



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? _____

2. 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? _____

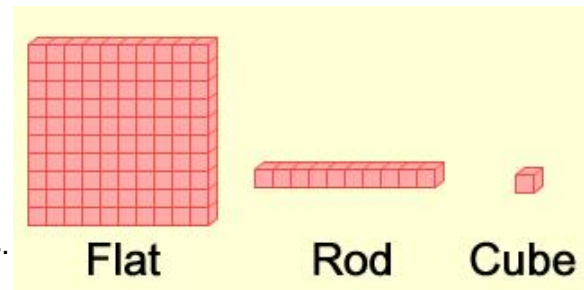
3. Morgan has 214 pennies in her purse. She makes a jingling sound as she walks.

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.

A. How many cubes are in a rod? _____

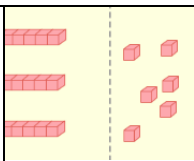
B. How many rods are in a flat? _____

C. 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? _____



Activity A: Modeling whole numbers	<u>Get the Gizmo ready:</u> <ul style="list-style-type: none"> • Click Clear. • Under Set block values, check that 100, 10, 1 is selected. 	
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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**.

2. Drag one of the flats into the **Tens** area, and drag one of the rods into the **Ones** area.

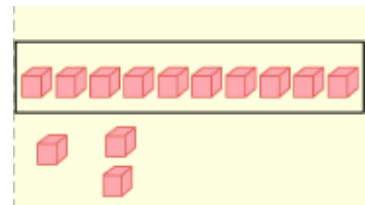
A. How many total flats, rods, and cubes do you have now?

Flats: _____ Rods: _____ Cubes: _____

B. Has the number being modeled changed? _____

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

What happens? _____




4. Use the same method to drag 10 rods into the **Hundreds** area. What happens? _____

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

6. 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?



Activity B: Modeling decimals	<u>Get the Gizmo ready:</u> <ul style="list-style-type: none"> • Click Clear. • Under Set block values, select 1, 0.1, 0.01. 	
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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.

- A. What is the value of one cube? _____
- B. What is the value of one rod? _____
- C. What is the value of one flat? _____

2. The flats, rods, and cubes can be converted from one form to another.

- A. Drag a flat into the **tenths** area. How many tenths are in one whole? _____
- B. Drag a rod into the **hundredths** area. How many hundredths are in one tenth? _____
- C. Click **Clear**. How many hundredths do you think are in one whole? _____

Use the Gizmo to check your answer.

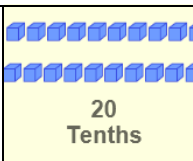
3. Turn on **Show values on mat**. Drag flats, rods, and cubes onto the mat until you have created the number 3.18. How many flats, rods, and cubes did you use?

Flats: _____ Rods: _____ Cubes: _____

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

5. 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.

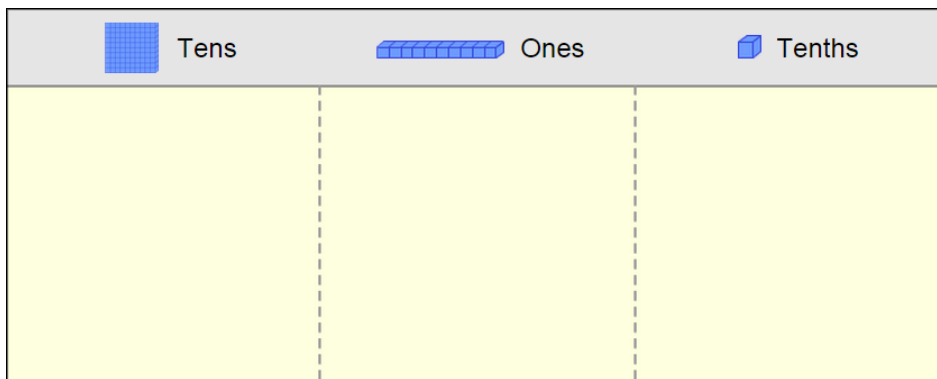


Activity C: Other models	<u>Get the Gizmo ready:</u> <ul style="list-style-type: none"> Click Clear. Turn off Show values on mat and Show value. Under Set block values, select 10, 1, 0.1. 	
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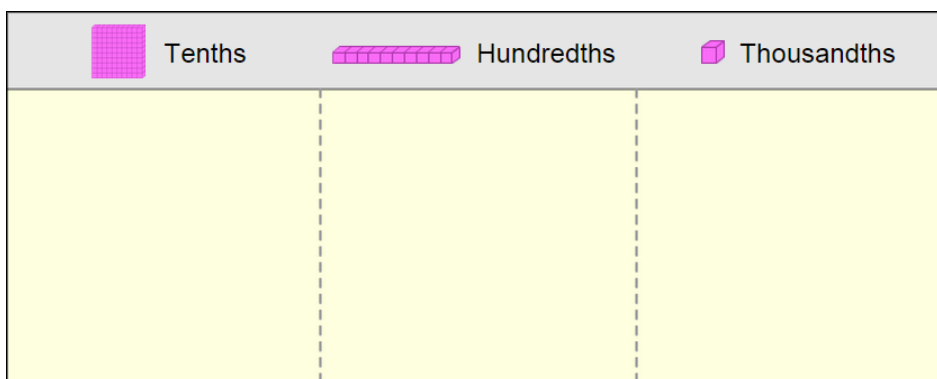
Base-10 blocks can be used to represent any set of places in the base-10 system.

- With block values set to **10, 1, 0.1**, look at the labels next to the flat, rod and cube at the top.
 - In this set, what is the value of one cube? _____
 - What is the value of one rod? _____
 - What is the value of one flat? _____

- In the space, draw flats, rods, and cubes to model 25.3. Use the Gizmo to check your work.



- 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.



- 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.