EXPLORATIONS

Activity 8

A Penny for Your Height

Students will investigate the relationship between inches and centimeters by measuring their height in inches or centimeters and converting the measurement.

Concept

- Geometry and measurement

Skills

- English to metric conversions
- Measuring
- Calculator skills: LIST, mean, [CONVERT]

Materials

- Student Activity sheets (page 40)
- TI-73 calculators
- Tape measures (inches and centimeters)
- Pennies

Activity

The students from Mount Valley school are participating in a fund raiser for their favorite charity. The students have decided to raise money by donating one penny for each inch of their height. They measured their heights and then challenged their Canadian penpal school to measure their heights and donate money to the same organization. The Canadian penpal students raised a lot more money. Investigate why this happened.

Before beginning this activity, have students look at a ruler and compare a centimeter to an inch. Ask these questions:

- *Which is larger, a centimeter or an inch?*
- *About how many centimeters fit inside an inch? (About 2.5)*
- *Based on this information, who would you expect to raise more money? Why?*
- *About how much more money would you expect them to raise? (2 to 3 times more)*

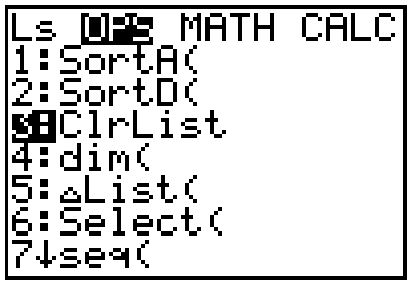
Divide the class into two groups. One group will represent the students from the United States and the others will represent the students from Canada. Try to divide the students evenly by height. (Don't put all the tall students in one group.)

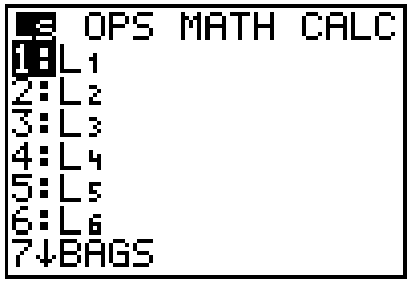
Have the group representing the United States measure their heights in inches. Have the group representing Canada measure their heights in centimeters.

Enter the English measurements in **L1** (list 1) and Metric measurements in **L2** (list 2). Also have students record the data on the Student Activity sheet.

For convenience, you may want to clear lists 1 through 4 before you begin the activity.

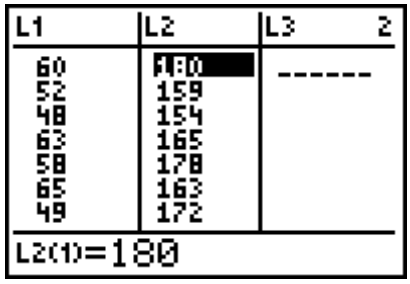
1. Press 2nd [STAT].
2. Press ▶ once to select the **OPS** menu.
3. Select **3: ClrList**.
4. To select the lists you want cleared, press 2nd [STAT] again and select **1: L1**. Repeat this process for **L2**, **L3**, and **L4** until you have **ClrList L1, L2, L3, L4** on the Home screen.
5. Press ENTER to clear the lists.





Now you are ready to enter the data.

1. To begin entering the data in the calculator, press LIST.
2. Enter the inch heights in **L1**. Press ENTER after each list item.
3. Press ▶ and follow the same procedure to enter the centimeter heights in **L2**.



Tip: *You can use any lists you want, but it is beneficial for comparison if the lists are adjacent.*

Ask the students:

- *What do you notice about the two lists? (List 2 has larger numbers.) Why?*

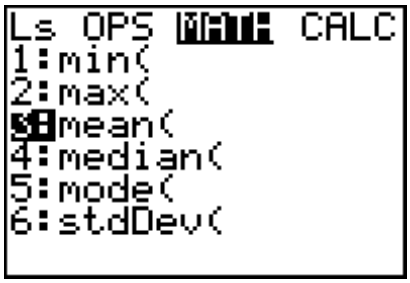
Calculate the amount of money each group would collect if they were giving a penny for each unit of measurement in their height. (USA students would give a penny for each inch and Canadian a penny for each centimeter.) Record on the Student Activity sheet.

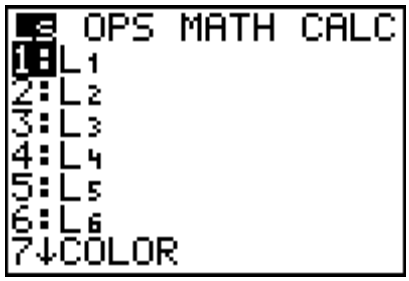
Ask the students:

- *Predict which list will have a greater mean. Why?*

Have students calculate the mean of each list and record their answers.

1. Press [2nd] [QUIT] to return to the Home screen.
2. Press [2nd] [STAT]. Press [▶] twice to select the **Math** menu. Select **3: mean(**. This will paste **mean(** on the Home screen.
3. Press [2nd] [STAT], **1:L1** to select list 1.
4. Press [ENTER] to calculate the mean.
5. Repeat the procedure for **L2**, except select **2:L2** to calculate the mean of list 2.





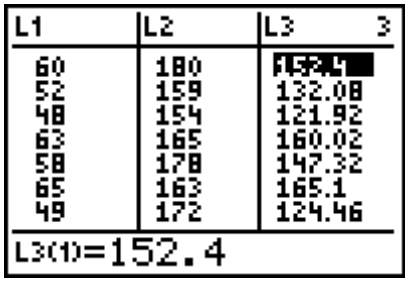
Compare the means of the two lists.

Ask the students:

- *Were your predictions right?*
- *Which of the two means is greater? (* **L2** *)*
- *Why? (Because the numbers in* **L2** *were larger.)*
- *Estimate how many times larger the mean of* **L2** *is than* **L1***? Is that what we should expect? Why? How does this relate to the number of centimeters in an inch?*
- *What accounts for the difference in the amount of money each group collected?*
- *Can we fairly compare inches with centimeters? How could we change one list so the comparison would be more accurate? (Convert* **L2** *to inches or* **L1** *to centimeters.)*

Before you begin the conversion, be sure that students understand what is happening when they use the conversion option on the TI-73. (When they choose inches to centimeters, the calculator multiplies the values in by **L1** by 2.54.) Select a few students to multiply various heights in inches by 2.54 and share the values they found. Make sure that they say, for example, that 52 inches is about 132 centimeters (132.08 cm.). You may want to have students draw a line segment that is 1 inch in length and measure it with a metric ruler to see that there really are a little more than 2.5 centimeters in 1 inch.

Convert **L1** to centimeters and put the new values in list 3 (**L3**).



1. Press [LIST] and use the arrows to highlight the heading of **L3**.
2. Press [2nd] [STAT] and select **L1**.
3. Press [2nd] [CONVERT] and choose **1:length**. Since we are converting from inches to centimeters, select inches first by pressing **4:inch**.
4. Select **2:cm**. Press [ENTER] and the calculator will convert inches to centimeters.
5. If you would also like to convert **L2** to inches, repeat the process in list 4, or **L4**. Remember to select **2:cm** followed by **4:inch**.

Have students think about the process of conversion. How do you change centimeters to inches? It will be worth the time to ensure that students know and understand what the calculator is doing.

To compare List 2 to List 3, find the mean of List 3. Follow the same procedure as before. First ask the students if they can easily predict which mean will be greater? Why? Then have them compare the actual means. What information does the mean provide about the heights of the students in the two groups?

Wrap-Up

Have each student use his or her own height. Have them calculate the amount of money they would have to give if they were a student from the USA or if they were a Canadian student.

Ask the students:

- *If you were in charge of this fund raiser, would you rather have people measure their heights in inches or centimeters? Why?*
- *How might you alter the fund raising campaign in the USA (with heights still measured in inches) so that Canadian students would not raise so much more money? (For example, have each person give 2 cents for each inch.)*

Assessment

A student's height is 51 inches. Would this student's height measured in centimeters be a larger number than 51 or smaller? Write a few sentences to explain your answer.

Extension

- Investigate other types of measurement such as weight and capacity and compare the difference between metric and standard. Is the ratio always the same as it is between centimeters and inches? Why or why not?

Student Activity

Name _____

Date _____

Activity 8

A Penny for Your Height

Record the heights in inches for the USA students and the heights in centimeters for the Canadian students. Then complete the questions below.

USA students' heights (in inches)			Canadian students' heights (in centimeters)		

Total sum _____inches

Mean _____inches

Amount of money donated to fund raiser (1 penny per inch)

$_____

Total sum _____cm

Mean _____cm

Amount of money donated to fund raiser (1 penny per cm)

$_____

After conversion:
Mean _____inches

1. Why did the Canadian students raise so much more money?

_____

2. About how many centimeters are in an inch?

_____

3. How does this relate to the amount of money the Canadian students raised?

_____