

A Practise

For help with questions 1 to 4, refer to Example 1.

1. For each function, determine $f(4)$, $f(-5)$, and $f\left(-\frac{2}{3}\right)$.

a) $f(x) = \frac{2}{5}x + 11$

b) $f(x) = 3x^2 + 2x + 1$

c) $f(x) = 2(x + 4)^2$

d) $f(x) = -6$

e) $f(x) = \frac{1}{x}$

f) $f(x) = \sqrt{x + 5}$

2. Find the value of each function at $x = 0$. Sketch the graph of each function.

a) $f(x) = 5x + 4$

b) $k(x) = 4x$

c) $p(x) = -4$

d) $g(x) = 11x^2 + 3x - 1$

e) $f(x) = (3x - 3)(2x + 2)$

f) $h(x) = -\frac{2}{3}(5 - 4x)(x - 7)$

3. A linear function machine uses a function of the form $f(x) = ax$. Find the value of a for each given point on the function, and then write the defining equation of the function.

a) $(3, -12)$

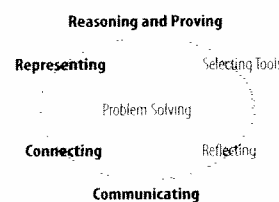
b) $(5, 15)$

c) $\left(1, \frac{2}{3}\right)$

d) $(-3, 3)$

4. Give an example of a linear function and a constant function, both in function notation.

Describe the similarities and the differences between the two functions.



For help with questions 5 to 8, refer to Example 2.

5. Show each set of data in a mapping diagram.

a) $\{(1, 4), (2, 1), (3, -2), (4, -5), (5, -8), (6, -11), (7, -14), (8, -17)\}$

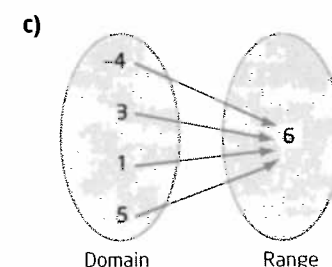
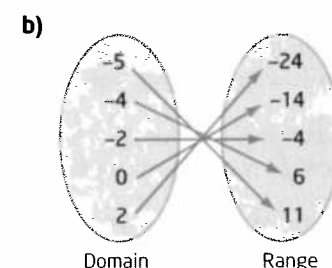
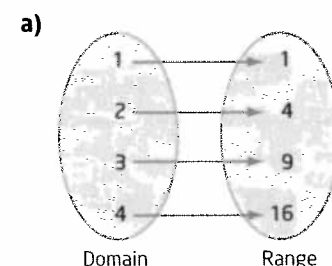
b) $\{(-3, 4), (-2, -1), (-1, -4), (0, -5), (1, -4), (2, -1)\}$

c) $\{(-5, 6), (-4, 9), (-3, 1), (-5, -6), (1, -2), (3, 8), (8, 8)\}$

d) $\{(9, 9), (7, 9), (5, 9), (3, 9)\}$

6. Determine if each relation in question 5 is a function. Justify your answer.

7. Write the ordered pairs associated with each mapping diagram.



8. Determine whether each relation in question 7 is a function. Justify your answer.

9. What advantages do mapping diagrams have over a list of ordered pairs?

For help with question 10, refer to Example 3.

10. Write each function in mapping notation.

a) $f(x) = -x + 4$

b) $g(x) = x^2 + 5x - 3$

c) $s(x) = \sqrt{4x - 4}$

d) $r(k) = -\frac{1}{2k - 1}$

B Connect and Apply

11. Describe two different ways to determine if a relation is a function.

12. **Use Technology** If the output of a quadratic function machine gives data that fit an equation of the form $f(x) = ax^2 + bx + c$, a graphing calculator can be used to determine the equation if at least three data points are given. Data are given from such a function machine as follows: $\{(1, 4), (2, 11), (3, 24)\}$.

- a) Enter the values of the domain in L1 and the values of the range in L2.

- b) Plot the data.

- c) Run quadratic regression to determine the quadratic equation that fits these data. Record the equation that results from this regression.

- d) Use this function to determine the range values for the domain values $x = -3$, $x = 0$, and $x = 5$.

Technology Tip

Refer to the Technology Appendix, pages 496 to 516, if you need help with displaying data, quadratic regression, or finding values.

13. a) Complete a table of values for the relation

$f(x) = \sqrt{x}$ and graph the data.

- b) Is this relation a function? Explain.

- c) Could you have identified the relation was a function from the table of values? Explain.

For help with questions 14 to 16, refer to Example 4.

14. Rivers located near an ocean have a large wave called a tidal bore. The speed, v , in kilometers per hour, of the tidal bore in a river is a function of the depth, d , in metres, of the river. The function is $v(d) = 11.27\sqrt{d}$.

- a) Determine the domain of this function.

- b) Make a table of values for this function.

15. The value, V , in dollars, of a car is given by $V(n) = \frac{23\,000}{n + 1}$.

- a) How much was this car worth when it was first purchased?

- b) Determine the value of the car after

i) 10 years ii) 12 years

- c) How long would it take the car to depreciate to a value of \$10,000?

- d) Is $V(n)$ a function? Justify your answer.

16. The amount, A , in dollars, that is invested at an interest rate i after 1 year is given by the relation $A(i) = \frac{100}{1 + i}$. Note that i must be in decimal form.

- a) Determine the domain of this relation.

- b) Graph the relation.

- c) How much money needs to be invested at 5% to give \$100 after 1 year?

- d) What rate of interest is required to give \$100 if \$100 is invested?