Name ______________________________ Date __________ Class __________

LESSON **11-8**

Reteach

Multiplying and Dividing Radical Expressions

Use the Product and Quotient Properties to multiply and divide radical expressions.

Product Property of Square Roots	Quotient Property of Square Roots
$\sqrt{ab} = \sqrt{a} \cdot \sqrt{b}$; where $a \geq 0$ and $b \geq 0$	$\sqrt{\frac{a}{b}} = \frac{\sqrt{a}}{\sqrt{b}}$; where $a \geq 0$ and $b > 0$

Multiply $\sqrt{6}\sqrt{10}$.

$\sqrt{6}\sqrt{10}$	
$\sqrt{6 \cdot 10}$	*Product Property of Square Roots*
$\sqrt{60}$	*Multiply the factors in the radicand.*
$\sqrt{4 \cdot 15}$	*Factor 60 using a perfect square factor.*
$\sqrt{4} \cdot \sqrt{15}$	*Product Property of Square Roots*
$2\sqrt{15}$	*Simplify.*

A quotient with a square root in the denominator is not simplified. Rationalize the denominator by multiplying by a form of 1 to get a perfect square.

Simplify $\sqrt{\frac{10}{3}}$.

$\sqrt{\frac{10}{3}} = \frac{\sqrt{10}}{\sqrt{3}}$	*Quotient Property*
$\frac{\sqrt{10}}{\sqrt{3}}\left(\frac{\sqrt{3}}{\sqrt{3}}\right)$	*Multiply by form of 1.*
$\frac{\sqrt{30}}{\sqrt{9}}$	*Product Property*
$\frac{\sqrt{30}}{3}$	*Simplify.*

Multiply. Then simplify.

1. $\sqrt{3}\sqrt{12}$ ____________

2. $\sqrt{5}\sqrt{10}$ ____________

3. $\sqrt{8}\sqrt{11}$ ____________

Rationalize the denominator of each quotient. Then simplify.

4. $\frac{\sqrt{7}}{\sqrt{2}}\left(\frac{\square}{\square}\right)$ ____________

5. $\frac{\sqrt{8}}{\sqrt{3}}\left(\frac{\square}{\square}\right)$ ____________

6. $\frac{\sqrt{12}}{\sqrt{5}}\left(\frac{\square}{\square}\right)$ ____________

Name ______________________________ Date __________ Class __________

LESSON **11-8**

Reteach

Multiplying and Dividing Radical Expressions (continued)

Terms can be multiplied and divided if they are both under the radicals OR if they are both outside the radicals.

Multiply 5×4.

$$(5\sqrt{2})(4\sqrt{3}) = 20\sqrt{6}$$

Multiply $\sqrt{2} \times \sqrt{3}$.

Multiply $\sqrt{3}\,(6 + \sqrt{8})$. Write the product in simplest form.

$\sqrt{3}\,(6 + \sqrt{8})$	
$\sqrt{3}(6) + \sqrt{3}\,\sqrt{8}$	*Distribute.*
$6\sqrt{3} + \sqrt{24}$	*Multiply the factors in the radicand.*
$6\sqrt{3} + \sqrt{4 \cdot 6}$	*Factor 24 using a perfect square factor.*
$6\sqrt{3} + \sqrt{4}\,\sqrt{6}$	*Product Property of Square Roots*
$6\sqrt{3} + 2\sqrt{6}$	*Simplify.*

Use FOIL to multiply binomials with square roots.

Multiply $(3 + \sqrt{2})\,(4 + \sqrt{2})$.

$(3 + \sqrt{2})(4 + \sqrt{2})$	
$3(4) + 3\sqrt{2} + 4\sqrt{2} + \sqrt{2}\,\sqrt{2}$	*FOIL.*
$12 + 3\sqrt{2} + 4\sqrt{2} + \sqrt{4}$	*Multiply.*
$12 + 3\sqrt{2} + 4\sqrt{2} + 2$	*Simplify.*
$14 + 7\sqrt{2}$	*Add.*

Multiply. Write each product in simplest form.

7. $\sqrt{5}\,(4 + \sqrt{8})$

$\sqrt{5}\boxed{} + \sqrt{5}\boxed{}$

____

8. $\sqrt{2}\,(\sqrt{2} + \sqrt{14})$

____

9. $(6 + \sqrt{3})(5 - \sqrt{3})$

$(6)(\boxed{}) - (6)(\boxed{}) + \sqrt{3}(\boxed{}) - \sqrt{3}(\boxed{})$

____

10. $(5 + \sqrt{10})(8 + \sqrt{10})$

____

LESSON 11-8

Practice A
Multiplying and Dividing Radical Expressions

Multiply. Write each product in simplest form.

1. $\sqrt{3} \cdot \sqrt{15}$
   $\sqrt{3 \cdot 15}$
   $\sqrt{45}$
   $\sqrt{\underline{9} \cdot 5}$
   $3\sqrt{5}$

2. $(2\sqrt{7})^2$
   $2\sqrt{7} \cdot 2\sqrt{7}$
   $\underline{2} \cdot \underline{2} \cdot \sqrt{7} \cdot \sqrt{7}$
   $\underline{4} \cdot \sqrt{7 \cdot 7}$
   $\underline{4} \cdot \sqrt{49}$
   28

3. $3\sqrt{5t} \cdot \sqrt{40t}$
   $3 \cdot \sqrt{(5t)(40t)}$
   $3 \cdot \sqrt{200t^2}$
   $3 \cdot \sqrt{2 \cdot \underline{100} \cdot \underline{t^2}}$
   $30t\sqrt{2}$

4. $\sqrt{10} \cdot \sqrt{5}$ **$5\sqrt{2}$**
5. $(3\sqrt{10})^2$ **90**
6. $6\sqrt{7x} \cdot \sqrt{8x}$ **$12x\sqrt{14}$**

7. $\sqrt{3}(\sqrt{6} - 2)$
   $\sqrt{3}(\sqrt{6}) - \sqrt{3}(2)$
   $\sqrt{18} - 2\sqrt{3}$
   $3\sqrt{2} - 2\sqrt{3}$

8. $\sqrt{6}(\sqrt{2} - \sqrt{3t})$
   $\sqrt{6}(\sqrt{2}) - \sqrt{6}(\sqrt{3t})$
   $\sqrt{12} - \sqrt{18t}$
   $2\sqrt{3} - 3\sqrt{2t}$

9. $(2 - \sqrt{5})(7 + \sqrt{5})$
   $14 + 2\sqrt{5} - \underline{7\sqrt{5}} - \underline{5}$
   $9 - 5\sqrt{5}$

10. $\sqrt{5}(\sqrt{5} - 8)$ **$5 - 8\sqrt{5}$**
11. $\sqrt{7}(\sqrt{7} + \sqrt{5})$ **$7 + \sqrt{35}$**
12. $(3 + \sqrt{2})(\sqrt{2} - 4)$ **$-\sqrt{2} - 10$**

Simplify each quotient.

13. $\frac{\sqrt{3}}{\sqrt{5}}$
    $\frac{\sqrt{3}}{\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}}$
    $\frac{\sqrt{15}}{5}$

14. $\frac{\sqrt{11}}{\sqrt{3}}$
    $\frac{\sqrt{11}}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}}$
    $\frac{\sqrt{33}}{3}$

15. $\frac{\sqrt{5}}{\sqrt{32b}}$
    $\frac{\sqrt{5}}{\underline{4} \cdot \sqrt{2b}} \cdot \frac{\sqrt{2b}}{\sqrt{2b}}$
    $\frac{\sqrt{10b}}{8b}$

16. $\frac{\sqrt{5}}{\sqrt{6}}$ **$\frac{\sqrt{30}}{6}$**
17. $\frac{\sqrt{10}}{\sqrt{2}}$ **$\sqrt{5}$**
18. $(4 + \sqrt{3})(5 - \sqrt{3})$ **$17 + \sqrt{3}$**

LESSON 11-8

Practice B
Multiplying and Dividing Radical Expressions

Multiply. Write each product in simplest form.

1. $\sqrt{15} \cdot \sqrt{6}$
   $\sqrt{15 \cdot 6}$
   $3\sqrt{10}$

2. $(3\sqrt{6})^2$
   $3\sqrt{6} \cdot 3\sqrt{6}$
   54

3. $4\sqrt{7x} \cdot \sqrt{20x}$
   $4 \cdot \sqrt{(7x)(20x)}$
   $8x\sqrt{35}$

4. $\sqrt{12} \cdot \sqrt{5}$ **$2\sqrt{15}$**
5. $(2\sqrt{7})^2$ **28**
6. $-2\sqrt{5b} \cdot \sqrt{10b}$ **$-10b\sqrt{2}$**
7. $3\sqrt{10y}\sqrt{6y}$ **$6y\sqrt{15}$**
8. $\sqrt{8}(\sqrt{12} - \sqrt{2})$ **$4\sqrt{6} - 4$**
9. $\sqrt{2x}(\sqrt{5} + \sqrt{2x})$ **$\sqrt{10x} + 2x$**
10. $\sqrt{2}(\sqrt{7} - 5)$ **$\sqrt{14} - 5\sqrt{2}$**
11. $\sqrt{10}(\sqrt{5m} - \sqrt{4})$ **$5\sqrt{2m} - 2\sqrt{10}$**
12. $(4 + \sqrt{3})(2 - \sqrt{3})$ **$5 - 2\sqrt{3}$**
13. $\sqrt{3}(\sqrt{8} - 6)$ **$2\sqrt{6} - 6\sqrt{3}$**
14. $\sqrt{5}(\sqrt{2} + \sqrt{8})$ **$3\sqrt{10}$**
15. $(5 + \sqrt{2})(6 - \sqrt{2})$ **$28 + \sqrt{2}$**
16. $\sqrt{5}(\sqrt{2} - \sqrt{6})$ **$\sqrt{10} - \sqrt{30}$**
17. $(3 - \sqrt{2})(5 + \sqrt{2})$ **$13 - 2\sqrt{2}$**
18. $(7 + \sqrt{3})(7 - \sqrt{3})$ **46**

Simplify each quotient.

19. $\frac{\sqrt{2}}{\sqrt{6}}$ **$\frac{\sqrt{3}}{3}$**
20. $\frac{\sqrt{10}}{\sqrt{11}}$ **$\frac{\sqrt{110}}{11}$**
21. $\frac{\sqrt{13}}{\sqrt{50t}}$ **$\frac{\sqrt{26t}}{10t}$**
22. $\frac{\sqrt{7}}{\sqrt{15}}$ **$\frac{\sqrt{105}}{15}$**
23. $\frac{\sqrt{2}}{\sqrt{17}}$ **$\frac{\sqrt{34}}{17}$**
24. $\frac{\sqrt{32}}{\sqrt{48z}}$ **$\frac{\sqrt{6z}}{3z}$**
25. $\frac{\sqrt{3}}{\sqrt{3a}}$ **$\frac{\sqrt{a}}{a}$**
26. $\frac{\sqrt{8x}}{\sqrt{5}}$ **$\frac{2\sqrt{10x}}{5}$**
27. $-\frac{\sqrt{75k}}{10\sqrt{2k}}$ **$-\frac{\sqrt{6}}{4}$**

LESSON 11-8

Practice C
Multiplying and Dividing Radical Expressions

Multiply. Write each product in simplest form.

1. $\sqrt{15} \cdot \sqrt{5}$ **$5\sqrt{3}$**
2. $\sqrt{42} \cdot \sqrt{12}$ **$6\sqrt{14}$**
3. $(2\sqrt{10})^2$ **40**
4. $(5\sqrt{5})^2$ **125**
5. $3\sqrt{6x} \cdot \sqrt{10x}$ **$6x\sqrt{15}$**
6. $4\sqrt{6x} \cdot \sqrt{12x}$ **$24x\sqrt{2}$**
7. $\sqrt{3}(\sqrt{12} + 6)$ **$6 + 6\sqrt{3}$**
8. $\sqrt{6}(\sqrt{10c} - \sqrt{8})$ **$2\sqrt{15c} - 4\sqrt{3}$**
9. $(10 + \sqrt{5})(4 - \sqrt{5})$ **$35 - 6\sqrt{5}$**
10. $\sqrt{7}(\sqrt{14} + 2)$ **$7\sqrt{2} + 2\sqrt{7}$**
11. $\sqrt{3}(\sqrt{3} - \sqrt{6})$ **$3 - 3\sqrt{2}$**
12. $(9 - \sqrt{3})(4 - \sqrt{3})$ **$39 - 13\sqrt{3}$**
13. $(4 + \sqrt{5})(1 - \sqrt{5})$ **$-1 - 3\sqrt{5}$**
14. $(2\sqrt{5} - \sqrt{3})(\sqrt{5} - \sqrt{3})$ **$13 - 3\sqrt{15}$**
15. $(9 - \sqrt{3})^2$ **$84 - 18\sqrt{3}$**

Simplify each quotient.

16. $\frac{\sqrt{3}}{\sqrt{5}}$ **$\frac{\sqrt{15}}{5}$**
17. $\frac{\sqrt{8}}{\sqrt{3}}$ **$\frac{2\sqrt{6}}{3}$**
18. $\frac{\sqrt{24}}{4\sqrt{3}}$ **$\frac{\sqrt{2}}{2}$**
19. $\frac{\sqrt{18}}{\sqrt{2}}$ **3**
20. $\frac{2\sqrt{2}}{\sqrt{8}}$ **1**
21. $\frac{-\sqrt{48x}}{2\sqrt{8}}$ **$-\frac{\sqrt{6x}}{2}$**
22. $\frac{\sqrt{11}}{\sqrt{72x}}$ **$\frac{\sqrt{22x}}{12x}$**
23. $\frac{\sqrt{96}}{3\sqrt{8x}}$ **$\frac{2\sqrt{3x}}{3x}$**
24. $-\frac{\sqrt{200m}}{2\sqrt{3m}}$ **$-\frac{5\sqrt{6}}{3}$**

25. Find the area of a triangle whose base is given by the expression $3\sqrt{6}$ m and whose height is given by the expression $2\sqrt{8}$ m.
    $12\sqrt{3}$ m^2

26. The area of a rectangle is $3\sqrt{50}$ yd^2. Find the width if the length is $3\sqrt{5}$ yd.
    $\sqrt{10}$ yd

LESSON 11-8

Reteach
Multiplying and Dividing Radical Expressions

Use the Product and Quotient Properties to multiply and divide radical expressions.

Product Property of Square Roots	Quotient Property of Square Roots
$\sqrt{ab} = \sqrt{a} \cdot \sqrt{b}$; where $a \geq 0$ and $b \geq 0$	$\sqrt{\frac{a}{b}} = \frac{\sqrt{a}}{\sqrt{b}}$; where $a \geq 0$ and $b > 0$

Multiply $\sqrt{6}\ \sqrt{10}$.

$\sqrt{6}\ \sqrt{10}$	
$\sqrt{6 \cdot 10}$	*Product Property of Square Roots*
$\sqrt{60}$	*Multiply the factors in the radicand.*
$\sqrt{4 \cdot 15}$	*Factor 60 using a perfect square factor.*
$\sqrt{4} \cdot \sqrt{15}$	*Product Property of Square Roots*
$2\sqrt{15}$	*Simplify.*

A quotient with a square root in the denominator is not simplified. Rationalize the denominator by multiplying by a form of 1 to get a perfect square.

Simplify $\sqrt{\frac{10}{3}}$.

$\sqrt{\frac{10}{3}} = \frac{\sqrt{10}}{\sqrt{3}}$	*Quotient Property*
$\frac{\sqrt{10}}{\sqrt{3}}\left(\frac{\sqrt{3}}{\sqrt{3}}\right)$	*Multiply by form of 1.*
$\frac{\sqrt{30}}{\sqrt{9}}$	*Product Property*
$\frac{\sqrt{30}}{3}$	*Simplify.*

Multiply. Then simplify.

1. $\sqrt{3}\ \sqrt{12}$ **6**
2. $\sqrt{5}\ \sqrt{10}$ **$5\sqrt{2}$**
3. $\sqrt{8}\ \sqrt{11}$ **$2\sqrt{22}$**

Rationalize the denominator of each quotient. Then simplify.

4. $\frac{\sqrt{7}}{\sqrt{2}}\left(\frac{\boxed{\sqrt{2}}}{\boxed{\sqrt{2}}}\right)$ **$\frac{\sqrt{14}}{2}$**
5. $\frac{\sqrt{8}}{\sqrt{3}}\left(\frac{\boxed{\sqrt{3}}}{\boxed{\sqrt{3}}}\right)$ **$\frac{2\sqrt{6}}{3}$**
6. $\frac{\sqrt{12}}{\sqrt{5}}\left(\frac{\boxed{\sqrt{5}}}{\boxed{\sqrt{5}}}\right)$ **$\frac{2\sqrt{15}}{5}$**

LESSON 11-8

Reteach
Multiplying and Dividing Radical Expressions (continued)

Terms can be multiplied and divided if they are both under the radicals OR if they are both outside the radicals.

Multiply 5 × 4.

$(5\sqrt{2})(4\sqrt{3}) = 20\sqrt{6}$

Multiply $\sqrt{2} \times \sqrt{3}$.

Multiply $\sqrt{3}\,(6 + \sqrt{8})$. Write the product in simplest form.

$\sqrt{3}\,(6 + \sqrt{8})$	
$\sqrt{3}(6) + \sqrt{3}\,\sqrt{8}$	*Distribute.*
$6\sqrt{3} + \sqrt{24}$	*Multiply the factors in the radicand.*
$6\sqrt{3} + \sqrt{4 \cdot 6}$	*Factor 24 using a perfect square factor.*
$6\sqrt{3} + \sqrt{4}\,\sqrt{6}$	*Product Property of Square Roots*
$6\sqrt{3} + 2\sqrt{6}$	*Simplify.*

Use FOIL to multiply binomials with square roots.

Multiply $(3 + \sqrt{2})\,(4 + \sqrt{2})$.

$(3 + \sqrt{2})(4 + \sqrt{2})$	
$3(4) + 3\sqrt{2} + 4\sqrt{2} + \sqrt{2}\,\sqrt{2}$	*FOIL.*
$12 + 3\sqrt{2} + 4\sqrt{2} + \sqrt{4}$	*Multiply.*
$12 + 3\sqrt{2} + 4\sqrt{2} + 2$	*Simplify.*
$14 + 7\sqrt{2}$	*Add.*

Multiply. Write each product in simplest form.

7. $\sqrt{5}\,(4 + \sqrt{8})$

$\sqrt{5}\,\boxed{4} + \sqrt{5}\,\boxed{\sqrt{8}}$

$4\sqrt{5} + 2\sqrt{10}$

8. $\sqrt{2}\,(\sqrt{2} + \sqrt{14})$

$2 + 2\sqrt{7}$

9. $(6 + \sqrt{3})(5 - \sqrt{3})$

$(6)(\boxed{5}) - (6)(\boxed{\sqrt{3}}) + \sqrt{3}(\boxed{5}) - \sqrt{3}(\boxed{\sqrt{3}})$

$27 - \sqrt{3}$

10. $(5 + \sqrt{10})(8 + \sqrt{10})$

$50 + 13\sqrt{10}$

LESSON 11-8

Challenge
Irrational Roots of Quadratic Equations

The solutions of a quadratic equation are sometimes called *roots*, but that has nothing to do with whether or not the solution contains a square root. If a solution does contain a square root, it is called an *irrational root.*

1. Is $x = -5 + \sqrt{3}$ an irrational root of $0 = x^2 + 10x + 22$? Substitute and simplify to find out.

Yes; $(-5 + \sqrt{3})^2 + 10(-5 + \sqrt{3}) + 22 =$
$(28 - 10\sqrt{3}) + (-50 + 10\sqrt{3}) + 22 = 0$

2. Use the Quadratic Formula to find all roots of $0 = x^2 + 10x + 22$. Does this support your answer to question 1?

$x = -5 \pm \sqrt{3}$; yes, $x = -5 + \sqrt{3}$ is one of the two roots.

3. Is $x = 1 - 3\sqrt{2}$ an irrational root of $0 = 4x^2 - 4x - 17$? Substitute and simplify to find out.

No; $4(1 - 3\sqrt{2})^2 - 4(1 - 3\sqrt{2}) - 17 =$
$(76 - 24\sqrt{2}) - (4 - 12\sqrt{2}) - 17 = 55 - 12\sqrt{2} \neq 0$

4. Use the Quadratic Formula to find all roots of $0 = 4x^2 - 4x - 17$. Does this support your answer to question 3?

$x = \frac{1 \pm 3\sqrt{2}}{2} = \frac{1}{2} \pm \frac{3}{2}\sqrt{2}$; yes, $x = 1 - 3\sqrt{2}$ is *not* one of the two roots.

5. Look at the roots that you found in questions 2 and 4. Based on these few examples, complete these conjectures about the irrational roots of quadratic equations that have rational coefficients:

a. In general, the irrational roots are conjugates of each other.

b. If one root is $m + n\sqrt{p}$, then the other root is $m - n\sqrt{p}$.

6. Explain how the Quadratic Formula guarantees that your conjectures in question 5 will hold true any time a quadratic equation has irrational roots?

The quadratic formula includes ± square root; irrational roots will always be conjugates.

7. Recall that when the discriminant $(b^2 - 4ac)$ is greater than zero, there are two real solutions. What must be true about the discriminant for there to be two irrational solutions?

$b^2 - 4ac$ would have to be greater than zero and *not* a perfect square.

LESSON 11-8

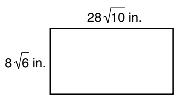
Problem Solving
Multiplying and Dividing Radical Expressions

Write each correct answer as a radical expression in simplest form.

1. The expression $\sqrt{\frac{W}{R}}$ models the electrical current in amperes, where W is power in watts and R is resistance in ohms. How much electrical current is running through an appliance with 500 watts of power and 16 ohms of resistance?

$\frac{5\sqrt{5}}{2}$ amps

2. The diagram shows the dimensions of a dining table. With a leaf in place, the table expands to seat eight people.



Find the area of the table.

$448\sqrt{15}$ in^2

Find the area of the table with the addition of a leaf that measures $8\sqrt{6}$ inches by $18\sqrt{3}$ inches.

$448\sqrt{15} + 432\sqrt{2}$ in^2

3. Riley's new bedroom is a perfect square. Each side measures $2\sqrt{3}$ meters. Find the area and perimeter of Riley's bedroom.

area: 12 m^2

perimeter: $8\sqrt{3}$ m

Select the best answer.

4. R.J. lives in a studio apartment. The apartment is rectangular with a width of $10 + 4\sqrt{2}$ feet and a length of $20 + 11\sqrt{2}$ feet. What is the area of R.J.'s apartment?

A 60 ft^2
B 288 ft^2
C $200 + 190\sqrt{2}$ ft^2
D $288 + 190\sqrt{2}$ ft^2

5. The volume of water in a lake, in gallons, can be represented by $x\sqrt{2}$. Heavy rains are forecast. The volume of water is expected to increase $\sqrt{2}$ times. How many gallons of water are expected in the lake after the rain?

F $\frac{x}{2}$ gallons
G x gallons
H $x\sqrt{2}$ gallons
J $2x$ gallons

6. The area of a rectangular window is 40 square feet. The length is $\sqrt{20}$ feet. What is the width of the window?

A $\sqrt{2}$ feet
B 2 feet
C $4\sqrt{5}$ feet
D $4\sqrt{10}$ feet

7. The height of a triangle can be found using $h = \frac{2A}{b}$ where A is the area and b is the base of the triangle. Which shows the height of a triangle with an area of $\sqrt{90}$ cm^2 and a base of $\sqrt{5}$ cm written in simplest form?

F $2\sqrt{18}$ cm
G $3\sqrt{18}$ cm
H $6\sqrt{2}$ cm
J $18\sqrt{2}$ cm

LESSON 11-8

Reading Strategies
Use Models

Use the four models below as a guide to multiplying and dividing radical expressions.

Multiplying and Dividing Radical Expressions

Two Square Roots	Distributive Property	FOIL	Rationalizing the Denominator
$4\sqrt{2x} \cdot 8\sqrt{14x}$	$\sqrt{5}(4 - \sqrt{10})$	$(3 + \sqrt{8})\,(4 - \sqrt{8})$	$\frac{1}{\sqrt{6}}$
$= 32\sqrt{28x^2}$	$= 4\sqrt{5} - \sqrt{5}\sqrt{10}$	$= 12 + 4\sqrt{8} - 3\sqrt{8} - \sqrt{64}$	$= \frac{1}{\sqrt{6}} \cdot \frac{\sqrt{6}}{\sqrt{6}}$
$= 32\sqrt{4}\sqrt{7}\sqrt{x^2}$	$= 4\sqrt{5} - \sqrt{50}$	$= 12 + \sqrt{8} - 8$	$= \frac{\sqrt{6}}{\sqrt{36}}$
$= 32 \cdot 2 \cdot x\sqrt{7}$	$= 4\sqrt{5} - \sqrt{25}\sqrt{2}$	$= 4 + \sqrt{4}\sqrt{2}$	$= \frac{\sqrt{6}}{6}$
$= 64x\sqrt{7}$	$= 4\sqrt{5} - 5\sqrt{2}$	$= 4 + 2\sqrt{2}$	

Complete the following.

1. Which method would be used to multiply $(3 + \sqrt{7})^2$?

FOIL

2. What does it mean to "rationalize the denominator"?

Rewrite the expression so there is no square root in the denominator.

Multiply. Write each product in simplest form.

3. $3\sqrt{6} \cdot 2\sqrt{3}$

$18\sqrt{2}$

4. $\sqrt{3}(5 + \sqrt{8})$

$5\sqrt{3} + 2\sqrt{6}$

5. $(9 - \sqrt{5})\,(7 + \sqrt{5})$

$58 + 2\sqrt{5}$

Simplify each quotient by rationalizing the denominator.

6. $\frac{10}{\sqrt{2}}$

$5\sqrt{2}$

7. $\frac{2\sqrt{12}}{\sqrt{3}}$

4

8. $\frac{\sqrt{5x}}{\sqrt{20}}$

$\frac{\sqrt{x}}{2}$