

Linear Changes
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Grade Level: 8-10

Time Required: 50 minutes

Activity Overview:

There are 3 problems in this activity, each requiring student interaction with the TI-*nspire* handheld, each producing immediate on-screen dynamic results. The students will be editing linear functions and observing the changes in the graphs, first changing slopes and then changing the y-intercept. Students will also grab & move the graphed line and observe the changes of the on-screen equation. Each page of the activity will require student input, which will require students to save their work with a unique file name in a designated folder. All work can be completed on the handheld unit or you can require students to complete the student worksheet.

Concepts:

In this activity, you will explore:

- Linear functions in slope/intercept form
- Linear functions as they relate to $f(x)=x$
- Function shifts
- Comparing slopes

Teacher Preparation:

Teacher will need to download the file into each students TI-*nspire* handheld unit.
Print-out and make copies of the student worksheet/directions.

Before starting the lesson the teacher should have reviewed function notation and the slope/intercept form of linear equations.

Classroom Management:

The worksheet given to students has detailed directions for this lesson. It is the teacher's choice whether the students are to enter their answers on the handheld, to be saved, or have the students write their answers on the worksheet, to be turned in. Each student should produce independent work, but allowing students to work within a group setting can assist students in a deeper understanding of the concepts.

TI-*nspire* Applications:

[Linear Changes.tns](#)

Directions:

Problem 1 has students changing the slope of $f(x) = x$, to include positive and negative integers and fractions, and asks them to observe the change in the graph. They will be asked about slopes that are more vertical vs. more horizontal.

The image shows a TI-Nspire calculator screen with a graphing window and a question window. The graphing window displays a coordinate plane with a line labeled $f1(x)=x$ passing through the origin. The x-axis is labeled with -8.17 and 8.17, and the y-axis with -7 and 7. The question window contains the following text:

Question

On page 1.1, compare the function $f(x)=x$ to the function $f(x)=2x$.

Is the slope of the line $f(x)=2x$ more vertical or more horizontal than the line $f(x)=x$?

Answer

The image shows two TI-Nspire calculator question windows. The top window contains the following text:

Question

On page 1.1, compare the function $f(x)=x$ to the function $f(x)=\frac{1}{2}x$.

Is the slope of the line for $f(x)=\frac{1}{2}x$ more vertical or more horizontal than the line for $f(x)=x$?

The bottom window contains the following text:

Question

On page 1.1, compare the function $f(x)=x$ to the function $f(x)=-x$.

Describe the slope of the line $f(x)=-x$

How does it compare to the slope of the line $f(x)=x$?

Answer

Problem 2 has students changing the y-intercept of $f(x) = x$, to include addition and subtraction of constant values, and asks them to observe the change in the graph. They will be asked about the changes it made in the graph.

The image shows a TI-Nspire calculator screen with a graphing window and two question windows. The graphing window displays a coordinate plane with a line labeled $f1(x)=x$ passing through the origin. The x-axis is labeled with -8.17 and 8.17, and the y-axis with -7 and 7. The first question window contains the following text:

Question

On page 2.1, **add a constant** value to the equation.

What change did it make to the graph?

Answer

The second question window contains the following text:

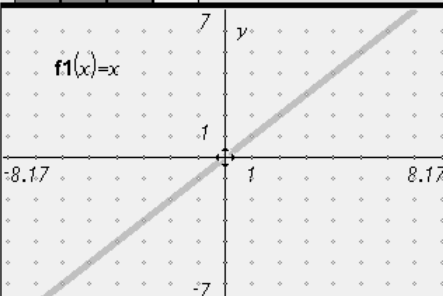
Question

On page 2.1, **subtract a constant** value, to the right of the x variable, in the equation.

What change did it make to the graph?

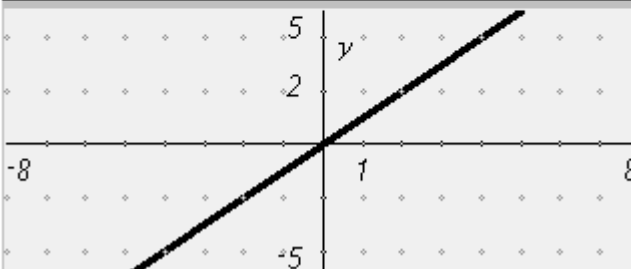
Answer

Problem 3 has students moving the graphed line, both vertically and rotationally, while observing the changes that occur in the equation. They will be asked to describe the changes.

<p>2.1 2.2 2.3 3.1 ▸ RAD AUTO REAL</p> 	<p>Question</p> <p>On page 3.1, grab the center of the graphed line and <i>move it up and down</i></p> <p>What changes in the equation?</p> <p>Answer</p>	<p>2.3 3.1 3.2 3.3 ▸ RAD AUTO REAL</p> <p>Question</p> <p>On page 3.1, grab the graphed line on the right or left end of the line, then move the line.</p> <p>What changes in the equation?</p> <p>Describe what is happening to the line as you move it?</p>
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Problem 4 – Assessment:

Students need to fill in the blanks, of the questions, using the facts they gathered during the activity. They will end the assignment by changing a graphed line to match the given equation.

<p>3.1 3.2 3.3 4.1 ▸ RAD AUTO REAL</p> <p>Question</p> <p>In a linear equation written as:</p> $f(x) = mx + b$ <p>m is the (A) _____ of the line. It controls the (B) _____ of the line.</p> <p>b is the y-intercept of the line. It dictates where the line will (C) _____</p>	<p>3.2 3.3 4.1 4.2 RAD AUTO REAL</p> <p>Grab & move the line to graph the function:</p> $f(x) = -x + 3$ 
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