

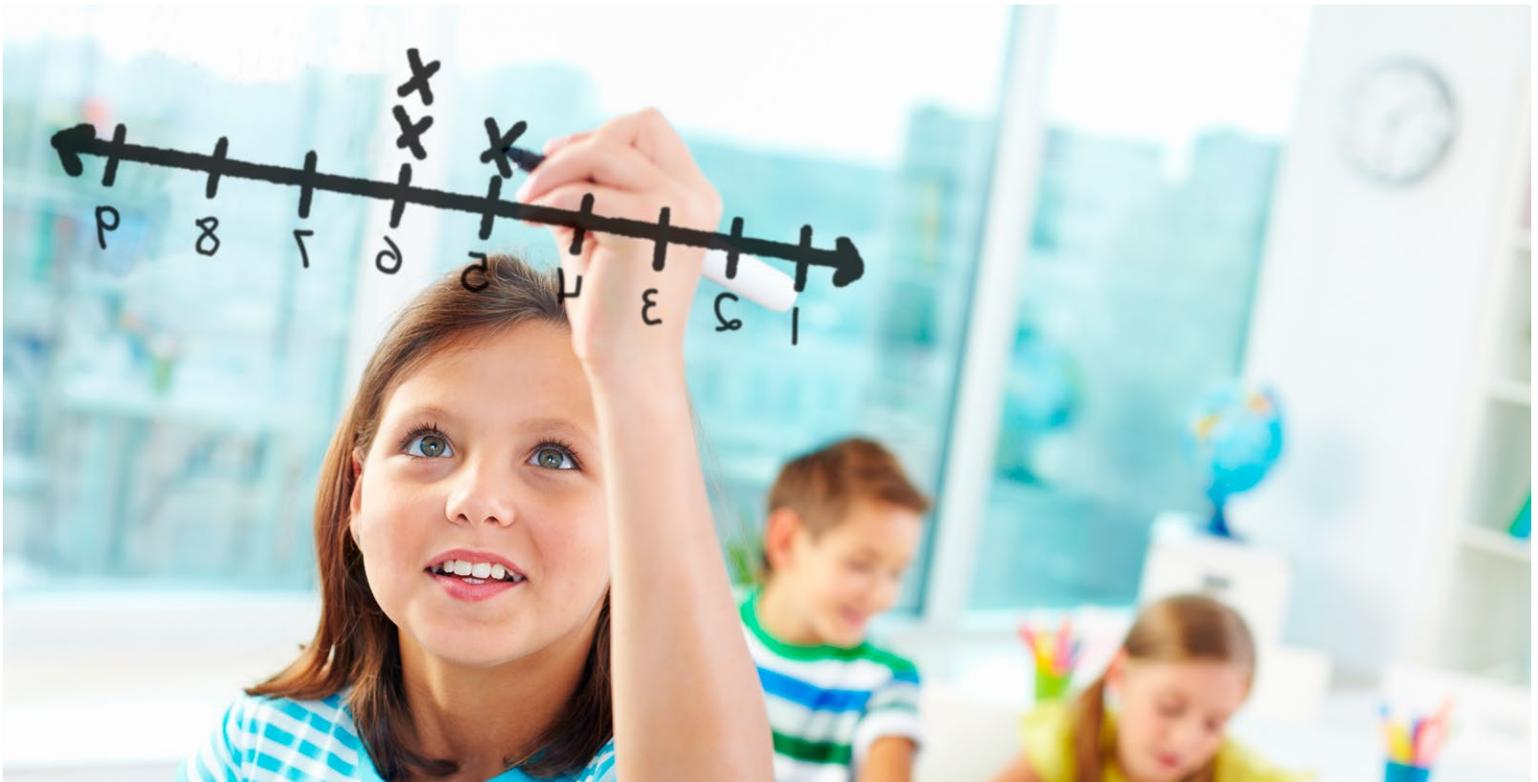


Developed with Kristin Hotter

Using line plots to display data sets

Volume 28 | Gr. 5

Time: 45-60 mins.



Content

Line plots are introduced as a whole class activity. For this section of the activity, numbers will be rounded to the nearest $\frac{1}{2}$. In small groups, students will measure a set of pencils to the nearest $\frac{1}{4}$ ". During each part of the lesson, students will have a blank line plot where they will need to fill in the appropriate numbers on the number line and place the collected data in the appropriate spots. An independent practice activity is also provided that requires students to create a line plot on their own.

Materials list

- 5 pencils to measure as a whole class
- 10 pencils per small group
- Rulers (at least 1 per group)
- Worksheet #1
- Worksheet #2
- Independent Practice Worksheet & Answer Key

Note to Teachers: Try to keep the range of length for your pencils within 3". Students are measuring to the $\frac{1}{4}$ ". Keeping the pencil lengths that close will keep the number line manageable for students.

Objectives

Students will...

- Be able to measure given objects to the nearest $\frac{1}{4}$ "
- Be able to order fractions from least to greatest
- Be able to create a line plot from a set of data

Common core state standards

CCSS.Math.Content.5.MD.B.2 — Make a line plot to display a data set of measurements in fractions of a unit ($\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$). Use operations on fractions for this grade to solve problems involving information presented in line plots. *For example, given different measurements of liquid in identical beakers, find the amount of liquid each beaker would contain if the total amount in all the beakers were redistributed equally.*



Introduction

- What are some kinds of graphs that you have either created or seen? (bar graph, circle graph, stem and leaf plot, line plot, line graph, etc.)
- What is the purpose of creating a graph? (to organize data)
- Why is it important to organize data? (to easily interpret or make sense of the data that has been collected; to easily communicate with others the data that has been collected; etc.)

In this activity, students are going to work with a specific type of graph called a line plot. A line plot uses a number line to illustrate how frequently a specific number or measurement occurs within a given data set.

Distribute Worksheet #1, and have students get warmed up by creating a line plot of their ages. Have students break their ages down to the $\frac{1}{2}$ year — some are 10 and some are $10\frac{1}{2}$, some are 11 and some are $11\frac{1}{2}$. You could even get really technical and break this down to the $\frac{1}{4}$ year. Go around the room and have each student tell their age to the $\frac{1}{2}$ year. Are they 9, $9\frac{1}{2}$, 10, $10\frac{1}{2}$, 11, or $11\frac{1}{2}$? As each student tells their age, everyone will need to record it in the table at the top of their worksheet. Record it on the board as well, but be sure that students keep up with the table on their worksheet.

Now that students have the data, it's time to plot it on their line plot so that they can easily interpret it and make some observations.

Students need to determine the lowest number in their data set. What is that number? Write the lowest number in the data set below the line beginning at left of the number line.

Now you need to give a value to each of the other lines on the number line. What value will the next line represent? (It will be a $\frac{1}{2}$ year larger than the lowest number in the data set.)

Continue filling in the number line until all lines have been assigned a value. It's okay if there are numbers on the line plot that are greater than the greatest number in the data set.

Now that students have given their number line intervals their values, it's time for them to plot their data. Start with the age of Student 1. Put an x above the value on the number line that corresponds with that student's age. Once that student's age is recorded on the line plot, it's important to cross it out in the table. Students need to do this to keep the data organized. Students want to be sure to record each value from their table grid. They also want to make sure they don't record any of the data more than once. As they work through the data, students should be sure that each piece of data is recorded with an x. When there is more than one piece of data for a given value, the x should be placed directly above the previous x (similar to the way that data is recorded in a vertical bar graph). You may record all the data on the line plot together as a class; or you may record part of the data together, and have students finish plotting the data independently. Before releasing students to complete independently, be sure they have a clear understanding how the data is recorded vertically.

When they've finished plotting the data, ask the following questions:

1. Which value is our mode? (Answer will be the value that occurs most frequently.)
2. What is the range of our values? (Answer will be the difference between your greatest and least values.)

Activity

Place students in groups of 3. Each group will need 10 pencils, at least 1 ruler, and copies of Worksheet #2 for each student.

Students are going to create another line plot with a different set of data. Instead of measuring ages, they're going to measure pencil lengths. When students measured their birthdays, they calculated them to the nearest $\frac{1}{2}$ year. For this activity, they will be measuring to the nearest $\frac{1}{4}$ ".

Take a moment to make sure students are comfortable using the rulers to measure to the $\frac{1}{4}$ ". Point out the marks on the ruler they will be using for this activity.

Have 5 pencils available for students to measure together as a whole class.

Ask students to come up and measure the 5 pencils for the whole class part of this activity. Record the measurements of those pencils for Pencils 1-5 in the table on Worksheet #2.

Once they have those measured and recorded, have 10 pencils available for each group.

Now it's time for the groups to do some measuring. Have them measure each pencil that they've been given. Students should record their measurements in the table for Pencils 6-15. It doesn't matter what order they measure their pencils in, but it does matter that they measure each pencil. Once they measure a pencil, have them set it aside so that they don't accidentally measure the same pencil more than once. Give students 5-10 minutes to complete their measurements. Reconvene to set up line plots for the data set.

Now that they have all of their data collected, it's time to organize it in a graph. Each group has slightly different data, so each group's line plot is going to look different.

What did they do first when they created their age line plot? (Recorded the lowest number for their data set.)

Have students take a moment with their group to go through their data. Ask them to circle the lowest number for their data set. (Circulate as students do this to confirm that they have chosen the lowest number in their set.) If a student finds the lowest number in their data set to be $3\frac{1}{2}$ ", then they are going to record that on the first line to the left of their number line.

When they measured, what did they round their measurements to? (the nearest $\frac{1}{4}$ "

Students need to label their number lines with the same intervals. If they started at $3\frac{1}{2}$ ", then their next number needs to be $\frac{1}{4}$ " greater than that.

What would their next line be labeled? ($3\frac{3}{4}$ "

Next? (4"

Next? ($4\frac{1}{4}$ "

Continue until the entire number line has been labeled.

Take a moment to label your own number line, and circulate to confirm that groups are labeling their number lines correctly.





Check for understanding

- Have students come up and plot the 5 pencils that they measured together as a class.
- Have groups of students plot the 10 pencils they measured as a group. Circulate to confirm each group's understanding of the skill.
- Distribute the Independent Practice Worksheet to check on each student's individual understanding of the skill.

Intervention

- Have students round the length of pencils to the nearest $\frac{1}{2}$ " rather than measuring each pencil to the nearest $\frac{1}{4}$ ".
- Decrease the number of pencils students need to measure down to 7.

Extension

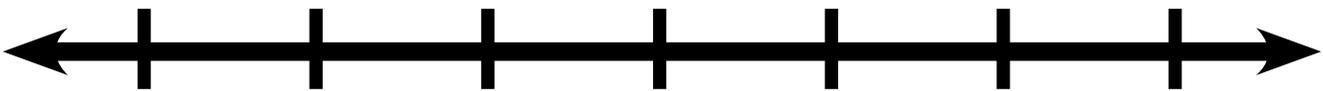
- Have students represent the data using other types of graphs.
- Example: Create a bar graph of pencil lengths. How many pencils measure from 5"-6"? 6"-7"? 7"-8"? Have students record their data on a bar graph.
- Use the same line of questioning to have students create a circle graph of the data collected.

Using line plots to display data sets – worksheet 1

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Name: _____ Date: _____

Student 1:	Student 7:	Student 13:	Student 19:	Student 25:
Student 2:	Student 8:	Student 14:	Student 20:	Student 26:
Student 3:	Student 9:	Student 15:	Student 21:	Student 27:
Student 4:	Student 10:	Student 16:	Student 22:	Student 28:
Student 5:	Student 11:	Student 17:	Student 23:	Student 29:
Student 6:	Student 12:	Student 18:	Student 24:	Student 30:



FOLLOW-UP QUESTIONS:

1. What is the mode of your data set? _____
2. What is the range of your data set? _____

Using line plots to display data sets – worksheet 2

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Name: _____ Date: _____

Pencil 1:	Pencil 6:	Pencil 11:
Pencil 2:	Pencil 7:	Pencil 12:
Pencil 3:	Pencil 8:	Pencil 13:
Pencil 4:	Pencil 9:	Pencil 14:
Pencil 5:	Pencil 10:	Pencil 15:



FOLLOW-UP QUESTIONS:

1. What is the mode of your data set? _____
2. What is the range of your data set? _____

Using line plots to display data sets — Independent practice worksheet

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Name: _____ Date: _____

A group of 16 friends got together for a pizza party. Each pizza they ordered had 8 slices. Below are the amount of slices each friend ate. In the “Fraction” column, write the fraction of a whole pizza each friend ate. Then, create a number line below. Finally, create a line plot for the amount of pizza each friend ate.

Name	Slices	Fraction
Kenny	4	
Frank	5	
José	7	
Brady	5	
Henry	2	
Leon	5	
Tyler	4	
Sean	3	

Name	Slices	Fraction
William	5	
Bryan	2	
Joaquin	3	
Vince	7	
Pedro	6	
Wayne	4	
Nicholas	7	
Andre	3	



Using line plots to display data sets — Independent practice answer key

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Name: _____ Date: _____

A group of 16 friends got together for a pizza party. Each pizza they ordered had 8 slices. Below are the amount of slices each friend ate. In the “Fraction” column, write the fraction of a whole pizza each friend ate. Then, create a number line below. Finally, create a line plot for the amount of pizza each friend ate.

Name	Slices	Fraction
Kenny	4	$\frac{4}{8}$
Frank	5	$\frac{5}{8}$
José	7	$\frac{7}{8}$
Brady	5	$\frac{5}{8}$
Henry	2	$\frac{2}{8}$
Leon	5	$\frac{5}{8}$
Tyler	4	$\frac{4}{8}$
Sean	3	$\frac{3}{8}$

Name	Slices	Fraction
William	5	$\frac{5}{8}$
Bryan	2	$\frac{2}{8}$
Joaquin	3	$\frac{3}{8}$
Vince	7	$\frac{7}{8}$
Pedro	6	$\frac{6}{8}$
Wayne	4	$\frac{4}{8}$
Nicholas	7	$\frac{7}{8}$
Andre	3	$\frac{3}{8}$

