Math Objectives

- Students will apply knowledge of the graphical relationship between a function and its derivative.

Activity Types

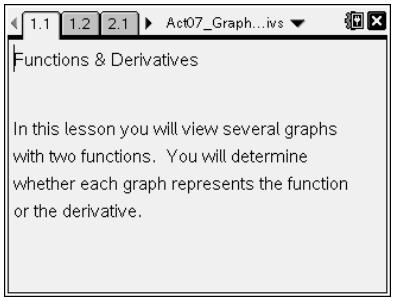
- Student Exploration
- Group Activity

About the Lesson

- Students will examine Graphs pages containing two graphs, a function, and its derivative. Students will determine which graph represents the function and which graph represents the derivative as well as justify their answer. In part II, students will be given a graph that represents the derivative or function and will have to draw the other function.

Directions

- Suggestions for class discussion points and information for students are given in detail on the following pages.



TI-Nspire™ Technology Skills:

- Download a TI-Nspire document
- Open a document
- Move between pages
- Grab and drag a point

Tech Tips:

- Make sure the font size on your TI-Nspire handheld is set to Medium.
- You can hide the function entry line by pressing ctrl G.

Lesson Materials:
Student Activity
Graphical_Derivatives_Student.pdf
Graphical_Derivatives_Student.doc

TI-Nspire document
Graphical_Derivatives.tns

Visit www.mathnspired.com for lesson updates.

Discussion Points and Possible Answers

Move to page 1.2.
Have students work in pairs to discuss their observations about the relationship between the graph labeled *derivative* and the graph labeled *function.*

CLASS DISCUSSION: Have students share their observations.

Move to page 2.1.
Let students work in pairs to determine which graph is the derivative or function for problems 2.2 to 2.7.

Tech Tip: The equations for each graph have been hidden. Students can attempt to find them by opening and searching the entry line. To make their conjectures valid, check to make sure students are not interacting with the graph screen other than viewing the given information.

Each pair of students should determine which graph represents the derivative or the function.

CLASS DISCUSSION: Lead a class discussion about the student answers to these problems and why they made their selections. Students should be specific about the language they use to describe the graphs. Words such as *increasing* and *decreasing* should be used, and students should identify that a zero of a function is appropriate for the discussion.

Functions students should draw are dotted for each solution.

Problem 2.2

Answer: The derivative is a linear function.

Problem 2.3

Answer: The derivative is a W-shaped function.

Problem 2.4

Answer: The derivative is an entirely negative function.

Problem 2.5

Answer: The derivative is a function that starts decreasing on the left side of the screen.

Problem 2.6

Answer: The derivative is an entirely negative function.

Problem 2.7

Answer: The derivative is a function that has two larger peaks close to the *y*-axis.

Move to page 3.1.

This problem has several graphs for students to draw a derivative or function based on what they have learned from problem 2.

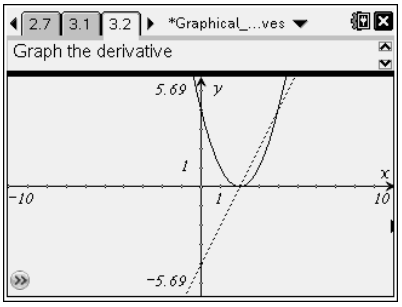
Have students copy the graphs and draw the derivative or function for problems 3.2 to 3.6. Students should compare results with their neighbor and discuss any differences in their graphs.

If you have communicators, small whiteboards, or chalkboards, students can work out each problem and then hold up the answers for the class to see.

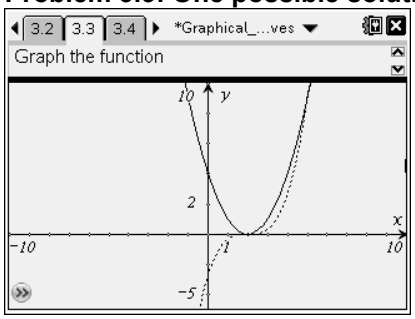
If you have a whiteboard or smartboard, ask one student to draw his or her solution on the board.

Answers:

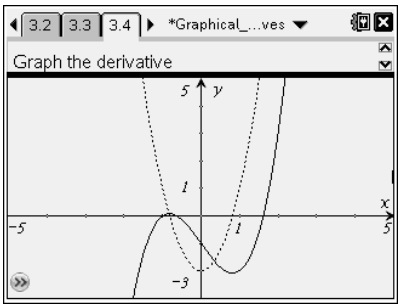
Problem 3.2



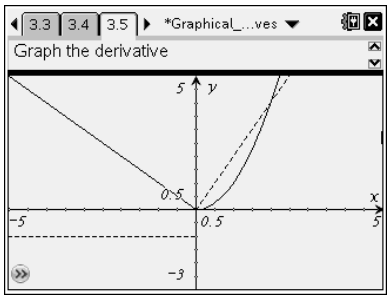
Problem 3.3: One possible solution



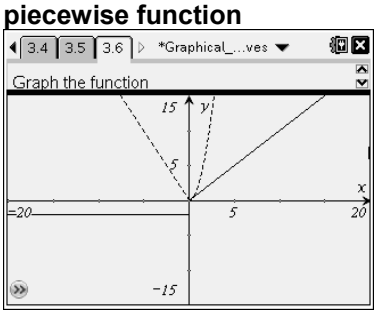
Problem 3.4



Problem 3.5: Piecewise function



Problem 3.6: One possible solution—piecewise function



CLASSROOM DISCUSSION:

For each problem, have the class discuss how they graphed the derivative or function.

NOTE: There may be more than one answer for a question where students have to graph the function. This a good point to discuss the affect of a constant on the relationship between functions and derivatives.