happens? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. Now drag a rod into the **Ones** area. What happens? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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| **Activity A:** **Modeling whole numbers** | Get the Gizmo ready: * Click **Clear**.
* Under **Set block values**, check that **100, 10, 1** is selected.
 | 1010SE1 |

Numbers with no fractional or decimal part are called **whole numbers**. With the base-10 blocks shown in the Gizmo, you can model whole numbers up to 1000.

1. Drag 2 flats into the **Hundreds** area, 3 rods into the **Tens** area, and 5 cubes into the **Ones** area of the yellow mat. What number have you modeled? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Check your answer by turning on **Show value**.

1. Drag one of the flats into the **Tens** area, and drag one of the rods into the **Ones** area.
	1. How many total flats, rods, and cubes do you have now?

Flats: \_\_\_\_\_ Rods: \_\_\_\_\_ Cubes: \_\_\_\_\_

* 1. Has the number being modeled changed? \_\_\_\_\_



1. Click and drag your cursor to select 10 cubes, as shown at right. Drag these cubes into the **Tens** area.

What happens?

1. Use the same method to drag 10 rods into the **Hundreds** area. What happens? \_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Click **Clear**. Model 134 in as many different ways as you can. Describe what you did below:

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\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Wilson has 210 dollars, all in one-dollar bills. He needs a briefcase just to carry his money around. How could Wilson carry his money with the fewest number of bills?

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| **Activity B:** **Modeling decimals** | Get the Gizmo ready: * Click **Clear**.
* Under **Set block values**, select **1, 0.1, 0.01**.
 | 1010SE3 |

**Decimals** are numbers written in the base-10 number system. Often, though, the term “decimal” is used to mean a number with a **decimal point** separating the units place and the tenths place.

1. With block values of **1, 0.1, 0.01** selected, look at the labels next to the flat, rod, and cube at the top of the Gizmo.
	1. What is the value of one cube? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	2. What is the value of one rod? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	3. What is the value of one flat? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. The flats, rods, and cubes can be converted from one form to another.
	1. Drag a flat into the **tenths** area. How many tenths are in one whole? \_\_\_\_\_
	2. Drag a rod into the **hundredths** area. How many hundredths are in one tenth? \_\_\_\_
	3. Click **Clear**. How many hundredths do you think are in one whole? \_\_\_\_\_

Use the Gizmo to check your answer.

1. Turn on **Show values on mat**. Drag flats, rods, and cubes onto the mat until you have created the number 3.18. How many flats, rods, and cubes did you use?

Flats: \_\_\_\_\_ Rods: \_\_\_\_\_ Cubes: \_\_\_\_\_

1. Model 3.18 in at least two other ways. Describe how you did it in the space below.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Shontay has 4 dollar bills. She wants to play a video game that only takes dimes. How many dimes can she get for her dollars? How many pennies? Explain.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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| **Activity C:** **Other models** | Get the Gizmo ready: * Click **Clear**. Turn off **Show values on mat** and **Show value**.
* Under **Set block values**, select **10, 1, 0.1**.
 | 1010SE4 |

Base-10 blocks can be used to represent any set of places in the base-10 system.

1. With block values set to **10, 1, 0.1**, look at the labels next to the flat, rod and cube at the top.
	1. In this set, what is the value of one cube? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	2. What is the value of one rod? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	3. What is the value of one flat? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. In the space, draw flats, rods, and cubes to model 25.3. Use the Gizmo to check your work.



1. Click **Clear**, and set the block values to **0.1, 0.01, 0.001**. Sketch a model of the number 0.147, and then use the Gizmo to check your work.



1. Turn **Show values on mat** and **Show value** off. Play the following game with a partner:
	* Model a number by dragging flats, rods, and cubes onto the mat.
	* Have your partner guess what the number is, and then turn on **Show value** to check.
	* Switch roles and play again! Play as many rounds as you like.