

Operations and Function Diagrams

You will need:

graph paper



function diagram paper



ADDITION

- Draw a function diagram to represent each of these functions.
 - $y = x + 6$
 - $y = x + 3$
 - Compare the two diagrams. How are they alike? How are they different?

The two function diagrams you just drew both represented functions of the form $y = x + b$, where b is a constant. In the first case, b was 6. In the second case, b was 3.

- Draw three other function diagrams of the form $y = x + b$. Be sure to try at least one negative value of b .
- Draw a function diagram for the function $y = x$.
 - The function $y = x$ is also of the form $y = x + b$. What is b ?
- ☛ The function diagrams you drew in problems 1-3 represent addition. In each case, to get the value of y , you added the number b to x . How are all of these diagrams alike? How are they different? How does the value of b affect the diagram?

MULTIPLICATION

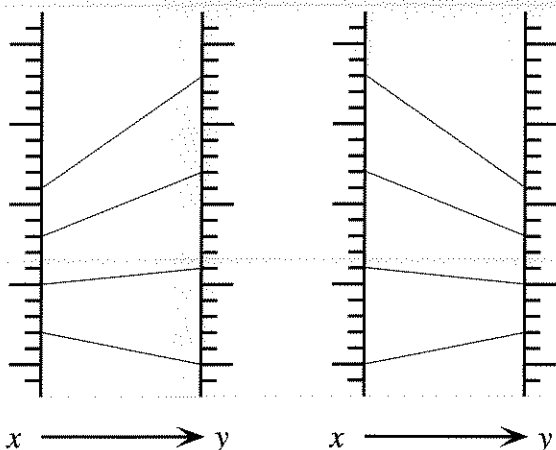
- Draw a function diagram to represent each of these functions.
 - $y = 2x$
 - $y = 3x$
 - Compare the two diagrams. How are they alike? How are they different?

The two function diagrams you just drew both represented functions of the form $y = mx$, where m is a constant. In the first case, m was 2. In the second case, m was 3.

- Draw three other function diagrams of the form $y = mx$. Be sure to try at least one negative value of m and one value of m between 0 and 1.
- The function $y = x$, for which you already have a diagram, is also of the form $y = mx$. What is m ?
- The function diagrams you just drew represent multiplication. In each case, to get the value of y you multiplied x by a number. How are all of these diagrams the same? How are they different?
- ☛ Look at your multiplication diagrams. For each one, as the value of x increases from the bottom of its number line, follow the value of y on its number line with your finger.

 - For what values of m does the value of y go up? Down?
 - Is there a value of m for which y goes neither up nor down, but remains unchanged?
 - For what values of m does the value of y change faster than x ? More slowly?
 - Is there a value of m for which y changes at the same rate as x ?

MIRROR IMAGE DIAGRAMS



The two function diagrams above are mirror images of each other.

10. Explain how to draw the mirror image of a function diagram.

For each of the following functions:

- a. Draw the function diagram, using the same scale on the x - and y -number lines.
- b. Draw the mirror image diagram.
- c. Find the function corresponding to the mirror image.

11. $y = x + 3$ 12. $y = 4x$

13. $y = x - 4$ 14. $y = x/3$

15. Explain the relationship between the function corresponding to the mirror image and the original function.

16. **Report** Write a report summarizing what you learned in this lesson. Illustrate your report with examples of function diagrams. Your report should include, but not be limited to, answers to the following questions:

- Addition can be represented by functions of the form $y = x + b$. What do their function diagrams look like if $b = 0$? What if b is greater than 0? Less than 0?
- Subtraction can be represented by functions of the form $y = x - b$. How do their function diagrams compare with those of addition?
- Multiplication can be represented by functions of the form $y = mx$. What do their function diagrams look like if m is negative? If m is positive? What if m is a number between 0 and 1?
- Division can be represented by functions of the form $y = x/m$. How do their function diagrams compare with those of multiplication? What if m is positive? Negative? What if m is a number between 0 and 1?

17. Compare function diagrams of the form $y = b - x$ with those of the form $y = x - b$.