

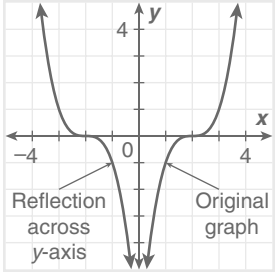
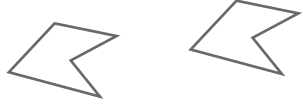
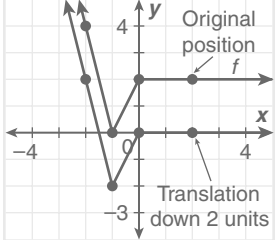
The table contains important vocabulary terms from Chapter 1. As you work through the chapter, fill in the page number, definition, and a clarifying example.

Term	Page	Definition	Clarifying Example
dependent variable			
domain			
function			
independent variable			
parent function			
principal root			
radicand			

The table contains important vocabulary terms from Chapter 1. As you work through the chapter, fill in the page number, definition, and a clarifying example.

Term	Page	Definition	Clarifying Example
dependent variable	52	The output of a function; a variable whose value depends on the value of the input, or independent variable.	For $y = 2x + 1$, y is the dependent variable.
domain	44	The set of all possible input values of a relation or function.	The domain of the function $f(x) = \sqrt{x}$ is $\{x \mid x \geq 0\}$.
function	45	A relation in which every input is paired with exactly one output.	Function: $\{(0, 5), (1, 3), (2, 1)\}$ Not a function: $\{(0, 1), (0, 3), (2, 1)\}$
independent variable	52	The input of a function; a variable whose value determines the value of the output, or dependent variable.	For $y = 2x + 1$, x is the independent variable.
parent function	67	The simplest function with the defining characteristics of the family. Functions in the same family are transformations of their parent function.	$f(x) = x^2$ is the parent function for $g(x) = x^2 + 4$ and $h(x) = 5(x + 2)^2 - 3$
principal root	21	The positive root of a number, indicated by the radical sign.	36 has two square roots, 6 and -6 . The principal square root of 36 is $\sqrt{36} = 6$.
radicand	21	The expression under a radical sign.	Expression: $\sqrt{x + 3}$ Radicand: $x + 3$

Term	Page	Definition	Clarifying Example
reflection			
relation			
scientific notation			
set			
set-builder notation			
subset			
transformation			
translation			

Term	Page	Definition	Clarifying Example
reflection	60	A transformation that reflects, or “flips,” a graph or figure across a line, called the line of reflection, such that each reflected point is the same distance from the line of reflection but is on the opposite side of the line.	
relation	44	A set of ordered pairs.	$\{(0, 5), (0, 4), (2, 3), (4, 0)\}$
scientific notation	36	A method of writing very large or very small numbers, by using powers of 10, in the form $m \times 10^n$, where $1 \leq m < 10$ and n is an integer.	$12,560,000,000 = 1.256 \times 10^9$ $0.0000075 = 7.5 \times 10^{-6}$
set	6	A collection of items called elements.	$\{1, 2, 3\}$
set-builder notation	8	A notation for a set that uses a rule to describe the properties of the elements of the set.	$\{x \mid x > 3\}$ is read “The set of all x such that x is greater than 3.”
subset	6	A set that is contained entirely within another set. Set B is a subset of set A if every element of B is contained in A , denoted $B \subset A$.	The set of integers is a subset of the set of rational numbers, denoted $\mathbb{Z} \subset \mathbb{Q}$
transformation	59	A change in the position, size, or shape of a figure or graph	
translation	59	A transformation that shifts or slides every point of a figure or graph the same distance in the same direction.	



1-1 Sets of Numbers

Order the given numbers from least to greatest. Then classify each number by the subsets of the real numbers to which it belongs.

1. $7\frac{1}{4}$, $\sqrt{21}$, -4.15 , $3.\overline{66}$

2. $7\frac{1}{4}$ 3. -4.15

4. $\sqrt{21}$ 5. $3.\overline{66}$

6. $-\sqrt{10}$, 7 , $\frac{1}{5}$, -3

7. $-\sqrt{10}$ 8. $\frac{1}{5}$

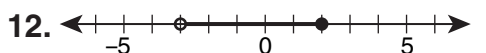
9. 7

10. -3

Rewrite each set in the indicated notation.

11. $\{x \mid -2 \leq x < 4\}$;

interval notation



set-builder notation

1-2 Properties of Real Numbers

Identify the property demonstrated by each equation.

13. $t + 4 = 4 + t$

14. $a + (6 + y) = (a + 6) + y$

15. $2a + 2b = 2(a + b)$

16. $0 + 21 = 21$

17. Use mental math to find a 25% discount on an item that costs \$160. Explain your steps.



1-1 Sets of Numbers

Order the given numbers from least to greatest. Then classify each number by the subsets of the real numbers to which it belongs.

1. $7\frac{1}{4}, \sqrt{21}, -4.15, 3.\overline{66}$ $-4.15, 3.\overline{66}, \sqrt{21}, 7\frac{1}{4}$

2. $7\frac{1}{4}$ rational; real 3. -4.15 rational; real

4. $\sqrt{21}$ irrational; real 5. $3.\overline{66}$ rational; real

6. $-\sqrt{10}, 7, \frac{1}{5}, -3$ $-\sqrt{10}, -3, \frac{1}{5}, 7$

7. $-\sqrt{10}$ irrational; real 8. $\frac{1}{5}$ rational; real

9. 7 whole; integer; rational; real

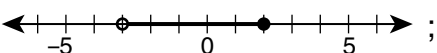
10. -3 integer; rational; real

Rewrite each set in the indicated notation.

11. $\{x \mid -2 \leq x < 4\}$;

interval notation

$(-2, 4]$

12.  ;

set-builder notation

$\{x \mid -3 < x \leq 2\}$

1-2 Properties of Real Numbers

Identify the property demonstrated by each equation.

13. $t + 4 = 4 + t$

Commutative Property of Addition

14. $a + (6 + y) = (a + 6) + y$

Associative Property of Addition

15. $2a + 2b = 2(a + b)$

Distributive Property

16. $0 + 21 = 21$

Identity Property of Zero

17. Use mental math to find a 25% discount on an item that costs \$160. Explain your steps.

\$40; Sample answer: 25% = 10% + 10% + 5%; 10% of \$160 is \$16 and 5% is \$8. \$16 + \$16 + \$8 = \$40

1-3 Square Roots

18. Margaret is putting baseboard around the bottom edge of a square-shaped room. The room is 196 ft^2 . If the baseboard comes in lengths of 10 feet, how many pieces of baseboard should she buy to place baseboard around the entire room?

Simplify each expression.

19. $\frac{\sqrt{80}}{\sqrt{5}}$

20. $-\sqrt{72}$

21. $\sqrt{18} \cdot \sqrt{28}$

22. $9\sqrt{50} - 4\sqrt{2}$

1-4 Simplifying Algebraic Expressions

Evaluate each expression for the given values of the variables.

23. $12ab - ab^2$ for $a = 3$ and $b = 4$

24. $\frac{2ab^2}{5a^2b}$ for $a = -2$ and $b = 3$

Simplify each expression.

25. $7x^2 - 5y + 9x^2 + y$

26. $3(2x - y) - 5x + 6y$

1-5 Properties of Exponents

Simplify each expression. Assume all variables are nonzero.

27. $(x^8y^{-8})^2$

28. $\frac{6a^{-5}b^3}{-3ab^{-2}}$

29. $6(m^2n^3)^{-3}$

30. $\left(\frac{x^2y^4}{y^{10}}\right)^3$

31. One parsec is about 3.26 light-years and 1 light-year is about 5.88×10^{12} miles. Find the number of miles in one parsec.

1-3 Square Roots

18. Margaret is putting baseboard around the bottom edge of a square-shaped room. The room is 196 ft^2 . If the baseboard comes in lengths of 10 feet, how many pieces of baseboard should she buy to place baseboard around the entire room?

6 pieces

Simplify each expression.

19. $\frac{\sqrt{80}}{\sqrt{5}}$

4

20. $-\sqrt{72}$

$-6\sqrt{2}$

21. $\sqrt{18} \cdot \sqrt{28}$

$6\sqrt{14}$

22. $9\sqrt{50} - 4\sqrt{2}$

$41\sqrt{2}$

1-4 Simplifying Algebraic Expressions

Evaluate each expression for the given values of the variables.

23. $12ab - ab^2$ for $a = 3$ and $b = 4$

96

24. $\frac{2ab^2}{5a^2b}$ for $a = -2$ and $b = 3$

$-\frac{3}{5}$

Simplify each expression.

25. $7x^2 - 5y + 9x^2 + y$

$16x^2 - 4y$

26. $3(2x - y) - 5x + 6y$

$x + 3y$

1-5 Properties of Exponents

Simplify each expression. Assume all variables are nonzero.

27. $(x^8y^{-8})^2$

$x^{16}y^{-16}$ or $\frac{x^{16}}{y^{16}}$

28. $\frac{6a^{-5}b^3}{-3ab^{-2}}$

$-\frac{2b^5}{a^6}$

29. $6(m^2n^3)^{-3}$

$6m^{-6}n^{-9}$ or $\frac{6}{m^6n^9}$

30. $\left(\frac{x^2y^4}{y^{10}}\right)^3$

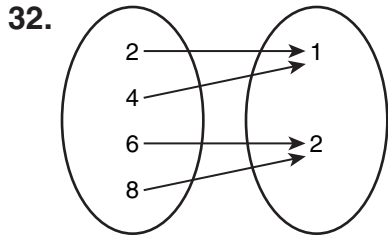
$\frac{x^6}{y^{18}}$

31. One parsec is about 3.26 light-years and 1 light-year is about 5.88×10^{12} miles. Find the number of miles in one parsec.

1.91688×10^{13}

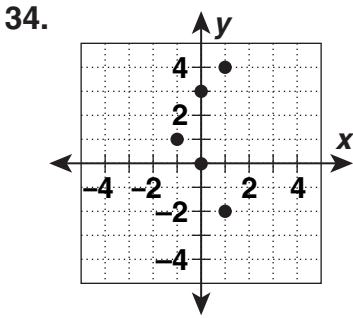
1-6 Relations and Functions

Give the domain and range for each relation. Then tell whether the relation is a function.



33.

Perimeter of Square	Area of Square
4	1
8	4
12	9
16	16



1-7 Function Notation

For each function, determine $f(-1)$, $f(0)$, and $f(2)$.

35. $f(x) = x^2 - 4$

36. $f(x) = 8 - x^3$

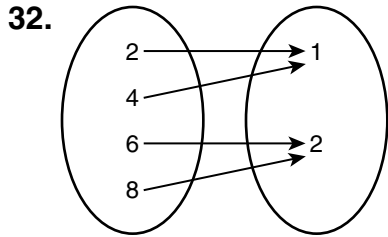
37. $f(x) = -3x + 4$

38. A wood planer costs \$1.50 to turn on and \$0.75 per minute of use.

- a. Write a function to represent the cost of the wood planer per number of minutes used.

1-6 Relations and Functions

Give the domain and range for each relation. Then tell whether the relation is a function.

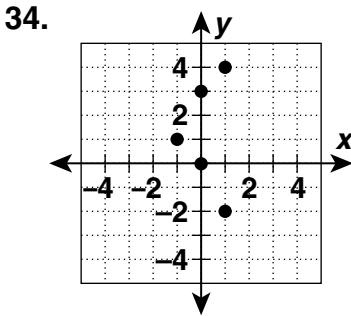


Domain: {2, 4, 6, 8};
Range: {1, 2}; yes

33.

Perimeter of Square	Area of Square
4	1
8	4
12	9
16	16

Domain: {4, 8, 12, 16};
Range: {1, 4, 9, 16}; yes



Domain: {-1, 0, 1};
Range: {-2, 0, 1, 3, 4}; No

1-7 Function Notation

For each function, determine $f(-1)$, $f(0)$, and $f(2)$.

35. $f(x) = x^2 - 4$

-3; -4; 0

36. $f(x) = 8 - x^3$

9; 8; 0

37. $f(x) = -3x + 4$

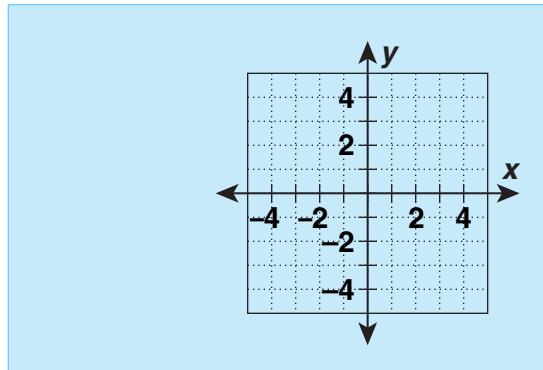
7; 4; -2

38. A wood planer costs \$1.50 to turn on and \$0.75 per minute of use.

a. Write a function to represent the cost of the wood planer per number of minutes used.

$c(t) = 0.75t + 1.50$

b. Graph the function.

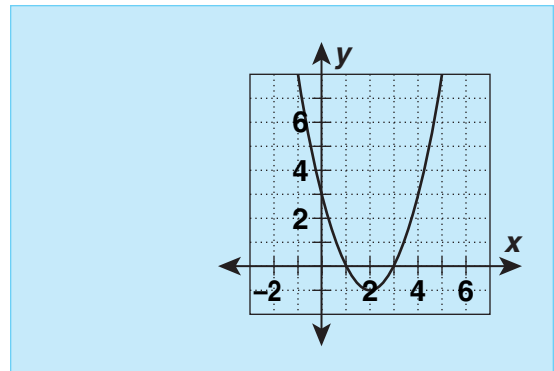


c. Give the value of the function for an input of 12 and explain its real-world meaning.

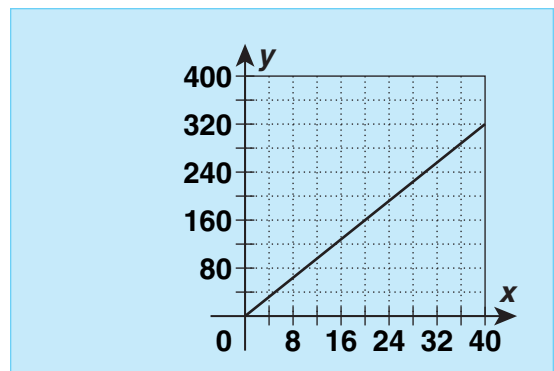
1-8 Exploring Transformations

39. Use a table to perform the transformation of $y = f(x)$. Graph the transformed function on the same coordinate plane as the original function.

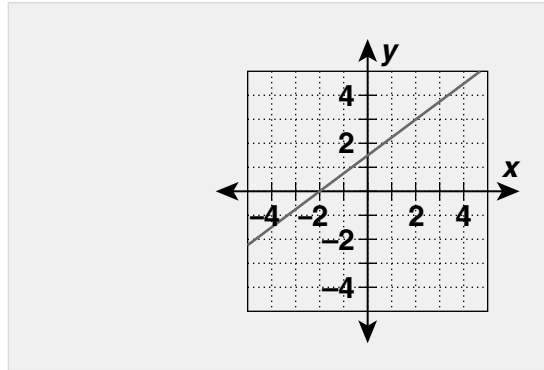
translation up 3 units



40. The graph shows the gross pay that you would make working a particular number of hours per week. Sketch a graph to represent an hourly rate increase of \$1 per hour and identify the transformation of the original graph that it represents.



b. Graph the function.



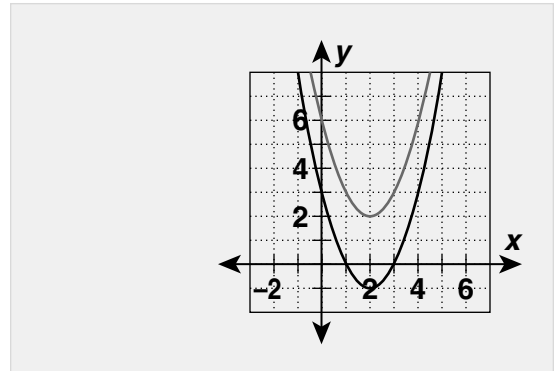
c. Give the value of the function for an input of 12 and explain its real-world meaning.

$c(12) = \$10.50$; It is the cost of using the wood planer for 12 minutes.

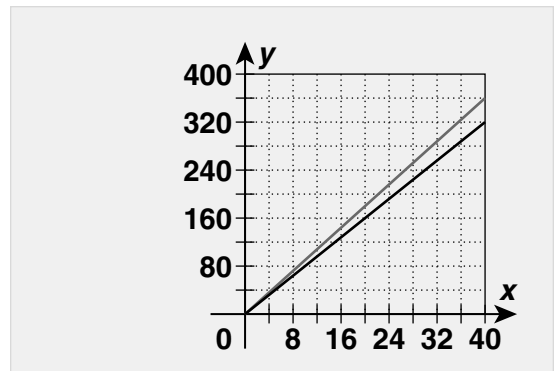
1-8 Exploring Transformations

39. Use a table to perform the transformation of $y = f(x)$. Graph the transformed function on the same coordinate plane as the original function.

translation up 3 units



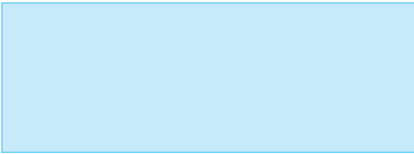
40. The graph shows the gross pay that you would make working a particular number of hours per week. Sketch a graph to represent an hourly rate increase of \$1 per hour and identify the transformation of the original graph that it represents.



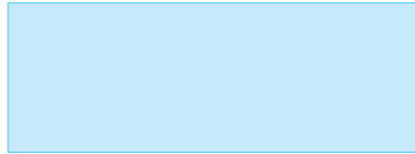
1-9 Introduction to Parent Functions

Identify the parent function for g from its equation. Then graph g on your calculator and describe what transformation of the parent function it represents.

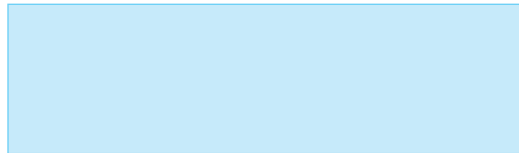
41. $g(x) = 3x - 2$



42. $g(x) = x^3 + 1$

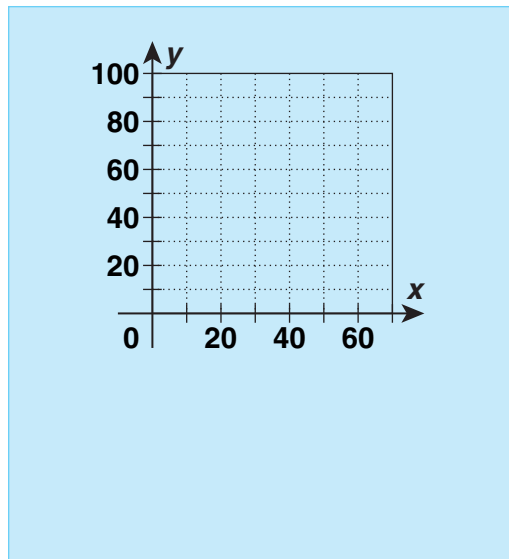


43. $g(x) = \frac{1}{2}x^2 - 3$



44. Graph the relationship between the number of minutes spent studying and the score on the math quiz. Identify which parent function best describes the data. Then use the graph to estimate the score on a quiz when 40 minutes are spent studying.

Minutes Studying	10	60	50	0	35	25
Score of Math Quiz	65	95	85	50	80	70



1-9 Introduction to Parent Functions

Identify the parent function for g from its equation. Then graph g on your calculator and describe what transformation of the parent function it represents.

41. $g(x) = 3x - 2$

$y = x$; 2 units down,
stretched vertically by a
factor of 3

42. $g(x) = x^3 + 1$

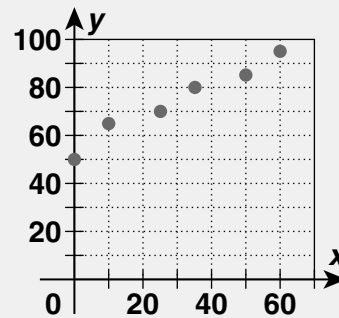
$y = x^3$; 1 unit up

43. $g(x) = \frac{1}{2}x^2 - 3$

$y = x^2$; 3 units down, stretched
vertically by a factor of $\frac{1}{2}$.

44. Graph the relationship between the number of minutes spent studying and the score on the math quiz. Identify which parent function best describes the data. Then use the graph to estimate the score on a quiz when 40 minutes are spent studying.

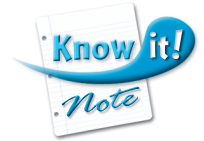
Minutes Studying	10	60	50	0	35	25
Score of Math Quiz	65	95	85	50	80	70



The parent function is

$$y = \frac{3}{4}x + 50.$$

A score of 82 would be expected with 40 minutes of studying.



Answer these questions to summarize the important concepts from Chapter 1 in your own words.

1. Explain how the various sets of numbers are related.

2. Explain how the Additive Inverse Property differs from the Multiplicative Inverse Property.

3. Explain how to simplify an algebraic expression.

4. What makes a relation a function? Explain how the inputs and outputs of a function are related.

For more review of Chapter 1:

- Complete the Chapter 1 Study Guide and Review on pages 76–79 of your textbook.
- Complete the Ready to Go On quizzes on pages 43 and 75 of your textbook.



Answer these questions to summarize the important concepts from Chapter 1 in your own words.

1. Explain how the various sets of numbers are related.

Real Numbers consist of Rational Numbers and Irrational Numbers. The Rational Numbers consist of Integers, Whole Numbers, and Natural Numbers

2. Explain how the Additive Inverse Property differs from the Multiplicative Inverse Property.

The Additive Inverse Property states that the sum of a number and its opposite is 0. The Multiplicative Inverse Property states the product of a nonzero number and its reciprocal is 1.

3. Explain how to simplify an algebraic expression.

To simplify an algebraic expression, combine like terms by adding or subtracting the coefficients. Like terms have the same exponent raised to the same power.

4. What makes a relation a function? Explain how the inputs and outputs of a function are related.

A relation in which the first coordinate is never repeated is called a function. A function has only one output for each input, so each element of the domain is mapped to exactly one element in the range. Even though a function cannot map a single input to more than one output, two or more different inputs can be mapped to the same output.

For more review of Chapter 1:

- Complete the Chapter 1 Study Guide and Review on pages 76–79 of your textbook.
- Complete the Ready to Go On quizzes on pages 43 and 75 of your textbook.