Name: _____ Date: _____

Student Exploration: Whole Numbers with Base-10 Blocks

Vocabulary: addend, base-10 blocks, base-10 system, difference, place value, regroup, sum, whole number

Prior Knowledge Questions (Do these BEFORE using the Gizmo.)
Karen and John both buy bags of candy for a party. Each bag has 10 candy bars. Karen leaves her candy in the bags. John dumps all his candy out on the counter.

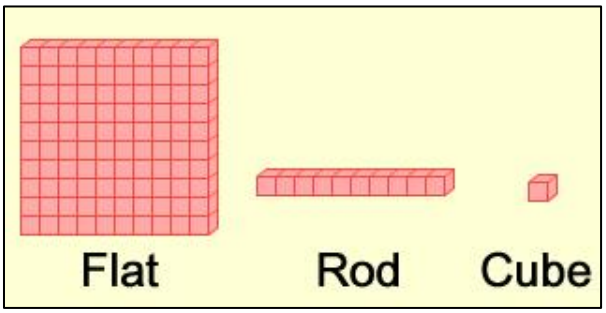
1. Who do you think will be able to count their candy bars faster? _____

   Why? _____

2. Karen has 9 bags of candy bars. How many candy bars does she have? _____

Gizmo Warm-up
The position of a digit in the **base-10 system** determines its **place value**. For example, the number 168 = 100 + 60 + 8, or in other words, 168 = 1 hundred + 6 tens + 8 ones.

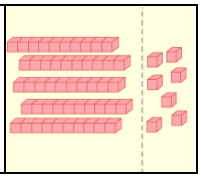
In the *Whole Numbers with Base-10 Blocks* Gizmo, **base-10 blocks** are used to model **whole numbers**. There are three groupings of blocks: *flats*, *rods*, and *cubes*.



1. Be sure **Modeling** is selected. Turn on **Show values on mat**. Drag one cube into the **Ones** area. What number is modeled? _____ Turn on **Show value** to check your answer.

2. Turn off **Show value**. Click **Clear**. Drag one rod into the **Tens** area.
   A. What number is modeled? _____ Turn on **Show value** to check your answer.
   B. Drag the rod into the **Ones** area. What happens? _____

3. Turn off **Show value**. Click **Clear**. Drag one flat into the **Hundreds** area.
   A. What number is modeled? _____ Turn on **Show value** to check your answer.
   B. Drag the flat into the **Tens** area. What happens? _____

Activity A: **Modeling whole numbers**	Get the Gizmo ready: • Turn off **Show value**. • Click **Clear**. • Be sure that **Modeling** is selected.	

Mia's family collected bottles of water to donate to flood victims. When they were done, they donated 2 palettes (100 bottles each), 3 cases (10 bottles each), and 6 single bottles.

1. In the Gizmo, model the donation using base-10 blocks. Drag 2 flats into the **Hundreds** area, 3 rods into the **Tens** area, and 6 cubes into the **Ones** area.

   How many water bottles did they donate in all? _____ Turn on **Show value** to check.

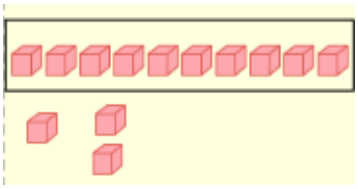
2. Drag one flat into the **Tens** area, and one rod into the **Ones** area.

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

   Flats: _____ Rods: _____ Cubes: _____

   B. What happens to the number modeled? _____

3. If you drag 1 rod into the **Ones** area, it splits into 10 cubes. What do you think will happen if you drag a group of 10 cubes into the **Tens** area?

   _____

   Click and drag to select 10 cubes. Drag them into the **Tens** area to check your answer.

4. If you drag 1 flat into the **Tens** area, it splits into 10 rods. Predict what will happen if you drag 10 rods into the **Hundreds** area. _____

   Click and drag to select 10 rods. Drag them into the **Hundreds** area to check your answer.

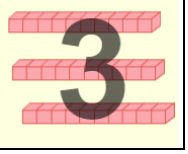
5. Jill donated 3 cases and 17 single water bottles. How many bottles is this in all? _____

   Model this in the Gizmo to check your answer.

6. A shelter asks for 135 water bottles. Describe at least three different ways these bottles could be grouped (palettes, cases, and bottles). Check your answers in the Gizmo.

   _____

   _____

Activity B: **Adding whole numbers**	Get the Gizmo ready: • Under **Select mode**, select **Adding**. • Be sure **Model addends** is selected. • Turn on **Show values on mat**.	

1. Rae and Kim bought bottled water to give to families in need. Rae bought 2 palettes (100 bottles each) and 3 cases (10 bottles each). Kim bought 4 cases and 5 single bottles.

   A. In the Gizmo, model Rae's water bottles on top, and Kim's on the bottom. Use flats for palettes, rods for cases, and cubes for bottles. How many bottles did each buy?

      Rae: _____ Kim: _____

   B. Select **Model sum**, and click **Sort**. This shows the **sum** of the two **addends** (the numbers being added). How many bottles did Rae and Kim buy in all? _____

2. Lori needs 144 water bottles for one shelter, and 368 bottles for another. She needs to know how many palettes, cases, and single bottles to buy.

   A. Click **Clear**, and select **Model addends**. Model 144 on top and 368 on the bottom. Then click **Model sum**. How many total flats, rods, and cubes do you have?

      Flats: _____ Rods: _____ Cubes: _____

   B. Now do some **regrouping**. Click **Sort**. Group as many single bottles into cases (cubes to rods) as you can. How many of each do you have now?

      Flats: _____ Rods: _____ Cubes: _____

   C. Then do the same with cases into palettes (rods to flats). What do you have now?

      Flats: _____ Rods: _____ Cubes: _____

   D. How many bottles does Lori need in all? _____

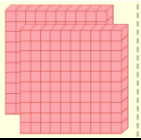
   E. Turn on **Show sum**. Notice the two blue 1's above 144. (In column addition, this is called "carrying.") Based on what you did with the blocks, what do the 1's mean?

      _____

      _____

3. Click **Clear**, and turn off **Show sum**. Find these sums, and then use the Gizmo to check your answers.

68	345	565
+34	+263	+279
___	___	___

Activity C: **Subtracting whole numbers**	Get the Gizmo ready: • Under **Select mode**, select **Subtracting**. • Be sure **Model first number** is selected.	

1. Marcus delivers water bottles to stores. His truck is carrying 2 palettes (100 water bottles each), 4 cases (10 bottles each), and 7 single bottles. Model this in the Gizmo.

   A. How many base-10 blocks did you use? Flats: _____ Rods: _____ Cubes: _____

   B. Turn on **Show values on mat**. How many water bottles is this in all? _____

2. The first store needs 68 bottles. Marcus opens the back of his truck to unload them.

   A. What can he do to have 8 "loose" water bottles to unload? (Hint: To "open" a case, drag a rod from the **Tens** to the **Ones** section.)

   _____

   B. Make that trade. How many are there now? Flats: _____ Rods: _____ Cubes: _____

   C. Now he needs 60 more bottles to make 68. How can he find 6 cases (rods)?

   _____

   D. Make that trade. How many are there now? Flats: _____ Rods: _____ Cubes: _____

3. After regrouping, Marcus delivers the bottles. Select **Model subtraction** and model this in the Gizmo. (To subtract, drag 68 blocks into the blue **Subtraction bin**.)

   A. How many bottles are left? _____ This is the **difference** between 247 and 68.

   B. Write this as a subtraction equation. _____

   C. Turn on **Show difference**. What do the three blue numbers written over 247 mean?

   _____

   _____

   _____

4. Click **Clear**. Turn off **Show difference** and select **Model first number**. Find these differences, and then use the Gizmo to check your answers.

$$\begin{array}{r} 30 \\ -\ 12 \\ \hline \end{array} \qquad \begin{array}{r} 452 \\ -\ 61 \\ \hline \end{array} \qquad \begin{array}{r} 741 \\ -\ 389 \\ \hline \end{array}$$