

## What's the Whole Population?

ID: 11269

 Time Required  
 45 minutes

## Activity Overview

*This teacher-led activity introduces students to the concept of using proportional reasoning to estimate the size of an animal population.*

## Topic: Numbers and Operations

- *Understand numbers, ways of representing numbers, relationships among numbers, and number systems*
- *Understand and use ratios and proportions to represent quantitative relationships*

## Teacher Preparation and Notes

- *Before beginning the activity, students should clear all lists and turn off functions. To clear the lists, press **[2nd] [0]** and scroll down until the arrow is in front of **ClrAllLists**. Press **[ENTER]** twice. To clear any functions, press **[Y=]** and then press **[CLEAR]** when the cursor is next to Y1 through Y4.*
- *For this activity, a large and known quantity of beans (or small objects with the same size and shape) in which a sample of known quantity has been marked is needed.*
- *TI-Navigator is not required for this activity, but an extension is given for those teachers that would like to use it.*
- **To download the student worksheet and navigator files, go to [education.ti.com/exchange](http://education.ti.com/exchange) and enter "11269" in the quick search box.**

## Associated Materials

- [MGAct05\\_RatioProp\\_worksheet\\_TI-73.pdf](#)
- [MGAct05\\_RatioProp\\_Nav\\_TI-73.act](#)

## Suggested Related Activities

*To download any activity listed, go to [education.ti.com/exchange](http://education.ti.com/exchange) and enter the number in the quick search box.*

- *Just How Many Are There? (TI-73 Explorer) — 6672*
- *Proportional Reasoning (TI-Navigator) — 2144*
- *Banquet Meal (TI-15 Explorer) — 4977*

**Problem 1 – Gathering Data**

Explain to students that animal population sizes are often estimated by tagging a certain number of animals, releasing them into the wild, and tracking the number of animal sightings over time.

Questions 1-4

Students first need to estimate the total number of beans in the jar. Then circulate through the room and give each student a sample of the beans. Make sure that there are plenty of beans left over after you have distributed them.

Instruct them to count the total number of beans in their sample and the total number that are marked (tagged).

L1	L2	L3	1
████████	-----	-----	
L1()=			

If you'd like to combine all the numbers into one list, have the students call out their values and put them into L1 and L2. List **L1** is the number of beans in each sample and list **L2** is the number of marked beans in each sample. Sample data is shown at the right.

Press [LIST] to enter the lists. If there are items in the list, go to the top of the list and press [CLEAR] [ENTER].

Questions 5-7

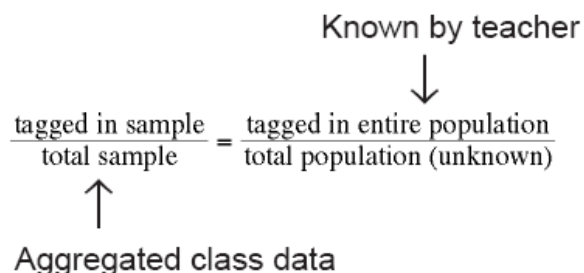
Use the commands **sum(L1)** and **sum(L2)** on the Home screen to find the sum of each list. These commands can be found by pressing [2nd] [LIST] ►► [7] and then choosing either L1 or L2 from [2nd] [LIST]. Close the parentheses, [], and press [ENTER].

sum(L1)	81
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**Problem 2 – Finding the Whole Population**

Questions 8-11

Reveal to students how many of the beans have been tagged (in the entire population) and ask them to write a proportion to solve for the total population. Depending on the ability level of your students, you may need to show them how to set up the proportion below.



**Problem 3 – Counting Parts of Populations**

This part of the activity gives students a couple of practice problems to get a better feel for how to use proportions to find the total population from a sample.

Students will use the **Constant** feature, which stores a number as a variable, C1. This will save students time and prevent errors. They can call up the number at any time by pressing **CONST** on the Home screen.

Question 12

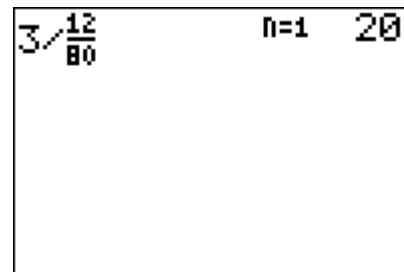
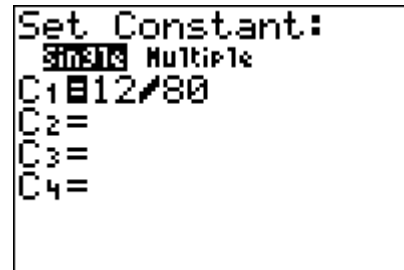
To set the Constant, press **2nd** **CONST** **1** **2** **b/c** **8** **0**.

Students need to make sure that they press **b/c** and not the division symbol.

Return to the home screen, **2nd** **MODE**.

To perform the calculation, press **3** **÷** **CONST**.

When students press **CONST**, it will automatically calculate the expression; there is no need to press **ENTER**. They can ignore the **n=1** that appears before the answer.



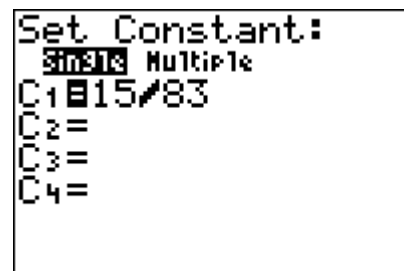
Question 13

Repeat steps for Question 12 replacing 3 with **7**.

Question 14

Students need to update the **Constant** with the given ratio and perform the same procedure with the new constant.

In this example, the key presses are **1** **2** **2** **÷** **CONST**.



**Solutions to Student Worksheet**

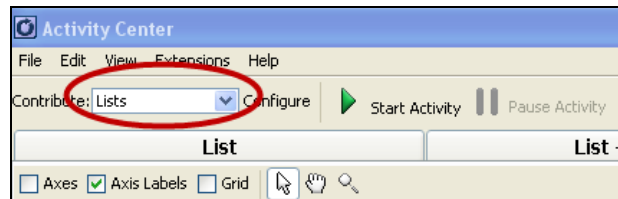
Problem 3

- 12. 20
- 13. 46, students should round down to a whole deer.
- 14. 675

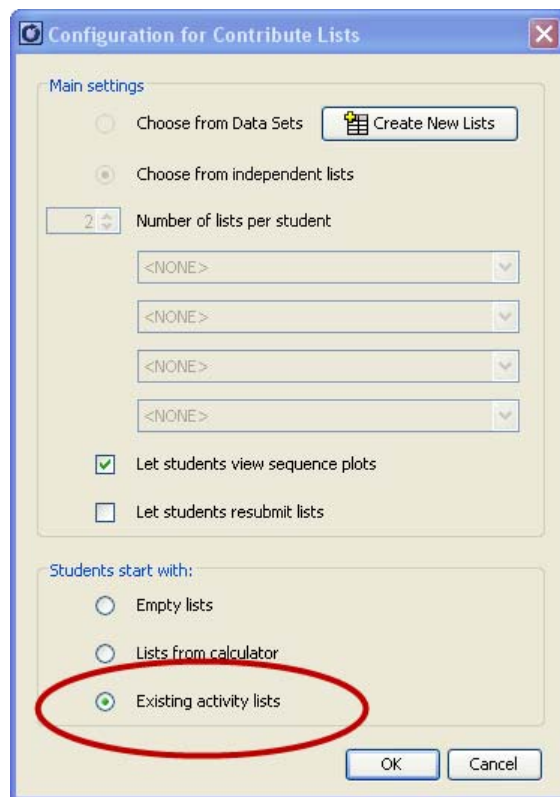
**Extension – TI-Navigator™**

1. Use **Quick Poll** to capture the students' estimates of the whole population at the beginning of the activity. Save this for reference after they figure out the actual total.
2. Load the **MGAct05\_RatioProp\_Nav\_TI-73.act** activity settings file into Activity Center. This sets up the Activity Center so that students will have two inputs, **TAGGED** and **TOTAL**. Have students enter their data and collect from the class. Students should input this information under the appropriate heading in Activity Center and select **SEND** to submit their lists to Activity Center.

3. Stop the activity and change **Contribute to Lists**, click **Configure**, and select the **Existing activity lists** check box. By starting the activity again, each student will receive the entire class data set.



Tell students to exit out of NavNet and use the commands **sum(L1)** and **sum(L2)** to find the sum of each list. These commands can be found by pressing **[2nd] [LIST] [▶] [▶] [7]** and then choosing either L1 or L2 from **[2nd] [LIST]**. Close the parentheses, **]**, and press **ENTER**.



4. Pull up the original **Quick Poll** and see which student was closest to the actual population.



**Problem 1 – Estimating and Gathering Data**

1. Estimate the total population in the jar.

Write your estimate. \_\_\_\_\_

2. How did you arrive at your estimate? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

3. Count your sample. Total: \_\_\_\_\_ Tagged: \_\_\_\_\_

4. What is the ratio of the number tagged in your sample to the total sample?  
\_\_\_\_\_

5. Record the data of the entire class. Total: \_\_\_\_\_ Tagged: \_\_\_\_\_

6. What is the ratio of classes' tagged samples to the total sample population?  
\_\_\_\_\_

7. How did your ratio compare to the class ratio?

**Problem 2 – Finding the Whole Population**

8. What is the total number of tagged beans? (given by teacher) \_\_\_\_\_

9. Write a proportion using the class tagged ratio to solve for the total population.  
\_\_\_\_\_

10. What is the total population? \_\_\_\_\_

11. How close was your original estimation to the actual population? \_\_\_\_\_



**Problem 3 – Counting Parts of Populations**

You are participating in a volunteer group to count deer in your area. The leader of the project tells you that the ratio of tagged deer to the population should be  $\frac{12}{80}$ .

**12.** One Saturday, you observe 3 tagged deer. How many deer likely live in the general area?

Use the **Constant** feature. Press `2nd` `CONST`, `1` `2` `b/c` `8` `0`. Go back to the home screen, `2nd` `MODE`. Enter the number you observed, `3`, `÷` `CONST` `ENTER`.

Write the answer. \_\_\_\_\_

**13.** Another group observes 7 tagged deer. How many likely live in that area?

Write the answer. \_\_\_\_\_

In another project, they do not know the total population of bass in a national park lake. However, they have obtained the following data from samples.

**14.** If they have average observed a sample ratio of  $\frac{15}{83}$ . If they know 122 tagged fish were released, what is the current total population in the lake? \_\_\_\_\_