

LESSON 16: Bar and Line Graphs

Weekly Focus: bar and line graphs, scatterplots
Weekly Skill: interpret

Lesson Summary: For the Warm Up, students will solve a problem about population growth. In Activity 1, they will learn vocabulary related to graphs. In Activities 2 and 3, they will interpret graphs in word problems. Activity 4 is an application activity about the salaries of U.S. Presidents. There is an exit ticket at the end. Estimated time for the lesson is 2 hours.

Materials Needed for Lesson 16:

- Video (length 7:40) on scatterplots. The video is required for teachers and optional for students.
- Application activity about presidential salaries (link embedded in lesson plan)
- *Mathematical Reasoning Test Preparation for the 2014 GED Test Student Book (pages 34-35) and Workbook (pages 46-49).*
- Exit ticket (attached)

Objectives: Students will be able to:

- Solve a time measurement word problem
- Give examples of different types of graphs
- Solve word problems with graphs
- Make a graph of presidential salaries

ACES Skills Addressed: N, CT, LS, ALS

CCRS Mathematical Practices Addressed: Building Solution Pathways, Reason Abstractly and Quantitatively

Levels of Knowing Math Addressed: Intuitive, Pictorial, Abstract, and Application

Notes:

You can add more examples if you feel students need them before they work. Any ideas that concretely relates to their lives make good examples.

For more practice as a class, feel free to choose some of the easier problems from the worksheets to do together. The “easier” problems are not necessarily at the beginning of each worksheet. Also, you may decide to have students complete only part of the worksheets in class and assign the rest as homework or extra practice.

The GED Math test is 115 minutes long and includes approximately 46 questions. The questions have a focus on quantitative problem solving (45%) and algebraic problem solving (55%).

Students must be able to understand math concepts and apply them to new situations, use logical reasoning to explain their answers, evaluate and further the reasoning of others, represent real world problems algebraically and visually, and manipulate and solve algebraic expressions.

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This computer-based test includes questions that may be multiple-choice, fill-in-the-blank, choose from a drop-down menu, or drag-and-drop the response from one place to another.

The purpose of the GED test is to provide students with the skills necessary to either further their education or be ready for the demands of today's careers.

Lesson 16 Warm-up: Solve the population question

Time: 10 Minutes

- Write on the board: The population of the U.S. is about 313.9 million and it increases by 1 person about every 12 seconds.

Basic Questions:

- Write 313.9 million as a number. (Answer: 313,900,000)
- The population increases by how many people in one minute? (12 seconds goes into 60 seconds 5 times so answer is 5 people)
- In one hour? (5 people in one minute x 60 minutes = 300 people)
- In one day? (300 people per hour x 24 hours = 7,200 people a day)
- In one year? (7,200 x 365 days = 2,628,000 people per year) (ok to use calculator)

Extension Question:

- The population increases by what percent per year? ($2,628,000/313,900,000 = 2,628/313,900 = 0.0084 = 0.84\%$ increase per year.) (Make sure students remember how to set up fractions to find percent and to reduce the fraction, and then they can use calculators.)
- Is this increase more or less than 1% a year? (less)

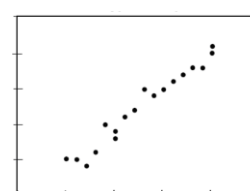
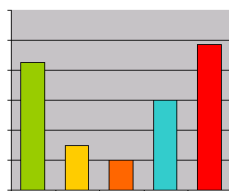
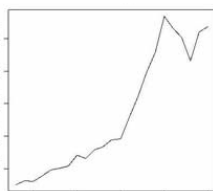
Lesson 16 Activity 1: Vocabulary on graphs

Time: 10 Minutes

- Write the following on the board:

Circle graph, bar graph, line graph, scatterplot, correlation, x-axis, y-axis, interval

- Make some quick sketches of the different types of graphs on the board like these:



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3. Ask the students to identify which is a **line graph (#1)**, **circle graph (#3)**, **bar graph (#2)**, and **scatterplot (#4)**.
4. Ask students which line is the x-axis (horizontal line) and which is y-axis (vertical line). The circle graph doesn't have axes.
5. Now refer back to the warm up question. Ask the students:
 - a. If you want to show the increase in the population of the U.S. over time, is it better to use a circle graph or a line graph? (*line graph*)
 - b. Why? (*Because you can show the time intervals on the x-axis and the population increase on the y-axis. You can't do that with a circle graph.*)
 - c. What is the **correlation**, the relationship, between time and the population of the U.S.? In other words, what happens to the population as time goes on? (*As time goes on, the population goes up.*)
 - d. The correlation is then **positive** because the line goes up as we go forward on the x-axis.

Lesson 16 Activity 2: Practice Examples

Time: 15-20 Minutes

Do the exercises in the **student book pages 34-35** together. Ask whole class:

1. What type of graph is on page 34? (*line graph*)
 - a. What is the title of the graph? (*Monthly Rainfall in Two State Parks*)
 - b. What information is on the x-axis? (*Months*)
 - c. What information is on the y-axis? (*Rainfall in inches*)
 - d. What are the intervals of the rainfall? (*one-inch intervals*)
2. Which type of graph is on page 35 with the title of Long Jump Results? (*bar graph*)
 - a. On which axis is the distance shown? (*x-axis*)
 - b. What are the intervals shown for the distance? (*5 feet*)
 - c. What can you say about Contestant C compared to D? (*D jumped 4 times farther.*)
3. Look at the graph titled Study Time for GED Math Test.
 - a. Ask similar questions to 1 and 2 above.
 - b. Why did they use a scatterplot and not a line graph to show this information? (*Because there isn't an exact correlation between the study time and the percent of answers correct. There is a generally positive correlation in that the more time spent studying resulted in an increase in percentage of correct answers on the test.*)
4. Give students time to work on questions 1-8 and go over them together.

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5. Note to teacher: This activity mentions *Hot Spot*. This is one of the ways students are expected to answer questions on the GED test. A graph, line, or coordinate grid has a virtual sensor and the student is expected to click on the spot where the answer goes. See page x of the Steck-Vaughn Mathematics *Student Book* for more information.

Lesson 16 Activity 3: Graph Word Problems

Time: 25-30 Minutes

1. Have students work independently in the **workbook pages 46-49**.
2. Point out that the graph on page 46 is a **double-bar graph**. Ask students the difference between first blue bar and the second yellow bar. (*Innings, as shown in top right corner.*)
3. The scatterplot graph related to questions 8 and 9 may be challenging. Discuss it once students have had a chance to look at it. You may need to explain "humming" and "booming" markets.
4. Circulate to help. Review any questions that students found challenging.

Lesson 16 Application: Presidential Salaries

Time: 30-45 Minutes

Do the [activity](#) about comparing the salaries of different U.S. presidents. It incorporates real life application, cost of living information, and social studies. Students may use calculators for this activity. Start the activity together and circulate to help students. Please download the activity directly from yummymath.com. You can access the solution if you are a member.

Lesson 16 Exit Ticket

Time: 10 Minutes

Have the students measure their arm span and compare to their heights (like the video explaining scatterplots). Then create a graph on the board and have each student put a dot on the graph. You can do both axes in inches to make it easier. As a class, decide if and what the correlation is between a person's height and arm span.