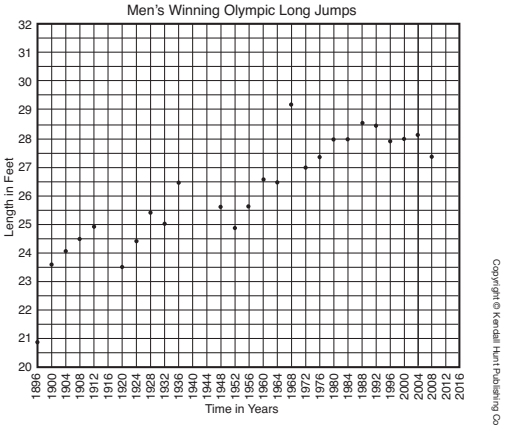
Predictions from Graphs

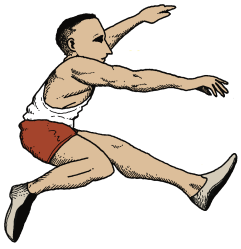
Graphs can tell stories. The following graph tells a story about the men's long jump competition in the Olympics. Contestants in the long jump try to jump as far as possible with a running start.



1. **A.** What variable is on the horizontal axis?
   B. What variable is on the vertical axis?

***Student Guide* - Page 164**

2. Jesse Owens won the long jump competition in 1936.
   A. How far did he jump?
   B. Is the distance Jesse Owens jumped longer or shorter than the length of your classroom?
   C. How many years passed before someone jumped farther than Jesse Owens in the Olympics?
3. **A.** Describe the graph. What does it look like?
   B. If you read the graph from left to right, do the points tend to go uphill or downhill?
   C. What does the graph tell you about the winning long jumps in the Olympics?



4. In 1968 Bob Beamon of the United States won the long jump competition.
   A. How far did Beamon jump?
   B. What is unusual about this point on the graph?
   C. Do you think the winner in 2016 will jump as far as Bob Beamon jumped in 1968? Why or why not?

***Student Guide* - Page 165**

Student Guide

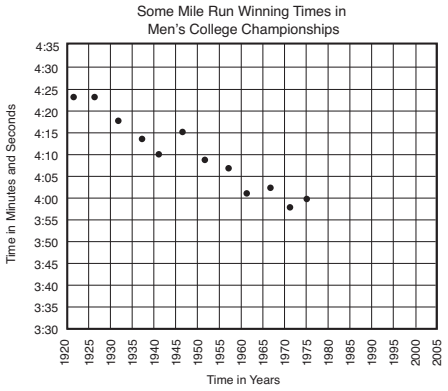
Questions 1–12 (SG pp. 164–168)

1. **A.** Time in years
   B. Length in feet
2. **A.** About 26 $\frac{1}{2}$ feet or 26 feet 6 inches
   B. Answers will vary.
   C. 24 years
3. **A.*** Possible response: The points go up and then down and then back up again.
   B.* They tend to go up.
   C.* The length of the jumps is getting longer.
4. **A.*** Approximately 29 feet 2 inches
   B. It is more than 2 feet longer than any previous jump.
   C.* Possible response: The best-fit line shows that in 2016 the length of the jump could be longer than Bob Beaman's. But since he jumped, all of the distances have been lower, so it may not happen.

***Answers and/or discussion are included in the lesson.**

5. **A.** Time in Years
   B. Time in Minutes and Seconds
6. 4 minutes and 10 seconds
7. 1971
8. **A.** Answers will vary. The points form a "bumpy" line.
   B. Downhill
   C. The winning time for running the mile decreased over the years.
9. **A.*** The line is drawn to fit the points as closely as possible.
   B.* 3
   C.* 5
   D.* 4
10. * Between 4 minutes and 5 seconds and 4 minutes and 10 seconds
11. * Under 3 minutes and 45 seconds
12. **A.*** Interpolation
    B.* Extrapolation
    C.* Possible response: Interpolation because as you get further from the actual data the predictions are not as close. The time may not be realistic.

The graph below shows the history of the mile run in college championship races. Runners do not run the mile anymore in these track meets because the distances are measured using the metric system. Contestants now run 1500 meters, which is a little shorter than a mile.



5. A. What variable is on the horizontal axis?
B. What variable is on the vertical axis?

6. What was the winning time for running the mile in 1941?

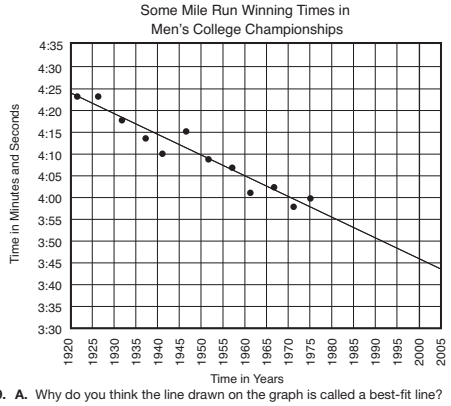
7. Find the data point which shows a time for the mile race which is less than 4 minutes. What is the year for this data point?

8. A. Describe the graph. What does it look like?
B. If you read the graph from left to right, do the points tend to go uphill or downhill?
C. What does the graph tell you about the winning times for the mile run?

166 SG • Grade 4 • Unit 5 • Lesson 1 Predictions from Graphs

***Student Guide* - Page 166**

If the points on a graph lie close to a line, you can draw a line to help you make predictions. This line is called a **best-fit line.**



9. A. Why do you think the line drawn on the graph is called a best-fit line?
B. How many points on the graph are above the line?
C. How many points are on the line?
D. How many points are below the line?

10. Use this graph to estimate the winning time for the mile run in 1955.

11. If the mile had been run in the college championships in the year 2005, predict the winning time. Explain how you made your prediction.

Predictions from Graphs SG • Grade 4 • Unit 5 • Lesson 1 167

***Student Guide* - Page 167**

Using the graph to estimate distances which lie between two points on the graph is called **interpolation.** "Inter-" means between points.

Using the graph to predict distances which lie beyond the data points on the graph is called **extrapolation.** "Extra-" means beyond or outside the points on the graph.

12. A. Did you use interpolation or extrapolation to estimate the winning time in 1955?
B. Did you use interpolation or extrapolation to predict the winning time in 2005?
C. Which is more accurate? Explain.

The *Using Best-Fit Lines* pages in the *Student Activity Book* provide more practice with making predictions from graphs.

168 SG • Grade 4 • Unit 5 • Lesson 1 Predictions from Graphs

***Student Guide* - Page 168**

***Answers and/or discussion are included in the lesson.**