Overview of Lesson

Students measure a variety of small objects to the nearest whole unit. The students record their data using a line plot for the measurements.

Mathematical Goals

Students will:

• Use a non standard unit to measure length.
• Create a line plot from data.
• Interpret the data on a line plot.
• Understand that the greater the unit for measuring, the fewer times it can be iterated resulting in a lesser number of units and the smaller the unit of measure, the more times it can be iterated resulting in a greater number of units.

Materials

• Random lengths of string, enough pieces for each student to get one, no string shorter than 4 inches and none greater than 14 inches
• Tape
• One-inch tiles (alternative: small paper clips)
• Sticky notes
Math Lessons for the Classroom

Measurement and Line Plots
Lessons for Grade 2

Teaching Directions

Introduce line plots
Today we’re going to collect data. That means we’re going to collect some information. We’ll use the information to make something called a line plot.

We start with a question. For example, How many pets do you have?

Draw a line on the board and number it 0 to 10. Give each student a sticky note.

The numbers are for the number of pets you have. Count your pets. Then, one at a time you can come to the board and place your sticky note above the number that matches how many pets you have.

Have students place their sticky notes above the numbers. Below is an example of what your line plot might look like.

Let’s review our data. How many students have no pets? (3) How many have 1 pet? (6) How many have 2? (4) 3? (3) 4? (2) 5? (1) 6 or 7? (0), 8? (1) 9 or 10? (0)

What are some things we can say about the numbers of pets that this class has? Use our line plot to say something about the numbers of pets.

As students respond, write their sentences on the board. Possible responses:

Most students have 1 or 2 pets.
The greatest number of students have 1 pet.
No one has more than 8 pets.
Except for one person, everyone has 5 or fewer pets.

Now let’s do another line plot. This time I am going to give you something to measure. We’ll use tiles to measure. You will report the greatest number of whole tiles for the length from one end to the other.

Provide each table with a cup of tiles and each student with a randomly cut piece of string, a couple of strips of masking tape, and a sticky note.
I’ll demonstrate how to measure your piece of string. I’ll place two small pieces of tape to hold it in place and keep it straight. Then I will begin placing tiles. The first tile should be lined up at the end of the string. Make sure your tiles are touching side to side as you place them.

Take two small pieces of tape and tape a piece of string to the board, or if students are sitting in a circle on the floor, you may want to tape it to the floor. Don’t cover the ends of the string, but just place the tape so that the string is pulled out straight and held in place in order to measure it.

Have a student help you measure the string by placing tiles along its length.

When everyone has taped their strings and placed their tiles, have students record the length of their strings. Explain that they are only using whole tiles so they shouldn’t worry if the string is a little longer but not long enough for another tile.

Now that everyone knows how long their string is, we’re ready to make a line plot. Who thinks they have the shortest string? How many tiles long is it? Who thinks they might have the longest string? How long is it?

Determine the shortest and longest strings so that you will know what numbers to use on the line plot. Draw a line plot. Then have one student at a time place a sticky note on the line plot above the number that matches the length of the string. Below is a possible line plot your class could generate.

Between what numbers of tiles were most of the string lengths? (7-9) What are some other things you can say about the data we collected on this line plot? (Possible answers: no one had strings greater than 12 tiles long; for 4, 5, and 11 tiles, only one student each had strings for those measures; more students had strings that are 9 tiles long than any other length; over half our class had 7, 8, and 9 tile lengths).

Have students measure the same piece of string but this time with centimeter cubes or some other small unit for which you have enough for each student to use, such as paper clips that are longer than a tile.

Ask: What do you predict about the numbers you’ll get this time?

After they offer their predictions, have students measure their pieces of string with the new unit of measure.
Determine the greatest number of cubes. (about 30 using the same data from above)

Determine the least number. (about 10)

Draw the line plot and label it 5 to 30.

Have students follow the same process of placing their sticky notes.

*I see that the numbers are a lot bigger for the same strings. Why do you think the numbers are greater? (because we are using smaller measuring units)*

*Did the sizes of the strings change? (no) The strings are the same length—they did not change. But we now know that the number we assign to the length can change. It depends on what we measure with.*

The important point to emphasize is that the measurement depends on the unit of measure you are using. The smaller the unit, the greater the number of units and the larger the unit, the smaller the number of units.

**Extensions**

Provide students with adding-machine tape cut into random lengths and have groups prepare their own line plots after measuring the paper with paper clips or tiles. Instead of sticky notes, have them draw the squares. Then display their line plots.

Demonstrate how to use a ruler and have students measure pencils of varying lengths to the nearest whole inch (or nearest whole centimeter).

If you plan to do this lesson for several classes or in future years, invest in some dowel sticks of different lengths (or cut into different lengths) for students to measure.