

## Learning Project 1 The Number Line and Informational Graphing

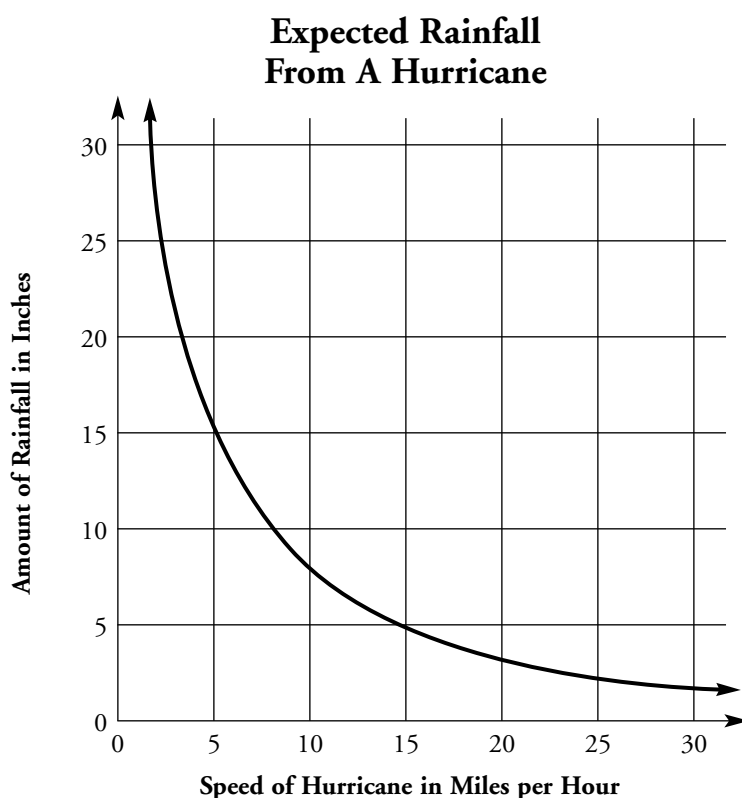
### Inquiry Activity 1-4: Reading a line graph

(Note: Italicized portions should be directed to students.)

#### 1. Identifying the Problem (Item #15, PA) Calculator not allowed.

*Read the question carefully, as you would if taking the actual test.*

15. The graph below shows the expected rainfall from a hurricane, based on the speed at which the hurricane is moving.



**Calculator  
NOT Allowed**



Based on the graph, what would be the approximate amount of rainfall, in inches, if a hurricane moves at 12 mph?

- 1) 15
- 2) 12
- 3) 10
- 4) 7
- 5) 4

*Here are some problem clarification questions you may want to consider when reading test questions.*

*What words and/or symbols might be important to understand to answer this problem and what are they telling you?*

*What words and/or symbols are unfamiliar and what do you think they mean?*



## **2. Becoming Familiar with the Problem**

*Ask yourself questions like the following about the problem, taking note of the ones that were especially helpful so that you can remember to use them when you take the test.*

*Re-read the question. What are you being asked to find?*

*Read the title of the graph and the labels on the sides. What are some facts that you can read from the graph?*

## **3. Planning and Performing Tasks**

*Try to answer the test question any way you can, even if you have to guess, but try to be aware of the reasoning and operations that you are using. The following can be helpful.*

*In your own words, determine what to look for in the graph.*

They are looking for the number on the rainfall axis that is the value of the point that is on the graph directly above 12 on the MPH axis.

*Estimate an approximate answer.*

*Eliminate answer choices that are unreasonable.*

*Choose the answer that is closest to your estimate. Be ready to defend your answer and explain your reasoning to your group.*

## **4. Sharing with Others**

*Telling other people what you know helps you to understand the material better. So take this opportunity not only to share the knowledge, but also to learn it more completely.*

**Small Groups:** *Compare your answer to others in the group, explain how you found it and why you think yours is correct.*

*Agree on the correct answer and a reliable step-by-step procedure to use when you are asked to estimate values that fall between the lines on a graph. You may want to consult the available textbooks. Remember that you will not be allowed to make any marks on the test itself.*

**Whole class:** *Report your group's answer to this question, as well as the procedure that you recommend using in these situations.*

Their procedure is likely to include three steps:

- 1) Approximate the position of the given value (12) on its axis.
- 2) Locate the point where the line of the graph intersects that position and follow its projection (perpendicularly) on the other axis.
- 3) Approximate the value of the point of intersection on the number line that serves as the other axis (nearly halfway between 5 and 10.)

*Take notes on any different ways that others used to find the answer.*

You could suggest that they use the corner of a piece of paper to help them to maintain the perpendicularity necessary in step 2. Align one side of the paper to the given value (keeping it vertical) and then adjust the paper so that its corner falls exactly on the graph line. Follow the other side of the paper to the vertical axis.

## **5. Reflecting, Extending and Evaluating**

**Reflecting:** *Think about what you learned.* (A group activity or instructor led)

*Here are some questions to start you thinking about the experience you just had. Thinking about what you have learned and experienced is part of the learning process. When the focus is only on the answer, you don't get much time to think about what was learned.*



Remind the students of the graph in the previous Inquiry Activities. Ask questions like these so they see the connection between them.

*What made this question more difficult than the previous one?*

Most will recognize that it was more difficult because neither the 12 nor the 7 fell on the grid lines of the graph, so they had to estimate twice. You may want to tell them that this process, when applied to graphing, is called interpolation. Others might mention the curve of the line as being difficult for them.

*Practice approximating values on this graph.*

*What is the expected rainfall when the speed of the hurricane is*

*5 mph?*

*8 mph?*

*17 mph?*

*28 mph?*

**Extending: Extend what you learned to new situations.**

***In extending, you are being asked to transfer the information presented in the Practice Test question to other information or situations you already know and maybe make new connections to other information.***

A line graph is often used to visualize a trend. Ask questions like the following so that your students also focus on the story that the graph is telling.

*In general, how does the speed of a hurricane affect the amount of rainfall? Explain how this makes sense to you.*

As the speed increases, the rainfall decreases. They may say that a slower speed means that the storm stays around longer, with more time to drop the rain.

*Complete the following table by estimating from the graph.*

<i>Hurricane Speed (Input)</i>	5	10	15	20	25	30
<i>Amount of Rainfall (Output)</i>						

*Notice that each number in the first row (input) is 5 units more than the one before it. Check to see if there is a similar pattern between the numbers in the second row (output). How much change in rainfall is there between the entries?*

*What is the greatest change and where does it occur?*

*Where does the least change occur?*

*Where is the line of the graph the steepest, between 5 and 10 or between 25 and 30?*

*Write a statement that connects the two ideas – steepness and amount of change.*

The questions above distinguish between amount of rainfall (found by approximating values from the graph) and the amount of change in rainfall (visualized by the slope of the line in an interval). These ideas are important ones for understanding change in real life and are likely to be assessed on the GED test. This is only an introduction to the notion that they can read more from graphs than the individual data points. The ideas of rates and slopes will be revisited in LP #2 where rates are studied in mathematical expressions and in LP #7 where they will study how rates are pictured in a graph.



This particular line is in the shape of an exponential curve, where the rate of decrease varies. If the curve were a straight line, the rate of decrease would be the same throughout the graph.

Graphs that follow an exponential pattern are not very common in newspapers and magazines, even though this pattern is a common one for growth and decay. You should ask the students to search out and bring in similar graphs over the next weeks. Analyze the submitted graphs together focusing on the pattern of change.

*What overall story does the graph tell?*

*During which period is the change the greatest? The least?*

*Make up your own GED test question about this graph that involves interpolation.*

**Evaluating: Assess what you learned and how you learned it.**

***In this last step, you get a chance to review the content of what you learned and the methods used to learn. There are no right or wrong answers to these questions; it is your chance to look more closely at your learning style and the opportunity to state how you benefited or didn't benefit from the content and/or the methods to help you pass the GED test.***

*How do you react to the presence of a graph in a newspaper article? For instance, do you usually ignore it or do you study it? Do you prefer to read the words or the graph to find out the facts? Explain your preference.*

This bit of introspection may give the learner clues as to his learning style. We hope to capitalize on the visual learning style throughout our study of graphs in this course.