Modify Me

In this activity, you will begin with the coefficients of standard functions to determine how they impact the graph of the function. You will use the Modify Feature on the Casio PRIZM Graphing Calculator to help you investigate.

1. Choose Graph from the Main Menu.
2. Enter the given functions for each activity below, using A, B, C, D…… as coefficients and press EXE.
3. Press F5 (MODIFY) to see a graph of the function. Use ◀ ▶ to modify the highlighted coefficient to see its effect on the graph.
4. To change the coefficient, use ▲ ▼ to select the coefficient you want to modify.

MODIFY A LINEAR FUNCTION: Enter Ax + B into Y1

- Modify the coefficient A (set the value of B to 1):
  - What happens when A is a positive number? Describe how the graph looks – sketch an example.
  - What happens as A gets larger in the positive direction? Describe how the graph looks – sketch an example.
  - What happens when A is 0? Describe how the graph looks – sketch an example.
  - What happens when A is negative? Describe how the graph looks – sketch an example.
  - What happens as A gets more negative? Describe how the graph looks – sketch an example.
  - Make a conjecture about how the coefficient A in a linear function impacts the graph of the function.

- Modify the coefficient B (set the value of A to 1):
  - What happens when B is a positive number? Describe how the graph looks – sketch an example.
  - What happens as B gets larger in the positive direction? Describe how the graph looks – sketch an example.
  - What happens when B is 0? Describe how the graph looks – sketch an example.
  - What happens when B is negative? Describe how the graph looks – sketch an example.
  - What happens as B gets more negative? Describe how the graph looks – sketch an example.
  - Make a conjecture about how the coefficient B in a linear function impacts the graph of the function.

- Based on your conjectures, guess and draw a rough sketch of what you think the following linear functions look like. Then, use your calculator to check your answers.

  1. $y = -3x + 1$
  2. $y = 2x - 4$
  3. $y = -x - 3$
  4. $y = 5x + 2$

CASIO

MODIFY A QUADRATIC FUNCTION: Enter $Ax^2 + Bx + C$

- Modify the coefficient A (set the value of B to 1 and C to 1):
  - What happens when A is a positive number? Describe how the graph looks – sketch an example.
  - What happens as A gets larger in the positive direction? Describe how the graph looks – sketch an example.
  - What happens when A is 0? Describe how the graph looks – sketch an example.
  - What happens when A is negative? Describe how the graph looks – sketch an example.
  - What happens as A gets more negative? Describe how the graph looks – sketch an example.
  - Make a conjecture about how the coefficient A in a quadratic function impacts the graph of the function.

- Modify the coefficient B (set the value of A to 1 and C to 1):
  - What happens when B is a positive number? Describe how the graph looks – sketch an example.
  - What happens as B gets larger in the positive direction? Describe how the graph looks – sketch an example.
  - What happens when B is 0? Describe how the graph looks – sketch an example.
  - What happens when B is negative? Describe how the graph looks – sketch an example.
  - What happens as B gets more negative? Describe how the graph looks – sketch an example.
  - Make a conjecture about how the coefficient B in a quadratic function impacts the graph of the function.

- Modify the coefficient C (set the value of A to 1 and B to 1):
  - What happens when C is a positive number? Describe how the graph looks – sketch an example.
  - What happens as C gets larger in the positive direction? Describe how the graph looks – sketch an example.
  - What happens when C is 0? Describe how the graph looks – sketch an example.
  - What happens when C is negative? Describe how the graph looks – sketch an example.
  - What happens as C gets more negative? Describe how the graph looks – sketch an example.
  - Make a conjecture about how the coefficient C in a quadratic function impacts the graph of the function.

- Based on your conjectures, guess and draw a rough sketch of what you think the following quadratic functions look like. Then, use your calculator to check your answers.

  1. $y = 2x^2 - 3x + 1$
  2. $y = -x^2 + 2x + 3$
  3. $y = -3x^2 - x - 2$

WHAT'S MY INTERSECTION?

Solving Systems of Equations:
These problems can be solved by writing equations to represent each situation, graphing the equations, and finding the intersection(s).

Calculator Hints:

- Choose GRAPH from the Main Menu.
- Enter each equation, pressing EXE after each to set.
- Press F6 (DRAW) to view the graph of the equations.
- Press F5 (G-Solv) and then F5 (INTSECT) again to find the intersection(s).
- If there is more than one intersection, use the arrow keys to toggle between them.

Simple Practice:

1. $y = -x + 5$
   $y = x - 2$

2. $y = -x - 3$
   $y = -x + 3$

3. $y = 2x + 1$
   $y = -x - 2$

4. $y = -x^2 + 2x - 1$
   $y = 2x - 4$

Application Problems:
Write equations to represent each situation and convert to y = form. Find the solution graphically by entering the equations you created and finding the intersection.

5. The Math Club and the Science Club have planned two different field trips. The Math Club rented and filled 1 van and 6 buses with 372 students. The Science Club rented and filled 4 vans and 12 buses with u780 students. Each van and each bus carried the same number of students. How many students can a van carry? How many students can a bus carry?

6. Mary Ann's school is selling tickets to the spring talent show. On the first day of ticket sales the school sold 3 staff tickets and 9 student tickets for a total of $75. The school took in $67 on the second day by selling 8 staff tickets and 5 student tickets. How much does each type of ticket cost?

Challenge Problem:

7. A cell-tower signal broad casts in a circular range represented by the equation $y = \sqrt{-x^2 + 2025}$
A highway cuts through this broadcast range and is represented by the equation $y = \frac{1}{20}x + 15$. At what points does a car driving on the highway enter and exit the cell-tower signal range? (What is an appropriate view window on your graphing calculator?)