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A Rumor in the Classroom

Interpret a graph with a point of inflection.

2.7 LESSON

Overview

Class Time: 15 minutes

Prerequisites: Students should have completed Lessons 1.1 through 1.4 and 2.1.

In this lesson, students are introduced to the concept of a point of inflection.

Teaching the Lesson

In this lesson students are introduced to the concept of a point of inflection. In addition, they again identify the units of measurement, locate values, and translate points into statements based on the application.

Homework and Assessment

For homework after finishing the recording sheet, ask students to solve these problems:

1. Suppose a class has thirty people in it, and three people start a rumor. What would that graph look like? Compare and contrast this graph with the one shown on the recording sheet.
2. A company president claimed at first that the company's debt was increasing at an increasing rate but now claims the debt is increasing at a decreasing rate. What would that graph look like compared to the graph on the recording sheet?

Answers to Lesson 2.7 Student Recording Sheet and Homework

STUDENT RECORDING SHEET

1.
   a. The graph shows the relationship between time and people who have heard the rumor.
   b. The units of measurement along the x-axis are minutes.
   c. The units of measurement along the y-axis are numbers of people.
   d. Two people start the rumor.

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MATH MATTERS

Point of Inflection

A *point of inflection* is a point where a function changes from being concave up to concave down or concave down to concave up. A curve is concave up if it is curved up like so ⌣ and concave down if it is curved down as here ⌢. A point of inflection can identify a place where an increasing function with an increasing rate of change switches to an increasing function with a decreasing rate of change ↘←. The arrow points at a point of inflection. It can also indicate a point where a decreasing function with a decreasing rate of change switches to a decreasing function with an increasing rate of change.

e. There are twenty-four people in the class. (Recall that the introduction to the problem says that everyone has heard the rumor within ten minutes.)
f. The function is increasing for the first 7 minutes and then remains constant. This is shown by the curve's rising and then remaining at the same level as we move along the x-axis from left to right. (A typical student answer to this question is "It goes up." Encourage students to write a more complete answer, such as, "As time passes, the y value is going up and then remaining at the same level" or "As we move from left to right along the x-axis, the curve is rising and then remaining at the same level.")
g. The point of inflection is at about (2.5,12).
h. At the point of inflection, twelve people have heard the rumor.
i. At the point of inflection, it has been about two and a half minutes since the rumor started.
j. After four and a half minutes, twenty-two people have heard the rumor.
k. The y-intercept is the number of people who first heard the rumor.

HOMEWORK

1. The graph would have a y-intercept of 3, not 2. It would level off at 30, not 24.
2. The graph showing the company's debt over time will also look like the graph on the recording sheet.

Extend the Learning: The population of a species of animals on an island often has the shape of the "rumor" graph. Can you explain why? Suppose the population starts with twenty-five animals and levels off at 300 after six years. Assume the point of inflection is at (2,150). Draw the graph, and use it as the basis for your explanation.

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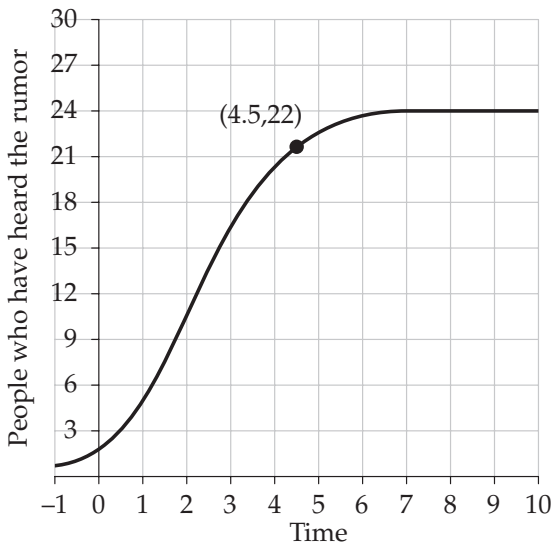
Student _____ Class _____ Date _____

LESSON 2.7 A Rumor in the Classroom

Student Recording Sheet

1. A rumor is spreading quickly among the students in a classroom, and within ten minutes, everyone has heard it. The graph below shows the number of people who have heard the rumor in relation to the time that has passed since the rumor was started.



a. This graph shows the relationship between what two quantities?

b. What are the units of measurement along the x-axis?

c. What are the units of measurement along the y-axis?

d. How many people start the rumor?

(continued)

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e. How many people are in the class?

f. The relationship between the quantities on this graph is called a *function*, because each x value leads to one and only one y value. Is the function decreasing? How can you tell?

g. The function changes more and more quickly and then more and more slowly. The point at which it shifts from faster and faster to slower and slower is called the *point of inflection*. Find and mark the point of inflection on the curve.

h. At the point of inflection, how many people have heard the rumor?

i. At the point of inflection, how long has it been since the rumor started?

j. A point is marked on the curve. Write a sentence about the rumor based on the information provided by the coordinates of the point.

k. What does the y-intercept mean in terms of this problem?

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