Shark Attack

ID: 11848

Time required
20 minutes

Activity Overview

*In this activity, students will see and practice with the basic form of the equation $y = m(x – x_1) + y_1$. Data is introduced in two separate problems where students will calculate the slope and write their own Point Slope form of an equation using those two data points. Then, students will use the **Graph Trace** along the line to make predictions based on their own equation that models the data.*

Topic: Rational Functions & Equations

- *Recognizing Point Slope form of a linear equation*
- *Identifying the slope and/or the ordered pair that is used in an equation*
- *Writing an equation in Point Slope form when given two ordered pairs (data points).*

Teacher Preparation and Notes

- *Students must have experience in calculating slope from two points. Students must also recognize the notation for an ordered pair with subscripts: (x_1, y_1)*
- *The **Graph Trace** tool is useful for tracing along either data points or a function graph. When the students access this tool, however, the application may be set up first to trace along the data points. The student must toggle to tracing along the line itself by pressing the up or down arrow, and then move along the graph with the right or left arrow.*
- ***To download the student and solution TI-Nspire documents (.tns files) and student worksheet, go to education.ti.com/exchange and enter "11848" in the quick search box.***

Associated Materials

- *SharkAttack_Student.doc*
- *SharkAttack.tns*
- *SharkAttack_Soln.tns*

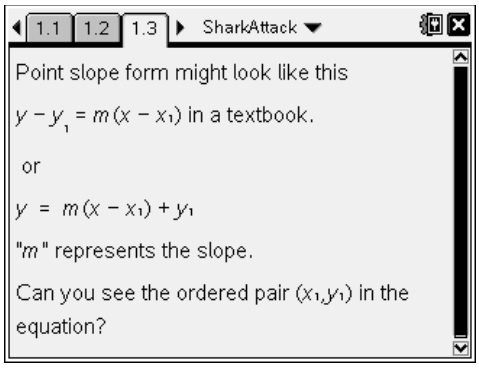
Suggested Related Activities

To download any activity listed, go to education.ti.com/exchange and enter the number in the quick search box.

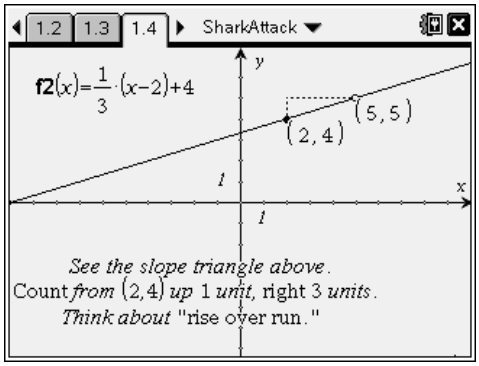
- *Linear Equations Jeopardy (TI-84 Plus family with TI-Navigator) — 8326*
- *Linear Functions and Slope (TI-84 Plus family with TI-Navigator) — 9031*
- *What's The Equation (TI-Nspire technology) — 9417*
- *9 Ball! – A Simulation Game (TI-Nspire technology) — 10575*

Problem 1 – Point-Slope Form of the equation

Students will become familiar with the equation, and what *m* means and how the ordered pair (x_1, y_1) appears in the equation. You may need to discuss the subscripts on the ordered pair, and also the two different forms of the equation. (How did the y_1 term get to the other side?) Discuss with students why it is important to learn another form of a linear equation, anticipating the question, "Can't we just use $y = mx + b$ every time?"

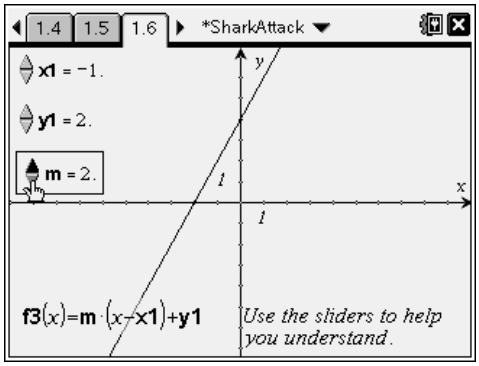


Students will study the example on page 1.4 to get an idea of how the equation looks when graphed.



On page 1.5, students will answer the question to see if they understand the point-slope form of an equation. All questions are currently in Exam Mode. For students to be able to Self-Check, you must change this format before sending the file. To Self-Check an answer, the students will need to press ctrl ▲.

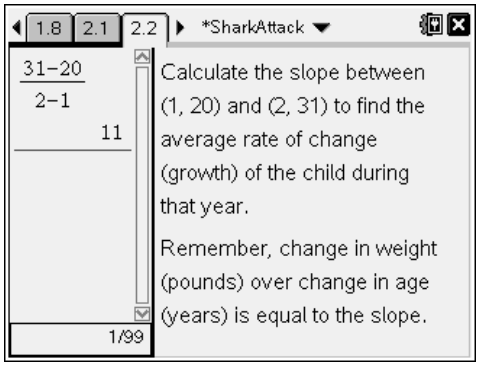
An interactive graph is provided on page 1.6 for students to use to answer additional questions. Guide them to use one slider at a time to investigate the changes in the graph as they change the values of *m*, x_1, and y_1.



The students should answer the questions on pages 1.7 and 1.8.

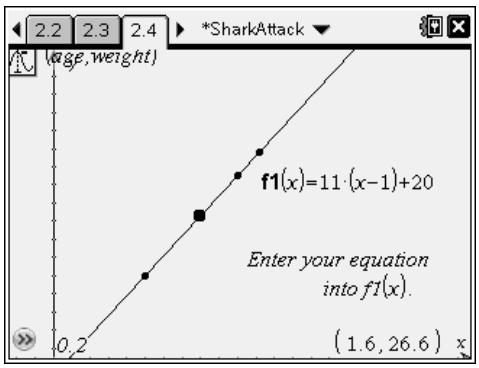
Problem 2 – Oh, Baby!

Students are given data in words and as ordered pairs on pages 2.1 and 2.2. Students can use the Calculator application to calculate the slope. However, some students may be able to do this mentally. They should press ctrl + ÷ to enter the fraction template. The text that is provided reminds students about the phrase "average rate of change" and how it relates to slope here.



Students write their linear equation in the Point-Slope form. The spreadsheet provides the data again and gives the general equation form for reference.

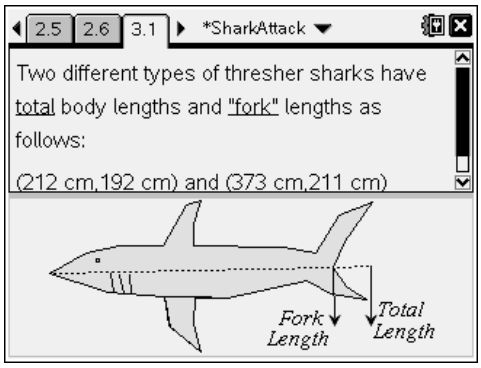
Students enter their equation into the function entry line and watch as it graphs through the two data points. They are to then use the **Graph Trace** feature to find other values along the line. This is a way for students to make "predictions" based on their model without performing difficult algebraic calculations yet. It lends itself to some discussion about how this growth trend may continue or may change over the next year or few years.



Page 2.6 asks the students to find a data point that will describe how much the child might weigh at age 3.

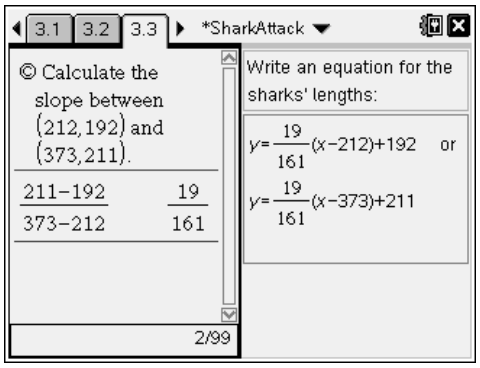
Problem 3- Shark Attack!

Again, data is given in context, along with a diagram of the fish to describe how the measurement is taken.



Students will follow the same process as in Problem 2. They are to calculate the slope and write an equation in point-slope form on page 3.3. Then they can graph the equation with the data points on page 3.4.

A statement for further discussion is presented on page 3.6: "The longer the total body length, the longer the fork length." (Agree or disagree)



This statement can lead into the discussion of direct variation and indirect variation, and perhaps even correlation. On page 3.7, the students are led into the same type of questioning, about whether weight might relate somehow to length of a shark, and how?

Extensions/Homework

- Take the equations from Problems 2 and 3 above and rewrite them (on paper or in a Notes page) in slope-intercept form. Explain the meaning of the *y*-intercept in the "Oh, Baby" problem. Explain the meaning of the *y*-intercept in the "Shark Attack" problem.
- Think of a measurement with regard to humans that would be related in a similar way (i.e., one number increases as the other number increases).
- Think of a relationship (manmade or natural) that would be related in the opposite way (i.e., one thing increases as the other decreases).