SECTION Ready To Go On? Skills Intervention

8A 8-1 Variation Functions

Find these vocabulary words in Lesson 8-1 and the Multilingual Glossary.

| Vocabulary | | |
|---|---|---|
| direct variation | constant of variation | joint variation |
| inverse variation | combined variation | |
| Vriting Variation F | unctions | |
| A. Given: y varies dire | ectly as x , and $y = 36$ when $x =$ | 4.5. Write the variation function. |
| <i>y</i> = | y varies | as <i>x</i> . |
| = <i>k</i> | Substitute 36 for y an | d 4.5 for <i>x</i> . |
| = <i>k</i> | Solve for the constan | t of variation <i>k</i> . |
| <i>y</i> = | Write the variation fur | nction by using the value of <i>k</i> . |
| Check: Substitute | the original values of <i>x</i> and <i>y</i> in | to the equation. |
| Does 36 = 8(4.5)? | | |
| B. Given: y varies inv | ersely as x , and $y = 8.4$ when x | x = 5. Write the variation function. |
| <i>y</i> = | y varies | as <i>x</i> . |
| = | Substitute 8.4 for y ar | nd 5 for <i>x</i> . |
| = <i>k</i> | Solve for the constan | t of variation <i>k</i> . |
| <i>y</i> = | Write the variation fur | nction by using the value of k. |
| Check: Substitute | the original values of <i>x</i> and <i>y</i> in | to the equation. |
| Does 8.4 = $\frac{42}{5}$? | | |
| C. Given: <i>y</i> varies joir variation function. | tly as x and z , and $y = 52$ when | n $x = 16$ and $z = 13$. Write the |
| <i>y</i> = | y varies | as <i>x</i> and |
| = <i>k</i> | Substitute 52 for y, 16 | 6 for <i>x</i> , and 13 for <i>z</i> . |
| = k | Solve for the constan | t of variation <i>k</i> . |
| = <i>k</i> | | |
| <i>y</i> = | Write the variation fur | nction by using the value of <i>k</i> . |
| Check: Does 52 = | 0.25(16)(13)? | |

SECTION Ready To Go On? Problem Solving Intervention **8**A 8-1 Variation Functions

Inverse variation describes a situation in which one quantity increases and the other decreases.

The time t that it takes for a group of volunteers to clean up the park after an event varies inversely as the number of volunteers v. If 15 volunteers can clean up the park in 35 working hours, how many volunteers would be needed to clean up the park in 25 working hours?

Understand the Problem

- 1. What are you being asked to do?
- 2. What type of variation is presented in the problem? _____
- 3. What information are you given?

Make a Plan

- **4.** What is the general form for determining the variation constant? $t = \frac{K}{1}$
- 5. What do you need to determine first?
- **6.** What is *t*? _____ What is *v*? _____

Solve

7. Substitute known values to determine k. 8. Use the value for k and let t = 25 to



- determine how many volunteers are needed. $t = \frac{k}{V}$ $25 = \frac{1}{v} \Rightarrow 25v = _ \Rightarrow v = _$
- **9.** The park could be cleaned up in 25 hours if there were volunteers.

Look Back

10. Complete the table to check your answer.

| Volunteers | 15 | 16 | 17 | 18 | 19 | 20 | 21 |
|------------|-----|-----|-----|-----|-----|-----|-----|
| Hours | 35 | | | | | | |
| Constant | 525 | 525 | 525 | 525 | 525 | 525 | 525 |

11. How many volunteers are needed to clean the park in 25 hours? _____

Does your answer match Exercise 9? _____

| Date | Class |
|------|-------|
| - | |

Ready To Go On? Skills Intervention 8A 8-2 Multiplying and Dividing Rational Expressions

Find this vocabulary word in Lesson 8-2 and the Multilingual Glossary.

Vocabulary rational expression

Simplifying Rational Expressions

Name

Simplify. Identify any *x*-values for which the expression is undefined.

A.
$$\frac{8x^2}{4x^3 + 8x}$$
 $(2x)$ $(x^2 + 2)$ $(x^2 + 2)$ Divide out the common factor. Simplify.

The expression is undefined at $x = _$ because this value makes the denominator equal zero.

B.
$$\frac{x^2 - 4}{x^2 + 3x - 10}$$

 $\frac{(x - 2)((---))}{((---))(x - 2)}$
Factor the numerator and denominator.
 $\frac{(---)}{((---))}$
Divide out the common factor. Simplify.

The expression is undefined at $x = _$ and $x = _$.

Dividing Rational Expressions

Divide. Assume that all expressions are defined.



Rewrite as _____ by the reciprocal.

Factor the numerators and denominators.

Divide out the common factor. Simplify.

Ready To Go On? Skills Intervention

8.3 Adding and Subtracting Rational Expressions

Find this vocabulary word in Lesson 8-3 and the Multilingual Glossary.

Vocabulary complex fraction

Adding Rational Expressions with Like Denominators

Add. Identify any *x*-values for which the expression is undefined.



The expression is undefined at x = ______ because these values make

the denominator equal zero. In other words, the expression is always _____

Subtracting Rational Expressions

Subtract. Identify any *x*-values for which the expression is undefined.

$$\frac{2x^{2} - 8}{x^{2} - 16} - \frac{x + 1}{x + 4}$$

$$\frac{2x^{2} - 8}{() () () } - \frac{x + 1}{x + 4}$$

$$\frac{2x^{2} - 8}{() () () } - \frac{x + 1}{x + 4} \cdot \frac{(x - 4)}{() () }$$

$$\frac{-8 - (x + 1)()}{(x - 4)(x + 4)}$$

$$\frac{2x^{2} - (x^{2} - 4)(x + 4)}{(x - 4)(x + 4)}$$

$$\frac{2x^{2} - (x^{2} - 4)(x + 4)}{(x - 4)(x + 4)}$$

$$\frac{-8 - x^{2} + 4}{(x - 4)(x + 4)}$$

$$\frac{-8 - x^{2} + 4}{(x - 4)(x + 4)}$$

$$\frac{-8 - x^{2} + 4}{(x - 4)(x + 4)}$$

$$\frac{-8 - x^{2} + 4}{(x - 4)(x + 4)}$$

$$\frac{-8 - x^{2} + 4}{(x - 4)(x + 4)}$$

$$\frac{-8 - x^{2} + 4}{(x - 4)(x + 4)}$$

$$\frac{-8 - x^{2} + 4}{(x - 4)(x + 4)}$$

$$\frac{-8 - x^{2} + 4}{(x - 4)(x + 4)}$$

$$\frac{-8 - x^{2} + 4}{(x - 4)(x + 4)}$$

$$\frac{-8 - x^{2} + 4}{(x - 4)(x + 4)}$$

Factor the denominators. The LCD is _____

Make the 2nd expression's denominator equal to the LCD by multiplying the rational expression by a form of 1.

Subtract the numerators.

Multiply the binomials in the numerator.

Distribute the negative sign.

Simplify the numerator. Write it in standard form.

Factor the numerator.

Divide out common factors and simplify.

The expression is undefined at $x = _$ and $x = _$ because these values make the denominator equal zero.

| Name | Date | Class |
|------|------|-------|
| | | |

Ready To Go On? Problem Solving Intervention SECTION - 8A 8-3 Adding and Subtracting Rational Expressions

Rational expressions can be used to determine average speed.

A ferryboat full of passengers averages 40 mi/h traveling to its destination and 50 mi/h on the return trip with no passengers. What is the ferryboat's average speed for the entire trip? Round to the nearest tenth.

Understand the Problem

1. Describe the ferryboat's speed for the trip.

Make a Plan

- What do you need to determine? _____
- **3.** Use the formula distance = rate \times time (d = rt) to determine the average speed for the entire trip. Let *d* represent the one-way distance.

Total distance: Time to the destination: $t_1 = \frac{a}{1}$ Use the formula $t = \frac{d}{r}$. Time on the return trip: $t_2 = \frac{d}{d}$ Total time: $t = \frac{d}{d} + \frac{d}{d}$ Average speed: $r = \frac{\boxed{d}}{\frac{d}{1} + \frac{d}{50}}$

Both legs of the trip have a distance of *d*.

Use the formula $t = \frac{u}{r}$.

Add the time for both legs.

```
Use average speed = \frac{\text{total distance}}{\text{total time}}
```

Solve

4. Multiply the terms in the average speed formula by the LCD, _____, and simplify.



5. The ferryboat's average speed is _____ mi/h.

Look Back

6. To check your solution, substitute the average speed from Exercise 5 into the average speed equation and choose a distance for d, for example 100 miles.

Average speed =
$$\frac{(100)}{\frac{100}{40} + \frac{100}{50}} \approx$$
 _____ mi/h

Does your solution make sense? _____

SECTION Ready To Go On? Skills Intervention 8A 8-4 Rational Functions Find these vocabulary words in Lesson 8-4 and the Multilingual Glossary. Vocabulary rational function discontinuous function continuous function **Graphing Rational Functions with Vertical Asymptotes** Identify the zeros and asymptotes of each function. Then graph. **A.** $f(x) = \frac{2x^3}{x^2 - 25}$ $f(x) = \frac{2x^3}{(x-1)(x-1)}$ Factor the denominator. Zero(s): _____ The numerator is zero when x =____. Vertical asymptote(s): $x = _$ and $x = _$. The denominator is zero when $x = _$. The degree of p (the numerator) is ______ the degree of q (the denominator). Horizontal asymptote(s): _____ Complete the table of values: -5-4-3-2-1⁰ 1 2 3 4 5 -2+ -3+ -4+ --5 -3-1 0 1 3 5 х у Graph the function using the table of values. **B.** $f(x) = \frac{3x^2 - 3}{x^2 - 9}$ $f(x) = \frac{3(x-1)(x-1)}{(x+3)}$ Factor the numerator and denominator. Zero(s): The numerator is zero when x =____. Vertical asymptote(s): $x = __$ and $x = __$ The denominator is zero when x =____. Degree of *p* degree of *q*. Horizontal asymptote(s): _____ Complete the table of values: 4 3 5 х $^{-5}$ -3 -1 0 1 3 2-1-**≪**++++++ -5-4-3-2-1 ⁰+ 1 2 3 4 5 У -2 -3 Graph the function using the table of values.

SECTION Ready To Go On? Skills Intervention 8A 8-5 Solving Rational Equations and Inequalities

Find these vocabulary words in Lesson 8-5 and the Multilingual Glossary.

| Vocabulary rational equation | extraneous solution | rational inequality |
|---|---|---------------------------------------|
| Solving Rational Equation Solve the equation $\frac{18}{y} = 11$ | ons — <i>y</i> . | |
| The Least Common Denomin | ator (LCD) is: | |
| $\frac{18}{y}(\underline{\qquad}) = 11(\underline{\qquad}) - y(\underline{\qquad})$ | Multiply each term by the | e LCD. |
| = $11y - $ | Simplify. Note that $y \neq _$ | |
| + 18 = 0 | Write in standard form. | |
| $(y - _)(\ 2) = 0$ | Factor. | |
| <i>y</i> = 0 or <i>y</i> = 0 | Apply the Zero Product F | Property. |
| <i>y</i> = or <i>y</i> = | Solve for <i>y</i> . | |
| Check your answer: Substitute $\frac{18}{y} = 11 - y$ $\frac{18}{y} = 11 - 9 \rightarrow 2 = 2 \checkmark \frac{1}{y}$ | $\frac{8}{2} = 11 - 2 \rightarrow 9 = 9 \checkmark$ | original equation. |
| Extraneous Solutions | | |
| Solve the equation $\frac{4}{x^2-4}$ = | $=\frac{1}{x+2}+\frac{1}{x-2}.$ | |
| The Least Common Denomin | ator (LCD) is: | |
| $\frac{4}{x^2-4}(x-2)(x+2)=\frac{1}{x+2}$ | $\frac{1}{2}(x-2)(__) + \frac{1}{x-2}(__)$ | Multiply each term)() by the LCD. |
| = () + (x + 2) | Divide out common factors | |
| 4 = <i>x</i> | Note that $x \neq$ Simplify | fy. |
| = <i>x</i> | Solve for <i>x</i> . | |
| The solution $x = $ is original equation equal to | because it makes Therefore, the equation has | the denominators of the |

Ready To Go On? Problem Solving Intervention 8A 8-5 Solving Rational Equations and Inequalities

Ruthann canoes 5 miles upstream and 5 miles downstream a river. Her entire trip takes 6 hours. Given, in still water, Ruthann paddles at an average speed of 2 mi/h, what is the average speed of the river's current? Round to the nearest tenth.

Understand the Problem

1. What is the total distance Ruthann canoed? _____ What was her average

speed? _____

2. What do you need to determine?

Make a Plan

3. Use the formula distance = rate \times time (d = rt) to complete the table. Let *c* represent the speed of the current.

| Direction | Distance (mi) | Average Speed (mi/h) | Time (h) |
|------------|---------------|-------------------------|----------------------|
| Upstream | 5 | 2 – <i>c</i> | 2 – |
| Downstream | | | $\frac{5}{\Box + c}$ |

4. Complete: Total time = time upstream + time downstream

6 = _____ + ____

Solve

5. Multiply the terms in the equation from Exercise 4 by the LCD and simplify.

| $6(2 - c)(2 + c) = \left(\frac{1}{2 - c}\right)(2 - c)(2 + c) + \left(\frac{1}{2 - c}\right)(2 - c)(2 - c)(2 + c) + \left(\frac{1}{2 - c}\right)(2 - c)(2 - c)(2 - c)(2 - c)(2 - c))$ | $(\frac{5}{+c})((-c)(2+))$ |
|--|--|
| (2 - c)(2 + c) = (2 + c) + 5(- c) | Simplify. |
| $6(4 - c^2) = (2 + 5c) + (10 - 2)$ | Use the Distributive Property. |
| $\boxed{} - 6c^2 = \underline{} \rightarrow \boxed{} = 6c^2$ | $\rightarrow \frac{4}{\Box} = c^2 \rightarrow \pm = c$ |

The speed of the current is _____ mi/h. (Its speed cannot be negative).

Look Back

6. To check your solution, substitute the current's speed into the equation from

Exercise 4. $6 = \frac{5}{5} + \frac{5}{5}$ Does your solution make sense?

| Name | Date | Class |
|------|------|-------|
| | | |

SECTION Ready To Go On? Quiz

8A

8-1 Variation Functions

- **1.** The price, *P*, paid for tomatoes varies directly as its weight, *w*, in pounds. If the price of 1.5 pounds of tomatoes is \$2.97, what is the price of 4.99 pounds of tomatoes?
- **2.** The simple interest, *I*, in dollars earned on a certain investment amount varies jointly as the interest rate, *r*, and the time, *t*. I = \$124.80 when r = 4% and t = 2 years. Find *t* when I = \$300.30 and r = 5.5%.

8-2 Multiplying and Dividing Rational Expressions

Simplify. Identify any *x*-values for which the expression is undefined.

3. $\frac{12x}{4x^2 + 8x}$ **4.** $\frac{x^2 - 6x + 9}{x^2 - 9}$

Multiply or divide. Assume that all expressions are defined.

5. $\frac{7x-7}{x^2-x-2} \cdot \frac{x+1}{14x-14}$ 6. $\frac{16x^2-1}{x^3y^2} \div \frac{4x^2+3x-1}{x^2y+xy}$

8-3 Adding and Subtracting Rational Expressions

Add or subtract. Identify any *x*-values for which the expression is undefined.

7.
$$\frac{x+3}{x^2+7x+6} + \frac{x+1}{x+6}$$
 8. $\frac{1}{x+5} - \frac{x}{x-5}$

9. Matt ran an average speed of 8.3 meters per second during the first lap of a race and an average speed of 7.45 meters per second during the second lap. What was Matt's average speed for the entire race? Round to the nearest hundredth.



- **13.** $\frac{x-1}{x-12} = \frac{2x-13}{x-12}$ **12.** $x - \frac{10}{x} = -3$
- 14. Brian can lay a foundation for a house in 10 hours. Together, Brian and Robin can lay a foundation in 6.5 hours. How long will it take Robin to lay a foundation when working alone?

8A

SECTION Ready To Go On? Enrichment

Continued Fractions

Lesson 8-3 introduced *complex fractions*. A complex fraction contains one or more fractions in its numerator, its denominator or both, as shown below.

 $\frac{\frac{4}{3}}{\frac{1}{x+5}} \qquad \frac{2+\frac{1}{x}}{x-7}$ *fractions* are more complicated. The two fractions below a

Continued fractions are more complicated. The two fractions below are continued fractions.

Finite: Infinite: $4 + \frac{1}{5 + \frac{1}{6 + \frac{1}{2}}}$ $1 + \frac{1}{3 + \frac{1}{3 + \frac{1}{3 + \dots}}}$

Since each numerator is 1, both examples are *simple* continued fractions. A *finite* simple continued fraction represents a rational number, and an *infinite* simple continued fraction represents an irrational number.

Find a simple fraction for each continued fraction.



Exercise 1 above can also be written in the condensed form [7, 6, 5, 4]. Write the simple continued fractions in expanded form.

4. [2, 3, 5, 6]

5. [2, 2, 4]

Hint: This one is infinite. Write the first several terms.

Date Class

SECTION Ready To Go On? Skills Intervention **8**B **8**-6 Radical Expressions and Rational Exponents

Find these vocabulary words in Lesson 8-6 and the Multilingual Glossary.

Vocabulary

rational exponent

Writing Expressions in Radical Form Write each expression in radical form, and simplify.

index



Writing Expressions by using Rational Exponents Write each expression by using rational exponents.

| Α. | $(\sqrt[4]{100})^3$ | |
|----|------------------------------------|--|
| | $(100)^{3}$ | Rewrite the root as a rational exponent. |
| | 100 ¹ / ₄ () | Apply the of a Power Property of Rational Exponents. |
| | 100— | Simplify the exponent. |
| B. | $(\sqrt[5]{-2})^4$ $((-2))^4$ | Rewrite the root as a rational exponent. |
| | (-2) ^{1/5} () | Apply the of a Power Property of Rational Exponents. |
| | (-2)— | Simplify the exponent. |

| Nomo | | | |
|------|--|--|--|
| Name | | | |

SECTIONReady To Go On? Problem Solving Intervention8B8-6 Radical Expressions and Rational Exponents

A rational exponent is an exponent that can be expressed as $\frac{m}{n}$, where *m* and *n* are integers and $n \neq 0$. Radical expressions can be written using rational exponents.

The initial amount deposited in a savings account is \$2500. The amount a in dollars

in the account after *y* years can be represented by the function $a(y) = 2500(2^{\frac{y}{24}})$. To the nearest dollar, what will the amount in the account be after 8 years?

Understand the Problem

- 1. What variable are you being asked to solve for in the formula? _____
- 2. What does \$2500 represent?

Make a Plan

- 3. What does y represent in the formula?
- 4. How many years is the money in the account? _____

Solve

5. Substitute known values into the formula and solve.

$$a(y) = 2500 \left(2^{\frac{y}{24}}\right)$$

$$a(y) = 2500 \begin{pmatrix} 2^{24} \end{pmatrix}$$
Substitute. $a(y) = 2500 \begin{pmatrix} 2^{1} \end{pmatrix}$ Simplify the fraction. $a(y) =$ Use a calculator. $a(y) =$ Round.

 The amount in the account, to the nearest whole dollar, after 8 years will be \$_____.

Look Back

7. Using a graphing calculator and the formula $a(y) = 2500(2^{\frac{y}{24}})$ to complete the table.

| Year | 0 | 2 | 4 | 6 | 8 | 10 |
|-------------------|--------|--------|----|----|----|----|
| Amount in Account | \$2500 | \$2649 | \$ | \$ | \$ | \$ |

8. Does the amount in Exercise 6 match the amount in the table for year 8? _____

Ready To Go On? Skills Intervention 8B 8-7 Radical Functions

Find these vocabulary words in Lesson 8-7 and the Multilingual Glossary.

Vocabulary

radical function square-root function

Transformations of square-root functions are summarized below.



Transforming Square Root Functions

Use the description to write the transformed function g. Then identify its domain and range.

A. $f(x) = \sqrt{x}$ is translated 2 units left and 1 unit up.



Domain of $q: \{x \mid y \}$

Ready To Go On? Problem Solving Intervention 8B 8-7 Radical Functions

A radical function that is vertically stretched can be represented by af(x).

On Mars, the function $f(x) = 4.8\sqrt{x}$ approximates an object's downward velocity in feet per second as the object hits the ground after bouncing *x* feet in height. The corresponding function for Earth is stretched vertically by a factor of $\frac{5}{3}$. Write the

corresponding function g for Earth, and use it to estimate how fast an object will hit the Earth's surface after a bounce of 30 feet in height. Round to the nearest tenth.

Understand the Problem

1. How is the function for Mars translated to represent an objects downward velocity on Earth?

Make a Plan

- 2. What do you need to determine?
- **3.** First, determine the transformed function g(x).

| $g(x) = (4.8\sqrt{x})$ | Stretch vertically by multiplying by |
|---------------------------------|--------------------------------------|
| $g(x) = \underline{ } \sqrt{x}$ | Simplify. |

Solve

4. Find the value of *g* for a bounce of x = 30 feet.

 $g(x) = 8\sqrt{$ Substitute 30 for x. $g(x) \approx$ Simplify.

5. The object will hit the Earth's surface with a downward velocity of about ______ ft/s.

Look Back

6. To check your solution, find the value of f(x) for a bounce 30 feet in height on Mars.

 $f(x) = 4.8\sqrt{x} = 4.8\sqrt{2} \approx$ _____ft/s

Then, multiply this value by a factor of $\frac{5}{2}$.

- Is $\frac{5}{3}$ (_____) \approx 43.8 ft/s? _____
- 7. Is your solution in Exercise 5 equal to the value in Exercise 6? _____

SECTION Ready To Go On? Skills Intervention

8B 8-8 Solving Radical Equations and Inequalities

Find these vocabulary words in Lesson 8-8 and the Multilingual Glossary.

Vocabulary

radical equation

radical inequality

Solving Equations Containing One Radical

| Solve $-7\sqrt[3]{18x-1} = -14$. | | |
|---|--------------------------------------|--|
| $-7\sqrt[3]{18x-1} = -14$ | | |
| $\frac{-7\sqrt[3]{18x-1}}{2} = \frac{-14}{2}$ | Isolate the radical by dividing both | sides by -7. |
| $\sqrt[3]{18x-1} = $ | Simplify. | Check: Substitute the value |
| $(\sqrt[3]{18x-1}) - = 2 -$ | Cube both sides of the equation. | equation. |
| 18 <i>x</i> - 1 = | Simplify. | $-7\sqrt[3]{18x-1} = -14$ |
| 18 <i>x</i> = | Isolate the x-term. | $-7\sqrt[3]{18\left(\frac{1}{2}\right)} - 1 = -14$ |
| | | -7(2) = -14 |
| x = | Solve for <i>x</i> . | -14 = -14 |

Solving Equations with Extraneous Solutions

Solve $\sqrt{x + 14} = x + 2$. $(\sqrt{x + 14}) - = (x + 2) -$ Square both sides of the equation. $x + 14 = __+ + 4x + ___$ Simplify. $0 = x^2 + __- - __$ Write in standard form. $0 = (x + __)(x - __)$ Factor. $x = __$ or $x = __$ Solve for x.

Check for extraneous solutions.

Substitute each value of *x* into the original equation. Substitute x = -5 Substitute x = 2

$$\sqrt{x + 14} = x + 2$$
 $\sqrt{x + 14} = x + 2$
 $\sqrt{-5 + 14} = -5 + 2$
 $\sqrt{2 + 14} = 2 + 2$
 $\sqrt{-3} = -3$
 $\sqrt{-3} = 4$
 $3 = -3$
 $4 = 4$

Because x =_____ is extraneous, x =_____ is the only solution.

SECTION Ready To Go On? Problem Solving Intervention 8-8 Solving Radical Equations and Inequalities

A radical equation contains a variable within a radical. Raising each side of an equation to an even power may introduce extraneous solutions. Remember to check each solution in the original equation.

The speed s in miles per hours that a car is traveling when it goes into a skid can be estimated by the formula $S = 5.5\sqrt{D(F + f)}$, where F is the coefficient of friction, f is the superelevation and D is the length of the skid marks in feet. After an accident, a driver claims to have been traveling the speed limit of 55 mph. The coefficient of friction under the accident conditions was 0.75 and the superelevation was 0.05. How long should the skid marks actually measure if the driver was in fact going 55 mph?

Understand the Problem

- 1. What variable are you being asked to determine?
- 2. What do each of the variables stand for in the formula?

Make a Plan

- **3.** What variable are you going to solve for? *S* =
- 4. What number represents each variable in the formula?

Solve

5. Substitute known values into the formula and solve.



6. The skid marks should measure _____ feet.

Look Back

7. Use the value for *D* from Exercise 5 and solve for *S*. Does your answer check?

$$S = 5.5\sqrt{D(F + f)}$$

 $S = 5.5\sqrt{_(0.75 + 0.05)}$ Substitute.
 $S = 5.5\sqrt{_}$ Simplify.
 $S = _$

F = _____

f =

| 6 Radical Expressions a nplify each expression. Ass | and Rational Exponents ume that all variables are positive. |
|--|--|
| $\sqrt{48x^6y^3}$ | 2. $\sqrt[6]{\frac{y^2}{8}}$ |
| rite each expression in radic | cal form, and simplify. 4. $81^{\frac{3}{4}}$ |
| rite each expression by usin | g rational exponents. |
| . V7 ⁵ | 6. ([∿] −125) ⁴ |

8-7 Radical Functions

Graph each function, and identify its domain and range.

8. $f(x) = -\sqrt{x} + 3$ domain: _____ range: _____ 5**≜***Y* 4 3-2-1+ 5 -2 -3 -4 -5**↓**



| Name _ | | Date | Class | |
|--------|----------------------|------|-------|--|
| | Deedy To Co On2 Ouis | | | |

SECTION Ready To Go On? Quiz continued

10. Water is draining from a pool into two pipes. The speed in feet per second at which water flows through the first pipe is given by $f(x) = \sqrt{36(x-1)}$, where x is the depth of the water in the pipe. The corresponding function for the second pipe is a translation 2 units up and 3 units left. Write the corresponding function g and estimate the speed at which water flows through the second pipe when the water is 0.5 feet deep.



14. The formula $s = \sqrt{22d}$ relates the speed, *s*, of a car in miles per hour to the distance, *d*, in feet that the car travels as it brakes to a stop. Police measure the length of a car's skid marks and then use this formula to determine the speed the car was traveling. What is the length of a car's skid marks if it was traveling 65 mph?

Solve each inequality.

15. $\sqrt[3]{3x} > -3$

16. $\sqrt{x+2} - 8 \le 5$

Ready To Go On? Enrichment SECTION 8B

Distance Between Opposite Vertices of a Rectangular Prism

There is a relationship involving the distance between opposite vertices of a rectangular prism.

The length of the diagonal of a rectangular prism can be solved by applying the Pythagorean Theorem twice. An alternate way to determine the length of the diagonal *d* is to apply the formula:

$$d=\sqrt{\ell^2+w^2+h^2}$$

where ℓ is the length, w is the width, and h is the height of the prism. Consider the prism:



- 3. A prism has a length of 12 in. and a width of 9 in. What is the height of the prism if its diagonal measures 27 inches?
- 4. The length, width, and height of a prism are tripled. What effect will this have on the length of the diagonal of the prism? Test your answer by tripling the dimensions of the prism in Exercise 2.

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| Section Ready To Go On? Skills Intervention 8A 8-1 Variation Functions Find these vocabulary words in Lesson 8-1 and the Multilingual Glossary. | | SECTION Ready To Go On? Problem Solving Intervention 8A 8-1 Variation Functions Inverse variation describes a situation in which one quantity increases and the other | |
|---|---|---|--|
| Vocabulary | | decreases. | |
| direct variation constant of variation joint variation inverse variation combined variation | | The time <i>t</i> that it takes for a group of volunteers to clean up the park after an event varies inversely as the number of volunteers <i>v</i> . If 15 volunteers can clean up the park in 35 working hours, how many volunteers would be needed to clean up the park in 25 working hours? | |
| Writing Variation Fun | ctions | | |
| A. Given: y varies direct | by as x, and $y = 36$ when $x = 4.5$. Write the variation function. | Understand the Problem | |
| $y = \underline{kx}$ | y varies <u>directly</u> as x. | What are you being asked to do? Determine how many volunteers are needed to clean up the park | |
| $\frac{36}{2} = k (4.5)$ | Substitute 36 for <i>y</i> and 4.5 for <i>x</i> . | Determine now many volunteers are needed to tream up the park. | |
| $\underline{0} = \mathbf{k}$ | Solve for the constant of variation k. | 2. What type of variation is presented in the problem? <u>Inverse</u> | |
| $y = \underline{\delta X}$ | Write the variation function by using the value of k. | 3. What information are you given? VOULINEETS Take 35 Hours to clean | |
| Check: Substitute the | e original values of x and y into the equation. | Make a Plan | |
| Does 36 = 8(4.5)? | 62 | 4. What is the general form for determining the variation constant? $t = \frac{k}{\Box}$ | |
| B. Given: y varies invers | sely as x, and $y = 8.4$ when $x = 5$. Write the variation function. | The variation constant k | |
| $y = \frac{n}{X}$ | y varies inversely as x. | 5. What do you need to determine first? The variation constant, x | |
| $8.4 = \frac{\kappa}{5}$ | Substitute 8.4 for y and 5 for y | 6. What is t? What is V? | |
| $\frac{42}{k} = \frac{1}{k}$ | Solve for the constant of variation k | Solve | |
| 42 | | 7. Substitute known values to determine k. 8. Use the value for k and let $t = 25$ to | |
| y = <u>X</u> | Write the variation function by using the value of k. | $t = \frac{k}{v}$ determine how many volunteers are | |
| Check: Substitute the | e original values of x and y into the equation. | $35 = \frac{k}{15}$ needed. $t = \frac{k}{V}$ | |
| Does 8.4 = $\frac{42}{5}$? Yes | <u>5</u> | $525 = \frac{525}{k} \Rightarrow 25v = 525 \Rightarrow v = 21$ | |
| C. Given: y varies jointly variation function | as x and z, and $y = 52$ when $x = 16$ and $z = 13$. Write the | | |
| v = kxz | v varies jointly as x and Z | 9. The park could be cleaned up in 25 hours if there were <u>L1</u> volunteers. | |
| 52 = k (16)(13) | Substitute 52 for <i>y</i> , 16 for <i>x</i> . and 13 for <i>z</i> . | Look Back | |
| 52 | | 10. Complete the table to check your answer. | |
| 208 = k | Solve for the constant of variation k. | Volunteers 15 16 17 18 19 20 21 | |
| 0.25 = k | | Hours 25 32 8 30 9 29 2 27 6 26 3 25 | |
| v = 0.25xz | Write the variation function by using the value of k. | Constant 505 505 505 505 505 505 505 | |
| Check: Does 52 = 0 | .25(16)(13)? Yes | Constant 323 323 323 323 323 323 323 323 | |
| | | 11. How many volunteers are needed to clean the park in 25 hours? <u>21</u> | |
| | | Does your answer match Exercise 9? 105 | |
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| SECTION Ready To Go On? Skills Intervention | | Ready To Go On? Skills Intervention | |
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| SECTION Heady TO SA 8-2 Multiply Find this vocabulary wo Glossary. Simplifying Rational Simplify. Identify any x-A. A . $\frac{8x^2}{4x^3 + 8x}$ $\frac{dx}{4x^2 + 2}$. $\frac{[2x]}{(x^2 + 2)}$ The expression is undenominator equal zeton B . $\frac{x^2 - 4}{x^2 + 3x - 10}$ (x - 2)((x + 2)) (x + 5)(x - 2) (x + 2)(x + 2) The expression is undenominator equal zeton Dividing Rational Exp Divide. Assume that all $\frac{x^2 - 9}{12x^3} + \frac{x^2 - 6x + 9}{6x^3 + 24x^2}$ $\frac{x^2 - 9}{12x^3} + \frac{(x^2 - 6x^2 + 9)}{(x^2 + 6x + 9)}$ (x - 3)(x + 4) 2x(x - 3) | Go On? Skills Intervention ving and Dividing Rational Expressions rd in Lesson 8-2 and the Multilingual Vocabulary rational expression rational expressions rational expressions rational expressions rational expressions rational expressions rational expressions Factor out the greatest common factor, $\frac{4x}{4x}$. Divide out the common factor. Simplify. defined at $x = 0$ because this value makes the roo. Factor the numerator and denominator. Divide out the common factor. Simplify. defined at $x = -5$ and $x = 2$. Pressions expressions are defined. Rewrite as <u>multiplication</u> by the reciprocal. Question of the common factor. Simplify. Divide out the common factor. Simplify. | Ready To Go On? Skills InterventionStemmReady To Go On? Skills InterventionStemmFind this vocabulary word in Lesson 8-3 and the Multilingual Glossary.Vocabulary complex fractionAdd. Identify any x-values for which the expression is undefined. $\frac{7x-3}{x^2+4} + \frac{-6x+11}{x^2+4}$ Notice these rational expressions have like denominators. $\frac{7x-3}{x^2+4} + \frac{-6x+11}{x^2+4}$ Notice these rational expressions have like denominators. $\frac{7x-3}{x^2+4} + \frac{-6x+11}{x^2+4}$ Add the numerators. $\frac{7x}{x^2+4}$ Combine like terms.The expression is undefined at $x = 10$ real values $\frac{x^2+4}{x^2+4}$ Combine like terms.The expression is undefined at $x = 10$ real values $\frac{10}{x^2+4}$ Bubtract identify any x-values for which the expression is always defined. $\frac{2x^2}{x^2-8}$ $\frac{x+1}{x+4}$ Combine like terms.Subtract identify any x-values for which the expression is undefined. $\frac{2x^2-8}{x^2-16} = \frac{x+1}{x+4}$ Factor the denominators. The LCD is $(x-4)(x+4)$. $\frac{2x^2-8}{(x-4)(x+4)} = \frac{x+1}{(x-4)(x+4)}$ Subtract the numerators. $\frac{2x^2-8}{(x-4)(x+4)} = \frac{x+1}{(x-4)(x+4)}$ Subtract the numerators. $\frac{2x^2-8}{(x-4)(x+4)} = \frac{x+1}{(x-4)(x+4)}$ Subtract the numerator. $\frac{2x^2}{(x-4)(x+4)} = \frac{x+1}{(x-4)(x+4)}$ Distribute the negative sign. $\frac{2x^2}{(x-4)(x+4)} = \frac{2x}{(x-4)(x+4)}$ Simplify the numerator. Write it in standard form. $\frac{2x^2-8}{(x-4)(x+4)$ | |
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| Section Ready to Good Subtracting Rational Expressions 8A 8-3 Adding and Subtracting Rational Expressions Rational expressions can be used to determine average speed. | SECTION Ready To Go On? Skills Intervention 3A 8-4 Rational Functions Find these vocabulary words in Lesson 8-4 and the Multilingual Glossary. | |
|---|--|-------------------|
| A ferryboat full of passengers averages 40 mi/h traveling to its destination and | Vocabulary | |
| 50 mi/h on the return trip with no passengers. What is the ferryboat's average speed for the entire trip? Round to the nearest tenth. | rational function discontinuous function continuous function | |
| Understand the Problem The boat travels 40 mi/h for a given distance 1. Describe the ferryboat's speed for the trip. and then 50 mi/h for the same distance. | Graphing Rational Functions with Vertical Asymptotes Identify the zeros and asymptotes of each function. Then graph. A. $f(x) = \frac{2x^2}{x^2} \frac{1}{x^2}$ | |
| Make a Plan | $f(x) = \frac{2x^3}{x^3}$ Eactor the denominator | |
| What do you need to determine? <u>The boat's average speed for the entire trip.</u> Use the formula distance – rate X time (d – rt) to determine the success enced for the | (x-5)(x+5) | 0 |
| 3. Use the formula distance = rate \times time (<i>a</i> = <i>rt</i>) to determine the average speed for the entire trip. Let <i>d</i> represent the one-way distance. | Zero(s): U The numerator is zero when $x = -5$ | <u> </u> |
| Total distance: <u>2</u> <i>d</i> Both legs of the trip have a distance of <i>d</i> . | Vertical asymptote(s): $x = \underline{ \ }$ and $x = \underline{ \ }$ The denominator is zero when $x =$ The degree of <i>p</i> (the numerator) is greater than the degree of <i>q</i> (the denominator | = <u> </u> |
| Time to the destination: $t_1 = \frac{d}{ I }$ Use the formula $t = \frac{d}{r}$. | Horizontal asymptote(s): None | ,- |
| Time on the return trip: $t_2 = \frac{d}{dt_1}$ Use the formula $t = \frac{d}{dt_2}$. | Complete the table of values: | |
| Tatal times $t = \frac{d}{d}$ | x -5 -3 -1 0 1 3 5 | |
| Initial time: $t = 40 + 50$ Add the time for both legs. | y und 3.38 0.08 0 -0.08 -3.38 und | 2345 |
| Average speed: $r = \frac{2d}{\frac{d}{d} + \frac{d}{d}}$ Use average speed = $\frac{\text{total distance}}{\text{total time}}$ | Graph the function using the table of values. $4 + \frac{4}{5} + \frac{4}{7}$ | 1 |
| 40 50 | B. $f(x) = \frac{3x^2 - 3}{x^2 - 0}$ | |
| 4. Multiply the terms in the average speed formula by the LCD, 200, and simplify. | $f(x) = \frac{3(x-1)(\overline{x+1})}{5(x-1)(\overline{x+1})}$ | |
| 2d/(200) $400d$ $400d$ $40d$ | $f(x) = \frac{1}{(x-3)(x+3)}$ | |
| $\frac{d}{d_{0}}(200) + \frac{d}{100}(200) = \frac{d}{5}d + \frac{d}{4}d = \frac{d}{9}d \approx \frac{44.4}{100} \text{ mi/h}$ | Zero(s): <u>-1 and 1</u> The numerator is zero when $x = \frac{1}{2}$ | <u>±1</u> . +2 |
| 5 The ferriter's everyon aread in 44.4 mith | Vertical asymptote(s): $x = -3$ and $x = -3$ The denominator is zero when $x = -3$ | <u> </u> |
| 5. The lenguous average speed is min. | Complete the table of values: | |
| Look Back | | 2 |
| To check your solution, substitute the average speed from Exercise 5 into the average speed equation and choose a distance for <i>d</i>, for example 100 miles. | 4.5 und 0 0.33 0 und 4.5 | |
| Average speed = $\frac{\boxed{2}(100)}{100} \approx \frac{.44.4}{.100}$ mi/h | Graph the function using the table of values. $\begin{pmatrix} 2 \\ -3 \\ -3 \\ -3 \\ -3 \\ -3 \\ -3 \\ -3 \\ $ | 2345 |
| 40 ' 50 7 Does your solution make sense? Yes | ↓ -4 + ↓ -5 ↓ | ł |
| | | |
| Copyright © by Holt, Rinehart and Winston. 130 Holt Algebra 2 | Copyright © by Holt, Rinehart and Winston. 131 Holt Alg | gebra 2 |
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| SECTION Ready To Go On? Skills Intervention | [SECTION] Ready To Go On? Problem Solving Intervention | on |
| Ready To Go On? Skills Intervention 8A 8-5 Solving Rational Equations and Inequalities | Ready To Go On? Problem Solving Intervention 84 8-5 Solving Rational Equations and Inequalities | on |
| SECTION Ready To Go On? Skills Intervention SA 8-5 Solving Rational Equations and Inequalities Find these vocabulary words in Lesson 8-5 and the Multilingual Glossary. | SECTION Ready To Go On? Problem Solving Intervention 84 8-5 Solving Rational Equations and Inequalities Ruthann canoes 5 miles upstream and 5 miles downstream a river. Her entire trip takes 6 hours. Given, in still water, Ruthann paddles at an average speed of 2 mi/h, | on |
| SECTION Ready To Go On? Skills Intervention 8A 8-5 Solving Rational Equations and Inequalities Find these vocabulary words in Lesson 8-5 and the Multilingual Glossary. Vocabulary rational equation extraneous solution | Ready To Go On? Problem Solving Intervention 8 <i>S-5 Solving Rational Equations and Inequalities</i> Ruthann canoes 5 miles upstream and 5 miles downstream a river. Her entire trip takes 6 hours. Given, in still water, Ruthann paddles at an average speed of 2 mi/h, what is the average speed of the river's current? Round to the nearest tenth. | on |
| Ready To Go On? Skills Intervention 8A 8-5 Solving Rational Equations and Inequalities Find these vocabulary words in Lesson 8-5 and the Multilingual Glossary. Vocabulary rational equation extraneous solution | Ready To Go On? Problem Solving Intervention BA 8-5 Solving Rational Equations and Inequalities Ruthann canoes 5 miles upstream and 5 miles downstream a river. Her entire trip takes 6 hours. Given, in still water, Ruthann paddles at an average speed of 2 mi/h, what is the average speed of the river's current? Round to the nearest tenth. Understand the Problem | on |
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| SECTION Ready To Go On? Skills Intervention BA 8-5 Solving Rational Equations and Inequalities Find these vocabulary words in Lesson 8-5 and the Multillingual Glossary. Vocabulary rational equation extraneous solution rational inequality Solving Rational Equations Solve the equation $\frac{18}{y} = 11 - y$. The Least Common Denominator (LCD) is: V | SECTION Ready To Go On? Problem Solving Intervention 3A 8-5 Solving Rational Equations and Inequalities Ruthann cances 5 miles upstream and 5 miles downstream a river. Her entire trip takes 6 hours. Given, in still water, Ruthann paddles at an average speed of 2 mi/h, what is the average speed of the river's current? Round to the nearest tenth. Understand the Problem 1. What is the total distance Ruthann canced? <u>10 miles</u> What was her average speed? <u>2 mi/hr</u> 3. What is upstream to the determine? The average speed of the current | on_ |
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| SECTION Ready To Go On? Skills Intervention BA 8-5 Solving Rational Equations and Inequalities Find these vocabulary words in Lesson 8-5 and the Multillingual Glossary. Vocabulary rational equation extraneous solution rational Equations Solving Rational Equations Solve the equation $\frac{18}{y} = 11 - y$. The Least Common Denominator (LCD) is: \underline{y} . $\frac{18}{y}(\underline{y}) = 11(\underline{y}) - y(\underline{y})$ Multiply each term by the LCD. $\frac{18}{y} = 11y - y^2$ Simplify. Note that $y \neq \underline{0}$. $\frac{y^2}{2} - \underline{11y} + 18 = 0$ Write in standard form. $(y - \underline{9})(\underline{y} - 2) = 0$ Factor. $y - \underline{9} = 0$ or $y - \underline{2} = 0$ Apply the Zero Product Property. $y = \underline{9}$ or $y = \underline{2}$ Solve for y . | Bready To Go On? Problem Solving Intervention BASING Problem Solving Intervention Section Based of Solving Rational Equations and Inequalities Ruthann cances 5 miles upstream and 5 miles downstream a river. Her entire trip takes 6 hours. Given, in still water, Ruthann paddles at an average speed of 2 mi/h, what is the average speed of the river's current? Round to the nearest tenth. Understand the Problem 1. What is the total distance Ruthann canced? 10 miles What was her average speed of the current Make a Plan 3. Use the formula distance = rate × time (d = rt) to complete the table. Let c represent the speed of the current. Direction Distance (m) Average Speed Upstream 5 2 - c 5 Downstream 5 2 - c 5 Downstream 5 2 + c 5 | on |
| SECTION Ready To Go On? Skills Intervention BA 8-5 Solving Rational Equations and Inequalities Find these vocabulary words in Lesson 8-5 and the Multilingual Glossary. Vocabulary rational equation rational equation Solving Rational Equations Solve the equation $\frac{18}{y} = 11 - y$. The Least Common Denominator (LCD) is: \underline{y} . $\frac{18}{y}(\underline{y}) = 11(\underline{y}) - y(\underline{y})$ Multiply each term by the LCD. Image: Simplify. Note that $y \neq 0$. $\frac{y^2}{y^2} - 11\underline{y} + 18 = 0$ Write in standard form. $(y - \underline{9})(\underline{y} - 2) = 0$ Factor. $y - \underline{9} = 0$ or $y - \underline{2} = 0$ Apply the Zero Product Property. $y = \underline{9}$ or $y = \underline{2}$ Solve for y . Check your answer: Substitute the solutions for y into the original equation. | Ready To Go On? Problem Solving Intervention Back and the problem Solving Intervention Solving Rational Equations and Inequalities Ruthann cances 5 miles upstream and 5 miles downstream a river. Her entire trip takes 6 hours. Given, in still water, Ruthann paddles at an average speed of 2 mi/h, what is the average speed of the river's current? Round to the nearest tenth. Understand the Problem 1. What is the total distance Ruthann canced? 10 miles What was her average speed? 2 mi/hr 2. What do you need to determine? The average speed of the current Make a Plan 3. Use the formula distance = rate × time (d = rt) to complete the table. Let c represent the speed of the current. Direction Distance (mi) Average Speed (mi/h) Time (h) Upstream 5 2 - c Downstream 5 2 + c 5 2 + c 5 2 - c 5 | on |
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| Beady To Go On? Skills InterventionSA 3-5 Solving Rational Equations and InequalitiesFind these vocabulary words in Lesson 8-5 and the Multilingual Glossary.Vocabulary rational equationextraneous solutionrational inequalitySolving Rational Equations Solve the equation $\frac{18}{7} = 11 - y$. The Least Common Denominator (LCD) is: y . $\frac{18}{7}(y) = 11(y) - y(y)$ Multiply each term by the LCD. $\frac{18}{7}(y) = 11(y) - y(y)$ Multiply each term by the LCD. $\frac{18}{7} = 11y - y^2$ Simplify. Note that $y \neq 0$. $y^2 - 11y + 18 = 0$ $y'' = 0$ Factor. $y - 9 = 0$ or $y - 2 = 0$ Factor. $y - 9 = 0$ or $y - 2 = 0$ $y - 9 = 0$ or $y - 2 = 0$ Factor. $y - 9 = 0$ or $y - 2 = 0$ Solve for y .Check your answer: Substitute the solutions for y into the original equation. $\frac{18}{9} = 11 - 9$ $2 = 2 \checkmark \frac{18}{12} = 11 - 2 \rightarrow 9 = 9 \checkmark$ Extraneous SolutionsSolve the equation $\frac{x^4}{x^2 - 4} = \frac{1}{x+2} + \frac{1}{x-2}$.The Least Common Denominator (LCD) is: $(x-2)(x+2)$. $\frac{4}{x^2 - 4}(x-2)(x+2) = \frac{1}{x+2}(x-2)(\frac{x+2}{x}) + \frac{1}{x-2}(\frac{x-2}{x})(\frac{x+2}{x+2})$ Multiply each term by the LCD. $\frac{4}{x^2 - 4}(x-2)(x+2) = \frac{1}{x+2}(x-2)(\frac{x+2}{x}) + \frac{1}{x-2}(\frac{x-2}{x})(\frac{x+2}{x+2})$ Multiply each term by the LCD. $\frac{4}{x} = (x-2) + (x+2)$ Divide out common factors. $4 = \frac{2}{x}$ Note that $x \neq \pm 2$. Simplify. $\frac{2}{x} = x$ Solve for x .The coldition $x = \frac{2}{x}$ is $extraneous blue have the decursion to a fire.$ | Ready To Go On? Problem Solving Intervention BA 8-5 Solving Rational Equations and Inequalities Ruthann cances 5 miles upstream and 5 miles downstream a river. Her entire trip takes 6 hours. Given, in still water, Ruthann paddles at an average speed of 2 mi/h, what is the average speed of the river's current? Round to the nearest tenth. Understand the Problem 1. What is the total distance Ruthann canced? 10 miles What was her average speed? 2 mi/hr 2. What do you need to determine? The average speed of the current Make a Plan 3. Use the formula distance = rate × time (d = rt) to complete the table. Let c represent the speed of the current. Direction Distance (mi) (mi/h) Time (h) Upstream 5 2 - c 2 c 2 c c c Downstream 5 2 - c 5 c <td><u>on</u> </td> | <u>on</u> |
| Beady To Go On? Skills InterventionSA 3-5 Solving Rational Equations and InequalitiesFind these vocabulary words in Lesson 8-5 and the Multillingual Glossary.Vocabulary rational equationextraneous solutionrational inequalitySolving Rational Equations Solve the equation $\frac{18}{y} = 11 - y$. The Least Common Denominator (LCD) is: y' . | Ready To Go On? Problem Solving Intervention 3.1 <i>B-5 Solving Rational Equations and Inequalities</i> Ruthan cances 5 miles upstream and 5 miles downstream a river. Her entire trip takes 6 hours. Given, in still water, Ruthann paddees at an average speed of 2 mi/h, what is the average speed of the river's current? Round to the nearest tenth. Understand the Problem 1. What is the total distance Ruthann canced? <u>10 miles</u> What was her average speed? <u>2 mi/hr</u> 2. What do you need to determine? <u>The average speed of the current</u> Make a Plan 3. Use the formula distance = rate × time (<i>d</i> = <i>rt</i>) to complete the table. Let <i>c</i> represent the speed of the current. Make a Plan 3. Use the formula distance = rate × time (<i>d</i> = <i>rt</i>) to complete the table. Let <i>c</i> represent the speed of the current. Make a Plan 3. Use the formula distance = rate × time (<i>d</i> = <i>rt</i>) to complete the table. Let <i>c</i> represent the speed of the current. Direction Distance (mi) (mi/h) Time (h) Upstream <u>5</u> <u>2 - c</u> <u>5</u> Downstream <u>5</u> <u>2 + c</u> <u>5</u> Downstream <u>5</u> <u>2 + c</u> <u>5</u> Downstream <u>5</u> <u>2 + c</u> <u>5</u> Solve 5. Multiply the terms in the equation from Exercise 4 by the LCD and simplify. 6(2 - c)(2 + c) = [5](2 + c) + 5[(2] - c) Simplify. $6(4 - c^2) = (10 + 5c) + (10 - [5c))$ Use the Distributive Property. $[24] - 6c^2 = 20 \rightarrow 4 - 6c^2 \rightarrow 4 - [5] = c^2 \rightarrow \pm 0.8$ The speed of the current is <u>0.8</u> mi/h. (Its speed cannot be negative). Look Back | |
| Ready To Go On? Skills InterventionSAL 3-5 Solving Rational Equations and Inequalities Find these vocabulary words in Lesson 8-5 and the Multillingual Glossary.Vocabulary rational equationextraneous solutionrational inequalitySolving Rational Equations Solve the equation $\frac{18}{7} = 11 - y$. The Least Common Denominator (LCD) is: \underline{y} . $\underline{19}(\underline{y}) = 11(\underline{y}) - y(\underline{y})$ Multiply each term by the LCD. $\underline{18} = 11y - y^2$ Simplify. Note that $y \neq \underline{0}$. $\underline{y}^2 - 11\underline{y} + 18 = 0$ Write in standard form. $(y - \underline{9})(\underline{y} - 2) = 0$ Factor. $y - \underline{9} = 0$ or $y - \underline{2} = 0$ Apply the Zero Product Property. $y = \underline{9}$ or $y - \underline{2}$ Solve for y .Check your answer: Substitute the solutions for y into the original equation. $\frac{18}{9} = 11 - y$ $\frac{18}{9} = 11 - 9 \rightarrow 2 = 2 \checkmark \frac{18}{12} = 11 - 2 \rightarrow 9 = 9 \checkmark$ Extraneous SolutionsSolve the equation $\frac{1}{x^2 - 4} = \frac{1}{x + 2} + \frac{1}{x - 2}$. The Least Common Denominator (LCD) is: $(\underline{x - 2})(\underline{x + 2})$. $\frac{4}{x^2 - 4}(x - 2)(x + 2) = \frac{1}{x + 2}(x - 2)(\underline{x + 2}) + \frac{1}{x - 2}(\underline{x - 2})(\underline{x + 2})$ Multiply each term by the LCD. $\frac{4}{x^2 - 4}(x - 2)(x + 2) = \frac{1}{x + 2}(x - 2)(\underline{x + 2}) + \frac{1}{x - 2}(\underline{x - 2})(\underline{x + 2})$ by the LCD.Multiply each term by the LCD. $\frac{4}{x^2 - 4}(x - 2)(x + 2) = \frac{1}{x + 2}(x - 2)(\underline{x + 2}) + \frac{1}{x - 2}(\underline{x - 2})(\underline{x + 2})$ by the LCD.Multiply each term by the LCD. $\frac{4}{x^2 - 4}(x - 2)(x + 2) = \frac{1}{x + 2}(x - 2)(\underline{x + 2}) + \frac{1}{x - 2}(\underline{x - 2})(\underline{x + 2})$ by the LCD.Multiply each term by the LCD. $\frac{4}{x^2 - 4}(x - 2)(x + 2) = \frac{1}{x + 2}(x - 2)(\underline{x + 2}) + \frac{1}{x - 2}(\underline{x - 2})(\underline{x + 2})$ by the LCD.Multiply each term by the | Ready To Go On? Problem Solving Intervention 3.1 <i>B-5 Solving Rational Equations and Inequalities</i> Ruthan cances 5 miles upstream and 5 miles downstream a river. Her entire trip takes 6 hours. Given, in still water, Ruthann paddes at an average speed of 2 mi/h, what is the average speed of the river's current? Round to the nearest tenth. Understand the Problem 1. What is the total distance Ruthann canced? <u>10 miles</u> What was her average speed? <u>2 mi/hr</u> 2. What do you need to determine? <u>The average speed of the current</u> Make a Plan 3. Use the formula distance = rate × time (<i>d</i> = <i>rt</i>) to complete the table. Let <i>c</i> represent the speed of the current. Make a Plan 3. Use the formula distance = rate × time (<i>d</i> = <i>rt</i>) to complete the table. Let <i>c</i> represent the speed of the current. Make a Plan 3. Use the formula distance = rate × time (<i>d</i> = <i>rt</i>) to complete the table. Let <i>c</i> represent the speed of the current. Direction Distance (mi) Average Speed Time (h) Upstream <u>5</u> <u>2 - c</u> <u>5</u> Downstream <u>5</u> <u>2 + c</u> <u>5</u> Solve 5. Multiply the terms in the equation from Exercise 4 by the LCD and simplify. $6(2 - c)(2 + c) = \left[\frac{5}{2 - c}\right](2 - c)\left[\frac{5}{2} + c\right] + 5\left[\frac{2}{2} - c\right]$ Solve 5. Multiply the terms in the equation from Exercise 4 by the LCD and simplify. $6(4 - c^2) = (fifth + 5c) + (10 - fifth)$ Use the Distributive Property. $[2d] - 6c^2 = 20 \rightarrow 4 - 6c^2 = 0 - $ | |
| Ready To Go On? Skills InterventionBA 8-5 Solving Rational Equations and InequalitiesFind these vocabulary words in Lesson 8-5 and the Multilingual Glossary.Vocabulary rational equationextraneous solutionrational inequalitySolving Rational Equations Solve the equation $\frac{18}{7} = 11 - y$. The Least Common Denominator (LCD) is: \underline{y} . $\frac{19}{y}(\underline{y}) = 11(\underline{y}) - y(\underline{y})$ Multiply each term by the LCD. $\frac{18}{9} = 11y - \underline{y}^2$ Simplify. Note that $y \neq 0$. $\underline{y}^2 - 11\underline{y} + 18 = 0$ Write in standard form. $(y - 9)(\underline{y} - 2) = 0$ Factor. $y - 9 = 0$ or $y - 2 = 0$ Apply the Zero Product Property. $y = 9$ or $y - 2$ Solve for y .Check your answer: Substitute the solutions for y into the original equation. $\frac{19}{2} = 11 - y$ $18 = 11 - 9 + 2 = 2 \checkmark \frac{18}{[2]} = 11 - 2 \rightarrow 9 = 9 \checkmark$ Extraneous SolutionsSolve the equation $\frac{4}{x^2 - 4} = \frac{1}{x + 2} + \frac{1}{x - 2}$. The Least Common Denominator (LCD) is: $(\underline{x} - 2)(\underline{x} + 2)$. $\frac{4}{x^2 - 4}(x - 2)(x + 2) = \frac{1}{x + 2}(x - 2)(\underline{x} + 2) + \frac{1}{x - 2}(\underline{x} - 2)(\underline{x} + 2)$ Multiply each term by the LCD. $\frac{4}{x^2 - 4}(x - 2)(x + 2) = \frac{1}{x + 2}(x - 2)(\underline{x} + 2) + \frac{1}{x - 2}(\underline{x} - 2)(\underline{x} + 2)$ Multiply each term by the LCD. $\frac{4}{x^2 - 4}(x - 2)(x + 2) = \frac{1}{x + 2}(x - 2)(\underline{x} + 2) + \frac{1}{x - 2}(\underline{x} - 2)(\underline{x} + 2)$ Multiply each term by the LCD. $\frac{4}{x^2 - 4}(x - 2)(x + 2) = \frac{1}{x + 2}(x - 2)(\underline{x} + 2) + \frac{1}{x - 2}(\underline{x} - 2)(\underline{x} + 2)$ Multiply each term by the LCD. $\frac{4}{x} = (\underline{x} - 2) + (x + 2)$ Divide out common factors.A = $2x$ Note that $x \neq \pm 2$. Simplify.C x S | Ready To Go On? Problem Solving InterventionBA8-5 Solving Rational Equations and InequalitiesRuthan cances 5 miles upstream and 5 miles downstream a river. Her entire trip takes 6 hours. Given, in still water, Ruthann paddes at an average speed of 2 mi/h, what is the average speed of the river's current? Round to the nearest tenth.Understand the Problem1. What is the total distance Ruthann canced? <u>10 miles</u> What was her average speed? <u>2 mi/hr</u> 2. What do you need to determine? <u>The average speed of the current</u> Make a Plan3. Use the formula distance = rate × time (d = rt) to complete the table. Let c represent the speed of the current. <u>Direction</u> Distance (mi)Upstream52 - c5Downstream52 - c5Downstream52 - c5Downstream52 - c5Downstream52 - c5Downstream52 - c5Downstream52 - c52 - c52 - c5Downstream52 - c52 - c5 | <u>on</u> |



| SETTON Ready To Go On? Problem Solving Interventional Exponents A rational exponent is an exponent that can be expressed as $\frac{m}{D}$, where <i>m</i> and <i>n</i> are integers and $n \neq 0$. Radical expressions can be written using rational exponents. The initial amount deposited in a savings account is \$2500. The amount <i>a</i> in dollars in the account after <i>y</i> years can be represented by the function $a(y) = 2500(2^{\frac{1}{22}})$. To the nearest dollar, what will the amount in the account be after 8 years? Understand the Problem 1. What variable are you being asked to solve for in the formula? <u>a</u> 2. What does \$2500 represent? <u>The initial deposit</u> Make a Plan 3. What does <i>y</i> represent in the formula? <u>Years</u> 4. How many years is the money in the account? <u>8</u> Solve 5. Substitute known values into the formula and solve. $a(y) = 2500(2^{\frac{1}{224}})$ Substitute. $a(y) = 2500(2^{\frac{1}{224}})$ Substitute. a(y) = 3150 Use a calculator. a(y) = 3150 Round. 6. The amount in the account, to the nearest whole dollar, after 8 years will be $\$ \frac{3150}{50}$. Look Back 7. Using a graphing calculator and the formula $a(y) = 2500(2^{\frac{y}{24}})$ to complete the tall $\frac{Year}{0} = \frac{2}{4} + \frac{6}{6} + \frac{8}{10}$ $\frac{10}{264}$ | SECTIONReady To Go On? SkillsBB8-7 Radical FunctionsFind these vocabulary words in Lesson 8-7 anVocabulary radical functionransformations of square-root functions are sum $ a \rightarrow$ vertical stretch or compression factor $a < 0 \rightarrow$ reflection across the x-axis $f(x) = \sqrt{\frac{1}{D}(x - h)} + k_y$ $ b \rightarrow$ horizontal stretch or compression factor $b < 0 \rightarrow$ reflection across the y-axisTransforming Square Root Functions Use the description to write the transformed for domain and range.A. $f(x) = \sqrt{x}$ is translated 2 units left and 1 unit $f(x) = \sqrt{x}$ $g(x) = \sqrt{x + [2]}$ To translate 2 $g(x) = \sqrt{x + [2]}$ Domain of $g: \{x \mid X \ge -2\}$ Range of $g: (y \mid y \ge 1)$ B. $f(x) = \sqrt[3]{x}$ is horizontally compressed by a fact $f(x) = \sqrt[3]{x}$ $g(x) = \sqrt[3]{x}$ Start by iden $g(x) = \sqrt{x}$ is vertically stretched by a factor of $f(x) = \sqrt{x}$ is vertically stretched by a factor of $f(x) = \sqrt{x}$ is vertically stretched by a factor of $f(x) = \sqrt{x}$ is vertically stretched by a factor of $f(x) = \sqrt{x}$ is vertically stretched by a factor of $f(x) = \sqrt{x}$ is vertically stretched by a factor of $f(x) = \sqrt{x}$ is vertically stretched by a factor of $f(x) = \sqrt{x}$ is vertically stretched by a factor of $f(x) = \sqrt{x}$ is vertically stretched by a factor of $f(x) =$ | the Multilingual Glossary. and the Multilingual Glossary. marized below. $h \rightarrow horizontal translation$ $k \rightarrow vertical translation$ unction g. Then identify its up. tifying the parent function. 2 units left, replace x with $x + 2$. 1 unit up, add 1 to the right side. ctor of $\frac{1}{2}$ and reflected across the y-axis. tifying the parent function. compress by multiplying x by 2. ss the y-axis by replacing x with $-x$. f 4 and translated 5 units down. tifying the parent function. |
|---|---|---|
| 8. Does the amount in Exercise 6 match the amount in the table for year 8? Yes | $g(x) = \frac{4}{3} \sqrt{x} - 5$ To translate 5 Domain of g: $\frac{\{x \mid x \ge 0\}}{ x \ge -5 }$ Range of g: $\frac{\{y \mid y \ge -5\}}{ x \ge 100}$ To translate 5 To | ally by multiplying by 4. 5 units down, <u>Subtract</u> 5 from the right side. |
| Ready To Go On? Problem Solving Intervent 83 8-7 Radical Functions A radical function that is vertically stretched can be represented by $af(x)$. On Mars, the function $f(x) = 4.8\sqrt{x}$ approximates an object's downward velocity in | Ready To Go On? Skills 83 8-8 Solving Radical Equatio Find these vocabulary words in Lesson 8-8 an | s Intervention |
| teet per second as the object hits the ground after bouncing x feet in height. The corresponding function for Earth is stretched vertically by a factor of $\frac{5}{3}$. Write the corresponding function g for Earth, and use it to estimate how fast an object will hit the Earth's surface after a bounce of 30 feet in height. Round to the nearest tenth. Understand the Problem 1. How is the function for Mars translated to represent an objects downward velocity on Earth? | Solving Equations Containing One Radic Solve $-7\sqrt[3]{18x-1} = -14$. $-7\sqrt[3]{18x-1} = -14$ $\frac{-7\sqrt[3]{18x-1}}{-7} = \frac{-14}{-7}$ Isolate the radical I | sal |
| The per second as the object hits the ground after bouncing x feet in height. The corresponding function of Earth is stretched vertically by a factor of $\frac{5}{3}$. Write the corresponding function g for Earth, and use it to estimate how fast an object will hit the Earth's surface after a bounce of 30 feet in height. Round to the nearest tenth. Understand the Problem 1. How is the function for Mars translated to represent an objects downward velocity on Earth? $f(x)$ is stretched vertically by $\frac{5}{3}$. Make a Plan 2. What do you need to determine? $g(x)$ and the downward velocity of an object with a bounce height of 30 ft 3. First, determine the transformed function $g(x)$. 5 | radical equation radical inequality Solving Equations Containing One Radic Solve $-7\sqrt[3]{18x-1} = -14$. $-7\sqrt[3]{18x-1} = -14$ $\frac{-7\sqrt[3]{18x-1}}{[-7]}$ Isolate the radical I $\sqrt[3]{18x-1} = \frac{2}{[-7]}$ Simplify. $(\sqrt[3]{18x-1})^{\frac{3}{2}} = 2^{\frac{3}{2}}$ Cube both sides of $18x - 1 = \frac{8}{9}$ Simplify. $18x = \frac{9}{2}$ Isolate the x-term. $x = \frac{2}{2}$ Solve for x. | the equation. $ \begin{array}{c} \text{Check: Substitute the value} \\ \text{of x into the original} \\ equation. \\ -7\sqrt[3]{18x-1} = -14 \\ -7\sqrt[3]{18}(\frac{1}{2}) - 1 = -14 \\ -7(2) = -14 \\ -14 = -14 \end{array} $ |
| The ter second as the object hits the ground after bouncing x feet in height. The corresponding function <i>g</i> for Earth, and use it to estimate how fast an object will hit the Earth's surface after a bounce of 30 feet in height. Round to the nearest tenth. Understand the Problem 1. How is the function for Mars translated to represent an objects downward velocity on Earth? $f(x) \text{ is stretched vertically by } \frac{5}{3}.$ Make a Plan 2. What do you need to determine? $g(x)$ and the downward velocity of an object with a bounce height of 30 ft 3. First, determine the transformed function $g(x)$. $g(x) = \frac{5}{3}.(4.8\sqrt{x}) \qquad \text{Stretch vertically by } \frac{5}{3}.$ $g(x) = \frac{3}{4}.(4.8\sqrt{x}) \qquad \text{Stretch vertically by multiplying by } \frac{5}{3}.$ $g(x) = \frac{3}{4}.(4.8\sqrt{x}) \qquad \text{Stretch vertically by multiplying by } \frac{5}{3}.$ Solve 4. Find the value of <i>g</i> for a bounce of $x = 30$ feet. $g(x) = 8\sqrt{30} \qquad \text{Substitute 30 for } x.$ $g(x) = \frac{43.8}{5} \qquad \text{Simplify.}$ 5. The object will hit the Earth's surface with a downward velocity of about $\frac{43.8}{5}$ ft Look Back 6. To check your solution, find the value of $f(x)$ for a bounce 30 feet in height on Marting: $f(x) = 4.8\sqrt{x} = 4.8\sqrt{30} = \frac{26.29}{3}$ ft/s Then, multiply this value by a factor of $\frac{5}{3}.$ $is \frac{5}{3}(\frac{26.29}{3}) = 43.8$ ft/s? $\frac{Yes}{3}$. | radical equation radical inequality radical equation radical inequality Solving Equations Containing One Radic Solve $-7\sqrt[3]{18x-1} = -14$. $-7\sqrt[3]{18x-1} = -14$ $\frac{-7\sqrt[3]{18x-1}}{-7} = \frac{-14}{-7}$ Isolate the radical 1 $\sqrt[3]{18x-1} = \frac{2}{-7}$ Simplify. $(\sqrt[3]{18x-1})^3 = 2^3$ Cube both sides of $18x - 1 = \frac{8}{-7}$ Isolate the x-term. $x = \frac{2}{-7}$ Solve for x. Solving Equations with Extraneous Solutions Solve $\sqrt{x+14} = x+2$. $(\sqrt{x+14})^2 = (x+2)^2$ Square bo $x + 14 = \frac{x^2}{-7} + 4x + \frac{4}{-7}$ Simplify. $0 = x^2 + \frac{3x}{-7} - \frac{10}{-7}$ Write in st $0 = (x + \frac{5}{-7})(x - \frac{2}{-7})$ Factor. $x = -\frac{5}{-7}$ or $x = \frac{2}{-7}$ Solve for x. Substitute each value of x into the original equations Substitute $x = -5$. Substitute $x = 2$. $\sqrt{x+14} = x+2$ $\sqrt{x+14} = x+2$ $\sqrt{-5+14} = -5+2$ $\sqrt{2+14} = 2+2$ $\sqrt{\frac{9}{-5}} = -3$ $\sqrt{\frac{116}{16}} = 4$ Because $x = -\frac{5}{-5}$ is extraneous, $x = \frac{2}{-7}$ is the original equations $x = -\frac{5}{-7}$ is the formula of the term $x = -\frac{5}{-7}$ is the formula of the term $x = -\frac{5}{-7}$ is the formula of the term $x = -\frac{5}{-7}$ is extraneous, $x = -\frac{2}{-7}$ is the formula of $x = -\frac{5}{-7}$ is extraneous, $x = -\frac{2}{-7}$ is the formula of $x = -\frac{5}{-7}$ is extraneous, $x = -\frac{2}{-7}$ is the formula of $x = -\frac{5}{-7}$ is extraneous, $x = -\frac{2}{-7}$ is the formula of $x = -\frac{5}{-7}$ is extraneous, $x = -\frac{2}{-7}$ is the formula of $x = -\frac{5}{-7}$ is extraneous, $x = -\frac{2}{-7}$ is the formula of $x = -\frac{5}{-7}$ is the formula of $x = -\frac{5}{-7}$ is $x = -\frac{5}{-7}$. | the equation. $-\frac{\sqrt{3}\sqrt{18\chi - 1}}{-14} = -14$ $-7\sqrt[3]{18(\frac{1}{2}) - 1} = -14$ $-7\sqrt[3]{18(\frac{1}{2}) - 1} = -14$ $-7(2) = -14$ $-7(2) = -14$ $-14 = -14$ The sides of the equation. and and form. K. son. |

