

The Work of Scientists ▪ Section Summary

Graphs in Science

This is graded.
Each question
is about 3 points.

Packet Due Date : _____

Key Concepts

- What type of data can line graphs display?
- How do you determine a line of best fit or the slope of a graph?
- Why are line graphs powerful tools in science?

A **graph** is a “picture” of your data. Graphs can reveal patterns or trends that words and data tables cannot. The three types of graphs that scientists commonly use are bar graphs, circle graphs, and line graphs. **Line graphs are used to display data to show how one variable (the responding variable) changes in response to another variable (the manipulated variable).** To plot a line graph of data, follow these steps.

1. **Draw the axes.** The **horizontal axis**, or *x*-axis, is the graph line that runs left to right. The **vertical axis**, or *y*-axis, is the graph line that runs up and down.
2. **Label the axes.** Label the horizontal axis with the manipulated variable and the vertical axis with the responding variable.
3. **Create a scale.** The scale should cover the range of the data collected. Both scales should begin at zero when possible. The point where the *x*-axis and the *y*-axis cross is the **origin** of the graph. A **coordinate** is a pair of numbers used to determine the position of a point on a graph.
4. **Plot the data.** Plot a point for each piece of data. Draw an imaginary vertical line from the horizontal axis and an imaginary horizontal line from the vertical axis. Plot a point where these two lines intersect, or cross. The point showing the location of the intersection is called a **data point**.
5. **Draw a “line of best fit.”** Look at the points you plotted to identify a general pattern in the data. Then draw a smooth line to reflect that general pattern. This graph line is called the **line of best fit**. A line graph in which the data points yield a straight line is called a **linear graph**.
6. **Add a title that identifies the variables or relationship in the graph.**

A **line of best fit** emphasizes the overall trend shown by all the data taken as a whole. When a line graph is linear, you can determine a value called **slope**, which is the steepness of the graph line. **The slope of a graph line tells you how much *y* changes for every change in *x*.** Slope is calculated using this formula:

$$\text{Slope} = \frac{\text{Rise}}{\text{Run}} = \frac{Y_2 - Y_1}{X_2 - X_1}$$

A line graph in which the data points do not fall along a straight line is called a **nonlinear graph**. Whether a graph is linear or nonlinear, the information it contains is very useful. **Line graphs are powerful tools in science because they allow you to identify trends and make predictions.**

The Work of Scientists ▪ *Guided Reading and Study*

Graphs in Science *(continued)*

The Importance of Graphs (pp. 69–71)

1. Is the following sentence true or false? A graph is a “picture” of your data.

2. What can graphs reveal about data?

3. What are the three types of graphs that scientists commonly use?

4. Graphs are used to show how the responding variable changes in response to the _____ variable.

Match each term with its definition by writing the letter of the correct definition on the line beside the term in the left column.

Term	Definition
_____ 5. horizontal axis	a. the point showing the location of a piece of data
_____ 6. vertical axis	b. the graph line that runs from left to right
_____ 7. origin	c. a pair of numbers used to determine the position of a point on a graph
_____ 8. coordinate	d. the graph line that runs up and down
_____ 9. data point	e. the point where the x -axis and the y -axis cross

10. Circle the letter of each sentence that is true about plotting a line graph.

- a. The x -axis is the horizontal axis and the y -axis is the vertical axis.
- b. Label the vertical axis with the name of the responding variable.
- c. Include units of measure on only one of the axes.

11. What is a line of best fit?

12. What is a linear graph?

The Work of Scientists ▪ *Guided Reading and Study***Graphs in Science** *(continued)*

13. The Data Table contains information about the distance traveled by a car.

14. Use the information in the Data Table to plot a line graph in the square provided.

14. Title + label graph.

Data Table

Time (min)	Distance Traveled (km)
10	8
20	16
30	24
40	32

Building Vocabulary

Fill in the blank to complete each statement.

15. A line graph in which the data points yield a straight line is called a(n) _____.
16. The steepness of a graph is called its _____.
17. The point where the x -axis and the y -axis cross is called the _____ of a graph.
18. A(n) _____ is a pair of numbers used to determine the position of a point on a graph.
19. A line graph in which the data points do not fall along a straight line is called a(n) _____.
20. A picture of information from a data table is called a(n) _____.
21. The _____ is the graph line that runs from left to right.
22. A smooth line drawn between points on a graph to reflect the general pattern of data is called the _____.
23. The point on a graph showing the location of a piece of data is called a(n) _____.
24. The _____ is the graph line that runs up and down.

The Work of Scientists ▪ Guided Reading and Study**Graphs in Science** (pp. 68–75)

This section explains how to plot a line graph, including how to draw the line on the graph. It also explains why line graphs are powerful tools in science.

Use Target Reading Skills 1. Find definition of page 1. 2. Underline or highlight definition. 3. Put number by definition. 4. Copy definition on this page.

A definition states the meaning of a word or phrase by telling about its most important feature or function. After you read this section, reread the paragraphs that contain definitions of Key Terms. Use all the information you have learned to write a definition in the spaces below of each Key Term in your own words.

25. graph

26. horizontal axis

27. vertical axis

28. origin

29. coordinate

30. data point

31. line of best fit

32. linear graph

33. slope

34. nonlinear graph
