



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.

RECIPROCAL

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 $x = 0$.)