

6.B Constant Differences, Constant Ratios

You will need:

graph paper



CONSTANT DIFFERENCE GRAPHS

These three (x, y) pairs follow a pattern: $(6, 0)$, $(7, 1)$, $(-4, -10)$. The difference between y and x always equals 6. The equation $y - x = -6$ describes the relationship between x and y .

Use the same pair of axes for all the graphs in problems 1-5.

1. Graph $y - x = -6$.
2. Choose any other integer D and graph the function $y - x = D$. (For example, if you chose the integer 10, you would graph the equation $y - x = 10$.) Label the graph with its equation.
3. Graph several other functions of the form $y - x = D$. For each graph, you will need to choose a different number for D . Remember to try negative numbers and fractions as well as positive integers.
4. Compare your *constant difference* graphs with the *constant sum* graphs that you investigated in Chapter 5, Lesson 1.
5. Graph some constant difference graphs of the form $x - y = D$. Explain any differences or similarities with graphs of the form $y - x = D$.

CONSTANT RATIO GRAPHS

These three (x, y) pairs follow a pattern: $(3, 6)$, $(4, 8)$, $(-4, -8)$. The ratio of y to x is always equal to 2. The equation $y/x = 2$ describes the relationship between x and y .

Use the same pair of axes for the graphs in problems 6-9.

6. Graph $y/x = 2$.

7. Choose any other number R and graph the function $y/x = R$. (For example, if you chose R to be 3, you would graph the equation $y/x = 3$.) Label the graph with its equation.
8. Graph several other functions of the form $y/x = R$. For each graph, you will need to choose a different number for R . Be sure to try some negative and fractional values as well as positive integers.
9. Now graph some *constant ratio* graphs of the form $x/y = R$. Explain any differences and similarities with graphs of the form $y/x = R$.

PARAMETERS

Note: D and R in problems 2-9 are called *parameters*.

10. **Report** Write a report describing and analyzing any patterns you noticed in the graphs you just drew. Your report should be divided into two parts, one on constant differences, and the other on constant ratios. It should include, but not be limited to, answers to these questions:
 - Can you tell from the value of the parameter which quadrants the lines will pass through? Whether the lines slope up or down?
 - Do any lines go through the origin? If not, do you think you could find a value for the parameter so that the line would go through the origin? Explain.
 - For the constant ratio graphs, why is there a “hole” in the graph when $x = 0$?
 - Comment on anything you notice about the x -intercepts and y -intercepts.
 - There is one constant difference graph that is also a constant ratio graph. What are the values of D and R ?