

Algebra Activity: Dynamic Graphing part 1 - Exploring Linear Functions

CALCULATORS: Casio: *fx-9860G*

INTRODUCTION:

A linear function is a function whose graph is that of a straight line.

Linear functions are often expressed in slope-intercept form, $y = mx + b$, where m represents the slope of the line and b represents its y-intercept.

When students are first learning about the graphing of linear functions in early algebra studies, it is often useful to investigate the role of the variables m and b .

The Dynamic Graphing capabilities of the Casio *fx-9860G* can be used as an effective teaching tool for such a demonstration.

PROCEDURE:

From the Main Menu, select the Dynamic Graphing mode (mode #6).

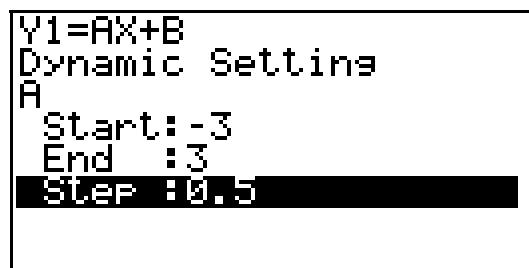
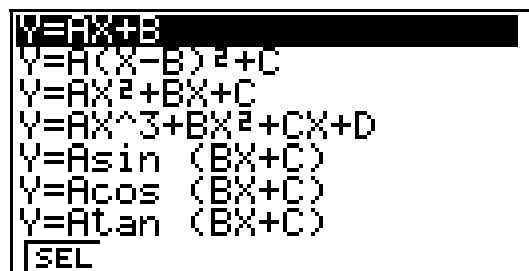
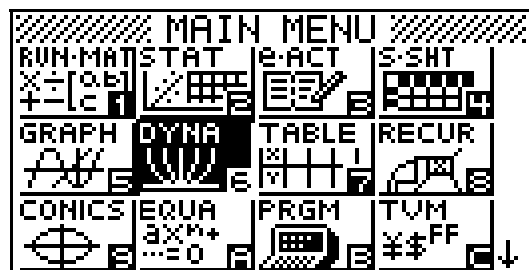
Make sure the list of functions is cleared by scrolling to each function and pressing

[F2] (DEL) **[F1]** (Yes) while the function is selected.

Press **[F5]** (B-IN) to display the list of built-in basic functions, then **[F1]** (SEL) to select the basic linear function ($Y=AX+B$).

Press **[F4]** (VAR) to begin setting parameters for the variables in $Y=AX+B$. Press **[F2]** (SET), then type:

[(-)] [3] [EXE] [3] [EXE] [0] [.] [5] [EXE]



This will cause the value of A (which is equivalent to m , the slope of the line) to oscillate between -3 and 3 , by increments of 0.5 .

Press **[EXIT]**. Note that the value of B is set to zero, so that the y-intercept of all graphed lines will be zero (they will pass through the origin). Note also that the Dynamic Variable is set to be A.

Press **[F6]** (DYNA). A progress bar will appear, requesting "One Moment Please." The calculator is generating a line for each of the varying values of A. You should soon see an animated series of lines with changing slopes.

Press **[AC/ON]** to interrupt the animation. The resulting screen will remind you of the current Dynamic settings. The menu options at the bottom of the screen allow you to change the speed of the animation. Listed left-to-right, the speeds are:

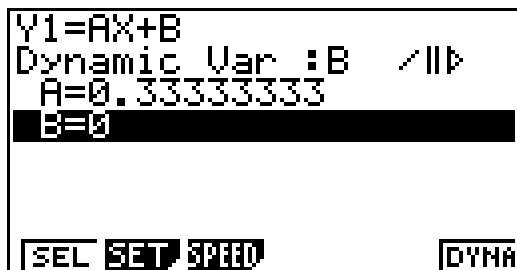
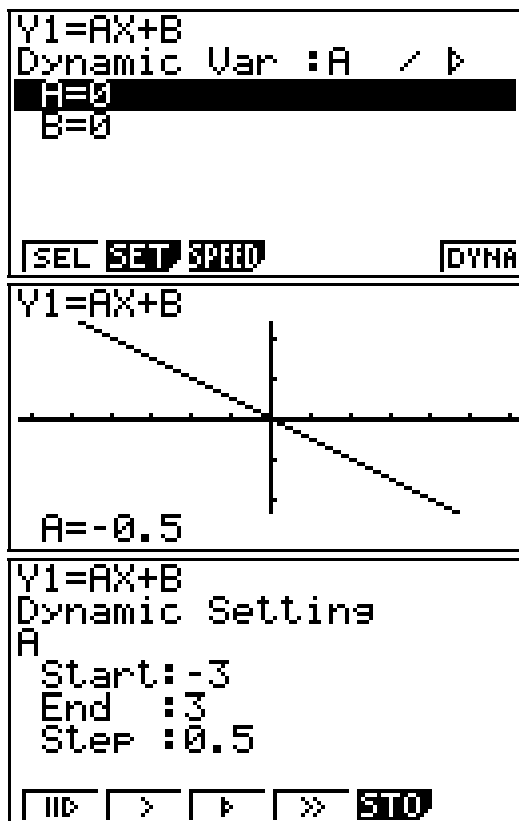
- [F1]** "Stop&Go", **[F2]** "Slow",
- [F3]** "Normal", and **[F4]** "Fast".

Press **[F1]** ($\|\triangleright$). The graphs will now "freeze" until **[EXE]** is pressed to advance to the next graph (and the next value of A). This is useful to allow more comfortable pacing during class discussion.

*(Tip: If for some reason the graph window does not display the lines at all, or does not display them in a desirable way, press **[AC/ON]** to interrupt the animation, then **[EXIT]** to return to the main Dynamic Variables screen, then **[SHIFT]-[F3]** to access the Viewing Window controls. Press **[F1]** (INIT) to choose the Initial settings, which will work well in most cases.)*

Press **[AC/ON]**, then **[EXIT]** to return to the Dynamic Variables screen. Type **[1] [a b/c] [3] [EXE]** to set the slope to $1/3$, then press **[F1]** (SEL) while B is highlighted to set B as the Dynamic Variable. Now, B will oscillate between the values of -3 and 3 .

Exercise 1. The play speed is still set to "Stop&Goe." Change the play speed to "Fast" to watch the y-intercept animate quickly.



Exercise 2. Create a Dynamic Graph animation for the equation $y = -\frac{1}{6}x + k$, where k is an integer with $-1 \leq k \leq 4$.

SOLUTIONS TO EXERCISES:

Exercise 1. If currently animating, the correct keystroke sequence is as follows:

[AC/ON] [EXIT] [F4] (>>)

When at the Dynamic Variable screen, use the following keystrokes:

[F3] (SPEED) [F4] (>>) [EXIT] [F6] (DYNA)

Exercise 2. If currently animating, press **[AC/ON]** to break the animation. Otherwise, press **[EXIT]** to return to the Dynamic Variable screen. Then type:

[(-)] [1] [a b/c] [6] [EXE]

**[F2] (SET) [(-)] [1] [EXE] [4] [EXE]
[1] [EXE] [EXIT]**

[F6] (DYNA)

