

LESSON
11-8

Review for Mastery

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
$\sqrt{ab} = \sqrt{a} \sqrt{b}$; 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. $\frac{\sqrt{7}}{\sqrt{2}} \left(\frac{\boxed{}}{\boxed{}} \right)$

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

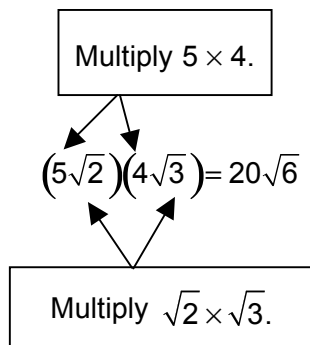
6. $\frac{\sqrt{12}}{\sqrt{5}} \left(\frac{\boxed{}}{\boxed{}} \right)$

LESSON
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Review for Mastery

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 $\sqrt{3}(6 + \sqrt{8})$. 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 $(3 + \sqrt{2})(4 + \sqrt{2})$

$$(3 + \sqrt{2})(4 + \sqrt{2})$$

$$3(4) + 3\sqrt{2} + 4\sqrt{2} + \sqrt{2}\sqrt{2} \quad \text{FOIL.}$$

$$12 + 3\sqrt{2} + 4\sqrt{2} + \sqrt{4} \quad \text{Multiply.}$$

$$12 + 3\sqrt{2} + 4\sqrt{2} + 2 \quad \text{Simplify.}$$

$$14 + 7\sqrt{2} \quad \text{Add.}$$

Multiply. Write each product in simplest form.

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

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

$$\sqrt{5} \square + \sqrt{5} \square$$

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

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

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

Reading Strategies

1. They have the same radicand, 6.
2. Keep $\sqrt{6}$ and subtract $5 - 3$.
3. Write $2\sqrt{54}$ as $6\sqrt{6}$.
4. $8\sqrt{6}$
5. $-3\sqrt{5}$
6. $6\sqrt{3x} + 2\sqrt{10x}$
7. $20\sqrt{2}$
8. $21\sqrt{7y}$

LESSON 11-8

Practice A

1. 9; $3\sqrt{5}$
2. 2; 2; 4; 4; 28
3. $100; t^2; 30t\sqrt{2}$
4. $5\sqrt{2}$
5. 90
6. $12x\sqrt{14}$
7. $3\sqrt{2} - 2\sqrt{3}$
8. $2\sqrt{3} - 3\sqrt{2t}$
9. $7\sqrt{5}; 5; 9 - 5\sqrt{5}$
10. $5 - 8\sqrt{5}$
11. $7 + \sqrt{35}$
12. $-\sqrt{2} - 10$
13. $\frac{\sqrt{15}}{5}$
14. $\frac{\sqrt{3}}{\sqrt{3}}; \frac{\sqrt{33}}{3}$
15. $4; \frac{\sqrt{2b}}{\sqrt{2b}}; \frac{\sqrt{10b}}{8b}$
16. $\frac{\sqrt{30}}{6}$
17. $\sqrt{5}$
18. $17 + \sqrt{3}$

Practice B

1. $3\sqrt{10}$
2. 54
3. $8x\sqrt{35}$
4. $2\sqrt{15}$
5. 28
6. $-10b\sqrt{2}$
7. $6y\sqrt{15}$
8. $4\sqrt{6} - 4$
9. $\sqrt{10x} + 2x$
10. $\sqrt{14} - 5\sqrt{2}$
11. $5\sqrt{2m} - 2\sqrt{10}$
12. $5 - 2\sqrt{3}$
13. $2\sqrt{6} - 6\sqrt{3}$
14. $3\sqrt{10}$
15. $28 + \sqrt{2}$
16. $\sqrt{10} - \sqrt{30}$
17. $13 - 2\sqrt{2}$
18. 46

19. $\frac{\sqrt{3}}{3}$
20. $\frac{\sqrt{110}}{11}$
21. $\frac{\sqrt{26t}}{10t}$
22. $\frac{\sqrt{105}}{15}$
23. $\frac{\sqrt{34}}{17}$
24. $\frac{\sqrt{6z}}{3z}$
25. $\frac{\sqrt{a}}{a}$
26. $\frac{2\sqrt{10x}}{5}$
27. $-\frac{\sqrt{6}}{4}$

Practice C

1. $5\sqrt{3}$
2. $6\sqrt{14}$
3. 40
4. 25
5. $6x\sqrt{15}$
6. $24x\sqrt{2}$
7. $6 + 6\sqrt{3}$
8. $2\sqrt{15c} - 4\sqrt{3}$
9. $35 - 6\sqrt{5}$
10. $7\sqrt{2} + 2\sqrt{7}$
11. $3 - 3\sqrt{2}$
12. $39 - 13\sqrt{3}$
13. $-1 - 3\sqrt{5}$
14. $13 - 3\sqrt{15}$
15. $84 - 18\sqrt{3}$
16. $\frac{\sqrt{15}}{5}$
17. $\frac{2\sqrt{6}}{3}$
18. $\frac{\sqrt{2}}{2}$
19. 3
20. 1
21. $-\frac{\sqrt{6x}}{2}$
22. $\frac{\sqrt{22x}}{12x}$
23. $\frac{2\sqrt{3x}}{3x}$
24. $-\frac{5\sqrt{6}}{3}$
25. $12\sqrt{3} \text{ m}^2$
26. $\sqrt{10} \text{ yd}$

Review for Mastery

1. 6
2. $5\sqrt{2}$
3. $2\sqrt{22}$
4. $\frac{\sqrt{14}}{2}$
5. $\frac{2\sqrt{6}}{3}$
6. $\frac{2\sqrt{15}}{5}$
7. 4; $\sqrt{8}$; $4\sqrt{5} + 2\sqrt{10}$
8. $2 + 2\sqrt{7}$
9. 5; $\sqrt{3}$; 5; $\sqrt{3}$; $27 - \sqrt{3}$
10. $50 + 13\sqrt{10}$