

Just in Time Quick Check
Standard of Learning 4.PS.1
Strand: Probability and Statistics

Standard of Learning 4.PS.1

The student will apply the data cycle (formulate questions; collect or acquire data; organize and represent data; and analyze data and communicate results) with a focus on line graphs.

Students will demonstrate the following Knowledge and Skills:

- a) Formulate questions that require the collection or acquisition of data.
- b) Determine the data needed to answer a formulated question and collect or acquire existing data (limited to 10 or fewer data points) using various methods (e.g., observations, measurements, experiments).
- c) Organize and represent a data set using line graphs with a title and labeled axes with whole number increments, with and without the use of technology tools.
- d) Analyze data represented in line graphs and communicate results orally and in writing:
 - i) describe the characteristics of the data represented in a line graph and the data as a whole (e.g., the time period when the temperature increased the most);
 - ii) identify parts of the data that have special characteristics and explain the meaning of the greatest, the least, or the same (e.g., the highest temperature shows the warmest day);
 - iii) make inferences about data represented in line graphs;
 - iv) draw conclusions about the data and make predictions based on the data to answer questions; and
 - v) solve single-step and multistep addition and subtraction problems using data from line graphs.

Just in Time Quick Check

Just in Time Quick Check Teacher Notes

Supporting and Prerequisite SOL: 4.CE.1, 3.PS.1

Just in Time Quick Check 4.PS.1

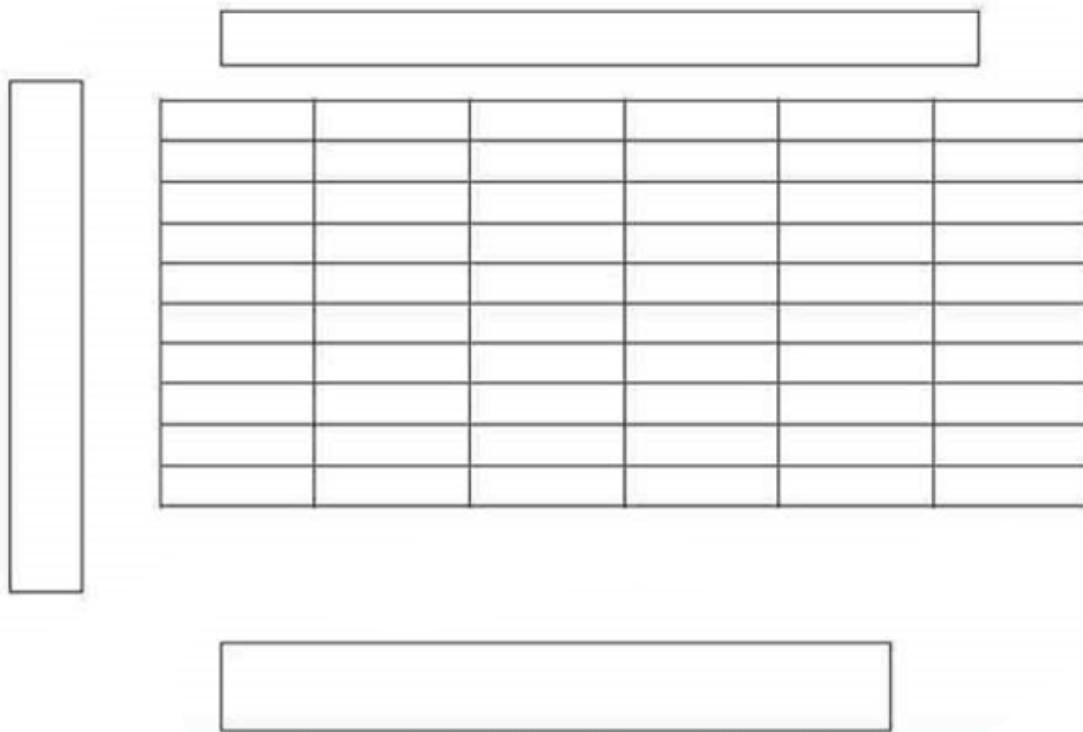
1. Ellen's class wants to make a line graph showing how the temperature on the playground changes during the school day. Which question would help them collect the data needed for their line graph?
 - a) How many students played on the playground today?
 - b) What is your favorite recess activity?
 - c) What is the temperature on the playground at different times of the day?
 - d) How many soccer balls are kept in the playground bucket?

2. Ellen's class wants to make a line graph showing how the temperature on the playground changes during the school day. What would be the best way for Ellen's class to collect the data needed?
 - a) Count how many students played on the playground
 - b) Measure the temperature on the playground at different times during the day
 - c) Count how many students played soccer during recess
 - d) Measure the temperature in the classroom at the same time on different days

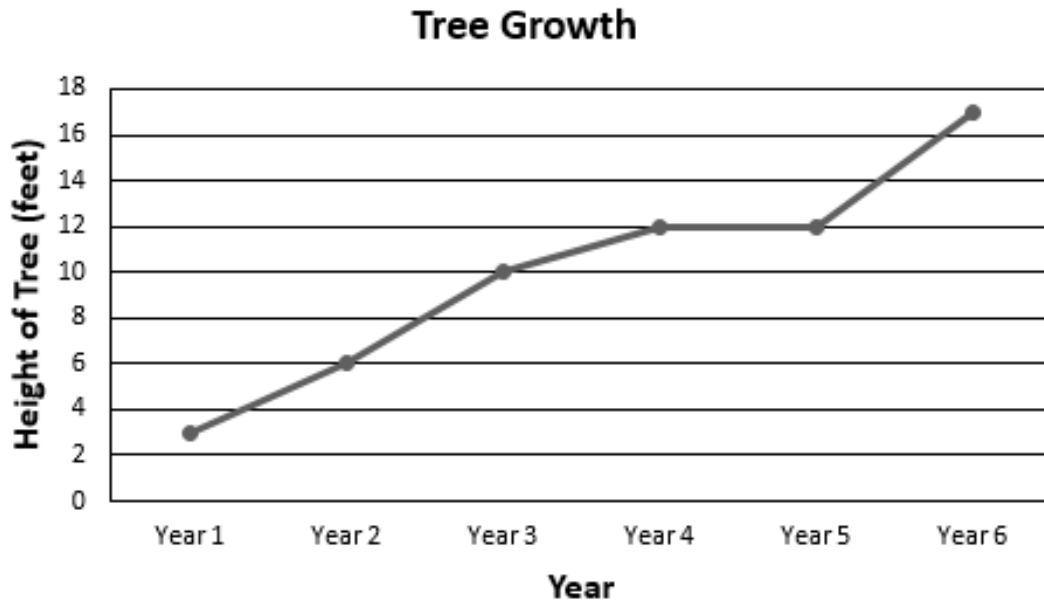
3. Tim planted a seed and recorded the height, in inches, of the plant each day for 6 days. His data is shown in the table. Create a line graph that correctly displays the data shown in the table to represent the height of the plant for each of the 6 days after Tim planted the seed.

Day	Height (inches)
1	0
2	0
3	2
4	3
5	5
6	6

Line Graph



4. Mr. Shelton measured the growth of a tree each year for 6 years. He recorded his information in this graph. Use the graph to answer the questions below.



- a) Between which two years did the tree's growth increase the most?
- b) Between which two years did the tree grow the least amount?
- c) What is the difference between the height of the tree in year 2 and year 4?
- d) What do you think will be the height of the tree in Year 8?

4.PS.1 Just in Time Quick Check Teacher Notes

Common Errors/Misconceptions and their Possible Indications

1. Ellen's class wants to make a line graph showing how the temperature on the playground changes during the school day. Which question would help them collect the data needed for their line graph?
 - a) How many students played on the playground today?
 - b) What is your favorite recess activity?
 - c) What is the temperature on the playground at different times of the day?
 - d) How many soccer balls are kept in the playground bucket?

Students may have difficulty formulating questions that require the collection or acquisition of data, especially with data that can be represented on a line graph. In the above example, students may choose a) or d) because they will result in numerical data values, however these options would not provide continuous data that would best be displayed on a line graph. It may be beneficial for students to note what kind of data would be provided by answering each question and relating it to the data that Ellen's class wants to show on the line graph (e.g., the answers to b) will result in multiple activities, which would not be used to show the temperature on the playground throughout the day).

2. Ellen's class wants to make a line graph showing how the temperature on the playground changes during the school day. What would be the best way for Ellen's class to collect the data needed?
 - a) Count how many students played on the playground
 - b) Measure the temperature on the playground at different times during the day
 - c) Count how many students played soccer during recess
 - d) Measure the temperature in the classroom at the same time on different days

Students may struggle to determine what data are needed to answer a formulated question or they may struggle to determine the best way to collect the data. In the example above, students may choose d) because they saw that it was also about measuring temperature. It may be beneficial for students to consider what type of information would be provided through the data collection method in each answer choice and see if it gives the type of information that Ellen's class is seeking.

3. Tim planted a seed and recorded the height, in inches, of the plant each day for 6 days. His data is shown in the table. Create a line graph that correctly displays the data shown in the table to represent the height of the plant for each of the 6 days after Tim planted the seed.

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Line Graph

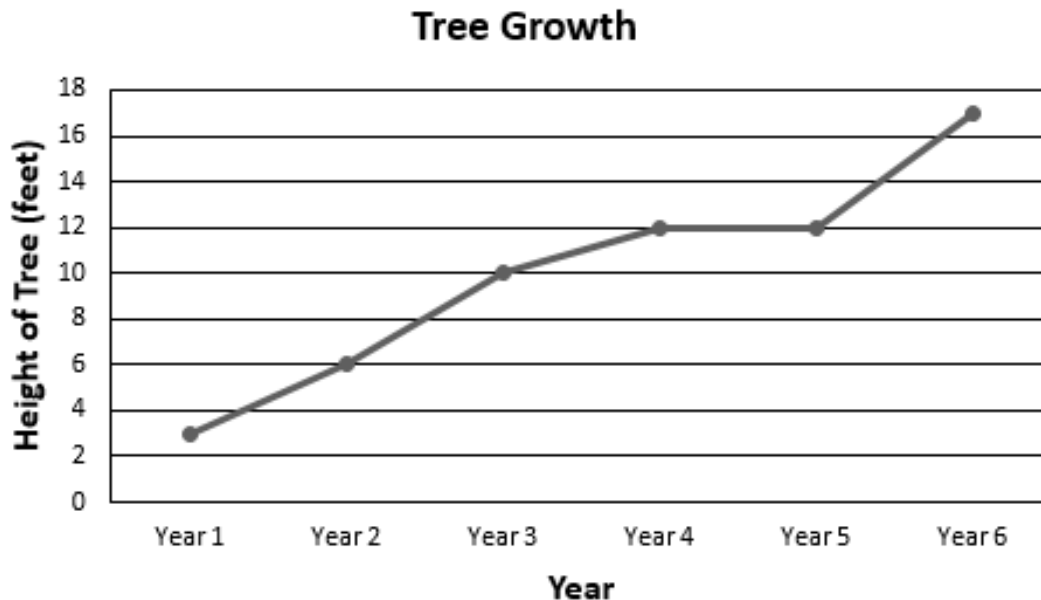
The form consists of a large grid for plotting data. The grid is 6 columns wide and 10 rows high. Above the grid is a horizontal box for labeling the x-axis. To the left of the grid is a vertical box for labeling the y-axis. Below the grid is another horizontal box, likely for a title or additional labels.

A common misconception some students may have when representing data, specifically in line graphs, is they may begin graphing the data directly on the vertical axis rather than beginning above the first horizontal label. This may indicate that students are having difficulty determining how to display the data that changes continuously over time. Encourage students to line up their plotted data directly above the horizontal axis in which they are graphing and that it correlates vertically with the increments used. Help students make the connection between points on a number line and points on a coordinate plane. Then connect the points to form a line graph. Encourage students to focus on the difference between looking at data represented by separate

points on a coordinate plane and the same data points connected with a line. Emphasize how the line can help them notice trends and lead to inferences about the data. Dividing the process into steps can help students be more successful creating a line graph.

Students may also struggle with labeling each axis based on the data given. This may indicate that students are not familiar with how the data are organized and represented in a line graph. It may be helpful to review how to label each part of the graph so that the graph is easily interpreted. Students commonly confuse the labels for the horizontal and vertical axes. This indicates that the student may not understand that the horizontal axis is commonly labeled with continuous times and that the vertical axis is labeled with the range of values for collected data. Students would benefit from exposure to examples of line graphs appropriately representing a variety of data. The teacher should focus on the labels of the graph and how they are crucial to correctly interpreting the line graph.

4. Mr. Shelton measured the growth of a tree each year for 6 years. He recorded his information in this graph. Use the graph to answer the questions below.



- a) Between which two years did the tree's growth increase the most?

Students may not understand how to identify the greatest amount of change by finding the line segment that is showing the steepest incline between any two consecutive years. This may indicate that students do not understand how to identify the characteristic of increasing between years using the data represented on the line graph. Students may benefit from a review of terms associated with graphing data. A visualization strategy of using different colors to identify the characteristics such as decreasing, increasing, and constant or remaining the same may help students understand and differentiate between each characteristic. Additionally, students could be encouraged to write the height associated with each year, and then perform the computation to find the difference between consecutive years to identify the greatest increase.

- b) Between which two years did the tree grow the least amount?

Students may not understand how to identify the least amount of change by finding the line segment that shows little or no change at all between any two consecutive years. The student would benefit from a review of terms associated with graphing data. A visualization strategy of using different colors to identify the characteristics such as decreasing, increasing, and constant or remaining the same may help the student understand and differentiate between each characteristic.

- c) What is the difference between the height of the tree in year 2 and year 4?

A common misconception some students may demonstrate is difficulty finding the difference between two years that are not consecutive. This may indicate that students lack conceptual knowledge of determining differences or changes between two years. Students may also struggle with interpreting the data for year 2 and year 4 to complete the problem. Students would benefit from finding the height of the tree for both years and then subtracting with the use of manipulatives if needed. It might be beneficial for students to have additional practice with similar problems in which they have to find the difference between two pieces of graphed data.

- d) What do you think will be the height of the tree in Year 8?

Students may have difficulty answering this question because it requires thinking beyond the information provided in the graph. Students will need to make a prediction, using the knowledge that tree grows 0 – 5 feet per year to help them. A common error students may make is to predict that the height of the tree will be close to 20 feet (e.g., 17 – 22). This may indicate that students predicted what the height of the tree will be in Year 7, rather than in Year 8. It may be helpful for students to add Year 7 and Year 8 to the x-axis and plot their predictions as points on the graph.