THINKING WRITING

3.B Opposites and Reciprocals

OPPOSITES

The function $y = -x$ can be thought of as the *opposite function,* since y and x are opposites.

1. a. Make a function diagram for the function $y = -x$.
   b. Describe the in-out lines. (Are they parallel? Do they meet in a single point? If so, where is that point?)

2. To answer these questions, look at the diagram you made for problem 1.
   a. As x increases, what happens to y?
   b. Are x and y ever equal? Explain.
   c. When x increases by 3, what happens to y?

3. Find the number and its opposite that are described. Use trial and error. Look for patterns. Try to develop a shortcut strategy.
   a. a number 16 more than its opposite
   b. a number 0.5 more than its opposite
   c. a number 21 less than its opposite
   d. 💡 a number A less than its opposite
   e. 💡 a number 8 more than twice its opposite.

4. **Report** In a few paragraphs, summarize what you learned about opposites and their function diagrams. Include examples.

RECIPROCALS

The function $y = 1/x$ can be thought of as the *reciprocal function,* since y and x are reciprocals.

5. a. Make an in-out table for the function $y = 1/x$, using the following values for x: -5, -4, -3, -2, -1, -0.8, -0.6, -0.4, -0.2, and the opposites of these numbers (0.2, 0.4, etc.)
   b. Make a whole-page function diagram for the function.

6. Use the function diagram you made in problem 5. Follow y with your finger as x goes up its number line. Answer these questions.
   a. As x increases, what happens to y?
   b. Are x and y ever equal?

7. On your function diagram of $y = 1/x$, as x moves up the number line, answer questions (a-h), describing what happens to y. (Does it move up or down? Fast or slowly? From what to what?)
   a. when x is a negative number far from 0
   b. when x approaches -1
   c. when x passes -1
   d. when x approaches 0
   e. when x passes 0
   f. when x approaches 1
   g. when x passes 1
   h. when x is a large positive number

8. Use your calculator to look for a number and its reciprocal that satisfy these requirements. If you cannot find an exact number, get as close as you can by trial and error. One is impossible.
   a. The number is 9 times its reciprocal.
   b. The number is 1/9 of its reciprocal.
   c. The number equals the opposite of its reciprocal.
   d. 💡 The number is 3 times its reciprocal.
   e. 💡 The number is one more than its reciprocal.

9. **Report** Summarize what you learned about reciprocals and their function diagrams. Include examples. (Do not forget to discuss what happens when $x = 0$.)