

Vocabulary Review

branch (p. 495)
complex fraction (p. 516)
dependent events (p. 531)
independent events (p. 531)

inverse variation (p. 488)
joint variation (p. 490)
mutually exclusive events (p. 533)
point of discontinuity (p. 501)

rational function (p. 501)
reciprocal function (p. 495)
simplest form (p. 509)

Choose the correct vocabulary term to complete each sentence.

- Two events are ? if they cannot happen at the same time. **mutually exclusive**
- When the numerator and denominator of a rational expression are polynomials with no common divisors, the rational expression is in ?. **simplest form**
- When the outcome of one event does not affect the outcome of a second event, the two events are ?. **independent events**
- A part of the graph of an inverse variation is called a(n) ?. **branch**
- If a is a zero of the denominator of a function, the function has a(n) ? at $x = a$. **point of discontinuity**



For: Vocabulary quiz
Web Code: agj-0951

Skills and Concepts

9-1 Objectives

- To use inverse variation (p. 488)
- To use joint and other variations (p. 490)

An equation in two variables of the form $xy = k$, $y = \frac{k}{x}$, or $x = \frac{k}{y}$, where $k \neq 0$, is an **inverse variation**. Extensions of direct and inverse variations to more complicated relationships are combined variations.

Suppose that x and y vary inversely. Write a function that models each inverse variation. Find y when $x = 5$.

6. $x = 10$ when $y = 15$ 7. $x = 30$ when $y = 2$ 8. $x = 6$ when $y = 30$
 $y = \frac{150}{x}; 30$ $y = \frac{60}{x}; 12$ $y = \frac{180}{x}; 36$

If possible, write direct or inverse variation equations to model each relation.

9.

x	3	4	8
y	24	18	9

 10.

x	11	13	15
y	15	13	11

 11.

x	5	7	9
y	30	42	54

 $y = \frac{72}{x}$ not possible $y = 6x$

Write the function that models each relationship. Find z when $x = 4$ and $y = 8$.

12. z varies jointly with x and y . When $x = 2$ and $y = 2$, $z = 7$. $z = \frac{7}{4}xy; 56$
 13. z varies directly with x and inversely with y . When $x = 5$ and $y = 2$, $z = 10$.
 14. z varies directly with the cube of x and inversely with y . When $x = 3$ and $y = 3$, $z = 9$. $z = \frac{x^3}{y}; 8$

Describe the variation modeled by each equation.

15. $R = kmn^2$ 16. $W = \frac{k}{d^2}$ 17. $P = \frac{kx}{y^2z}$
 R varies jointly with k , m and the square of n . **W varies inversely with the square of d .**

13. $z = \frac{4x}{y}; 2$

Resources

Student Edition

Extra Skills and Word Problems Practice, Ch. 1, p. 852
English/Spanish Glossary, p. 899
Properties and Formulas, p. 893
Table of Symbols, p. 889

Differentiated Instruction

Vocabulary and Study Skills worksheet 9F
Spanish Vocabulary and Study Skills worksheet 9F
Interactive Textbook Audio Glossary
Online Vocabulary Quiz

Success Tracker™
Online at PHSchool.com

Spanish Vocabulary/Study Skills ELL

Vocabulary/Study Skills L3

9D: Vocabulary For use with Chapter Review

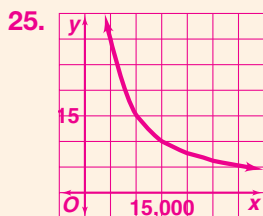
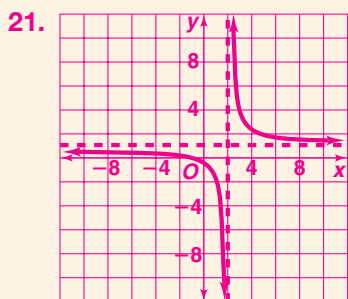
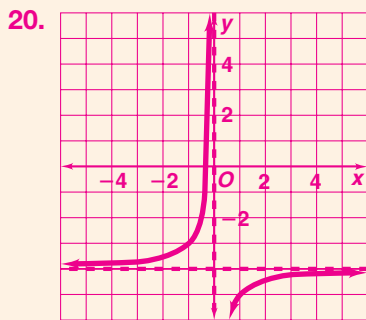
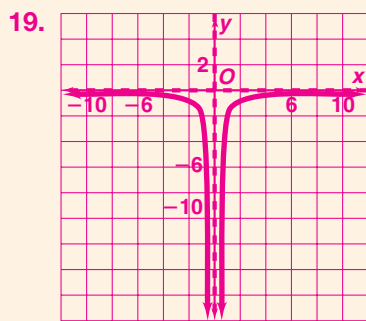
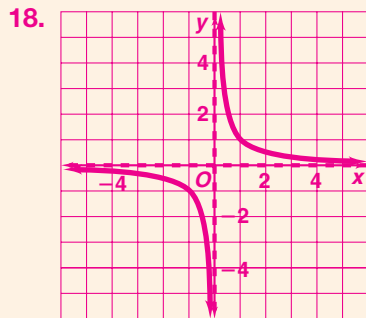
Study Skill: Try writing vocabulary words on note cards, with the definitions on the back of the cards. You can then flip through the cards and say the definitions to yourself as you read each word. If you need help remembering the definition, flip the card over.

Unscramble the UPPERCASE letters to form a math word or phrase that completes each sentence.

- A rational expression is in TESSPILM MORF when its numerator and denominator are polynomials that have no common divisors. _____
- A fraction that has a fraction in either its numerator or denominator is SLEEMPOG. _____
- A value that satisfies the derived equation but not the original equation is a(n) TENNAESOUR TOOSNUIL. _____
- A point on the graph where the denominator of a rational function is zero is a(n) TENNINCOLDITYS. _____
- Events for which the outcome of one event does not affect the outcome of a second are called PTENNENDEED. _____
- Each of the two parts of a graph is called a(n) NARBCH. _____
- A function of x that can be written as the quotient of two other polynomial functions of x (with the divisor not equal to zero) is called LATNOIRA. _____
- When events are PTENNENDEED, the outcome of one affects the outcome of the second. _____
- A variation that puts together direct and inverse variation is called WORESMIC. _____
- When two events cannot happen at the same time, the events are called EYTMUULA CLEESIVUX. _____

9-2 Objectives

- ▼ To graph reciprocal functions (p. 495)
- ▼ To graph translations of reciprocal functions (p. 497)



about 31,056
headsets

The graph of an inverse variation has two parts called **branches**. The graph of $y = \frac{k}{x-b} + c$ is a translation of $y = \frac{k}{x}$ by b units horizontally and c units vertically. It has a vertical asymptote at $x = b$ and a horizontal asymptote at $y = c$.

Sketch the graph of each equation. 18–21. See margin.

18. $y = \frac{1}{x}$ 19. $y = \frac{-2}{x^2}$ 20. $y = \frac{-1}{x} - 4$ 21. $y = \frac{3}{x-2} + 1$

Write an equation for the translation of $xy = 4$ that has the given asymptotes.

22. $x = 0, y = 3$ 23. $x = 2, y = 2$ 24. $x = -3, y = -4$
 $y = \frac{4}{x} + 3$ $y = \frac{4}{x-2} + 2$ $y = \frac{4}{x+3} - 4$

9-3 Objectives

- ▼ To identify properties of rational functions (p. 501)
- ▼ To graph rational functions (p. 504)

The rational function $f(x) = \frac{P(x)}{Q(x)}$ has a **point of discontinuity** for each real zero of $Q(x)$. If $P(x)$ and $Q(x)$ have no common factors, then the graph of $f(x)$ has a vertical asymptote when $Q(x) = 0$. If $P(x)$ and $Q(x)$ have a common real zero a , then there is a hole or a vertical asymptote at $x = a$.

If the degree of $Q(x)$ is greater than the degree of $P(x)$, then the graph of $f(x)$ has a horizontal asymptote at $y = 0$.

If $P(x)$ and $Q(x)$ have equal degrees, then there is a horizontal asymptote at $y = \frac{a}{b}$, where a and b are the coefficients of the terms of greatest degree in $P(x)$ and $Q(x)$.

If the degree of $P(x)$ is greater than the degree of $Q(x)$, then there is no horizontal asymptote.

25. A headset can be manufactured for \$.17. The development cost is \$150,000. Graph the function that represents the average cost of a headset. About how many must be manufactured to result in a cost of less than \$5 per headset?

See margin.

Find any points of discontinuity for each rational function. Sketch the graph. Describe any vertical or horizontal asymptotes and any holes. 26–29. See margin pp. 540–541.

30. $\frac{(x-1)(x+1)}{x+3}$;
 $x \neq -4, -3, \text{ or } 0$

31. $\frac{(2x-1)(x+1)}{x+4}$;
 $x \neq -4, -1, \text{ or } 0$

26. $y = \frac{2.5}{x+7}$

27. $y = \frac{x-1}{(x+2)(x-1)}$

28. $y = \frac{x^3-1}{x^2-1}$

29. $y = \frac{2x^2+3}{x^2+2}$

9-4 and 9-5 Objectives

- ▼ To simplify rational expressions (p. 509)
- ▼ To multiply and divide rational expressions (p. 510)
- ▼ To add and subtract rational expressions (p. 514)
- ▼ To simplify complex fractions (p. 516)

A rational expression is in **simplest form** when its numerator and denominator are polynomials that have no common divisors. To add or subtract rational expressions with different denominators, write each expression with the least common denominator.

A fraction that has a fraction in its numerator or denominator or in both is called a **complex fraction**. You can simplify a complex fraction by multiplying the numerator and denominator by the LCD of all the rational expressions.

30–31. See above left.

Simplify each rational expression. State any restrictions on the variable.

30. $\frac{x^2-2x-24}{x^2+7x+12} \cdot \frac{x^2-1}{x-6}$

31. $\frac{4x^2-2x}{x^2+5x+4} \div \frac{2x}{x^2+2x+1}$

