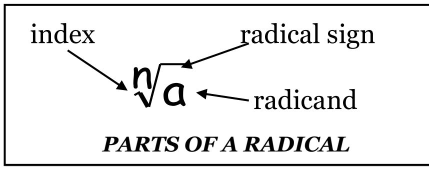
Unit 5 Day 05 Simplifying Radicals Notes/HW



Note: When there is no index shown, the index is understood to be 2 (square root)

$\sqrt{a^2} =$ $\qquad \sqrt{a \bullet a} =$ $\qquad \left(\sqrt{a}\right)^2 =$

A radical is in simplest form when:

1. The radicand has no perfect root factors
2. The radicand does not contain a fraction.
3. There is no radical in the denominator.
4. The radicand does not have any exponents greater than the index.

To simplify a radical when the radicand contains a perfect factor, use the:

PRODUCT PROPERTY $= \sqrt[n]{a \cdot b} = \sqrt[n]{a} \cdot \sqrt[n]{b}$

Examples:

a. $\sqrt{8} = \sqrt{\boxed{4}} \bullet \sqrt{2} = 2\sqrt{2}$ $\qquad$ **b.** $\sqrt{96} = \sqrt{\boxed{16}} \bullet \sqrt{6} = 4\sqrt{6}$

c. $2\sqrt{12} \bullet 5\sqrt{5} = 2 \bullet 5 \bullet \sqrt{12} \bullet \sqrt{5} = 10\sqrt{\boxed{4}}\sqrt{3} \bullet \sqrt{5} = 20\sqrt{15}$

1-9: Simplify the following square roots:

1. $\sqrt{72}$	**2.** $4\sqrt{320}$	**3.** $2\sqrt{10} \bullet 3\sqrt{5}$
4. $\sqrt{32x^4y^9}$	**5.** $\sqrt{324a^3b^7}$	**6.** $3\sqrt{75}$
7. $\sqrt{5} \bullet \sqrt{10}$	**8.** $5\sqrt{150}$	**9.** $3\sqrt{49x^9y^{16}}$

10-15: Simplify the following cube roots:

10. $\sqrt[3]{-64x^{10}y^{21}}$	**11.** $\sqrt[3]{216m^3n^6}$	**12.** $\sqrt[3]{-250}$

13. $3\sqrt[3]{108}$	**14.** $2\sqrt[3]{48}$	**15.** $\sqrt[3]{-81p^2q^{12}}$
16-21: Simplify the following cube roots:		
16. $\sqrt[4]{w^4v^{17}}$	**17.** $\sqrt[4]{48m^8n^3}$	**18.** $\sqrt[4]{625c^{23}d^{11}}$
19. $6\sqrt[4]{405}$	**20.** $5\sqrt[4]{112c^{24}d^{13}}$	**21.** $\sqrt[4]{243m^5n^{13}}$

☺ **To simplify a fraction when the denominator contains a radical, you apply the quotient property of square roots. It is called "Rationalizing the Denominator".**

QUOTIENT PROPERTY: $\sqrt{\frac{a}{b}} = \frac{\sqrt{a}}{\sqrt{b}}$

<u>Rationalizing the Denominator:</u> When there is a radical in the denominator, apply the following:

If the denominator is:	Multiply the numerator and denominator by:	Examples:
$\sqrt{b}$	$\sqrt{b}$	$\frac{3}{\sqrt{2}} = \frac{3}{\sqrt{2}} \bullet \frac{\sqrt{2}}{\sqrt{2}} = \frac{3\sqrt{2}}{2}$

Examples:

a. $\sqrt{\frac{3}{5}} = \frac{\sqrt{3}}{\sqrt{5}} \bullet \frac{\sqrt{5}}{\sqrt{5}} == \frac{\sqrt{15}}{5}$

b. $\frac{1}{\sqrt{5}} = \frac{1}{\sqrt{5}} \bullet \frac{\sqrt{5}}{\sqrt{5}} = \frac{\sqrt{5}}{\sqrt{25}} = \frac{\sqrt{5}}{5}$

c. $\frac{6}{\sqrt{2}} = \frac{6}{\sqrt{2}} \bullet \frac{\sqrt{2}}{\sqrt{2}} = \frac{6\sqrt{2}}{\sqrt{4}} = \frac{6\sqrt{2}}{2} = 3\sqrt{2}$

22-24: Simplify the following by rationalizing the denominator:		
22. $\frac{11}{\sqrt{3}}$	**23.** $\frac{\sqrt{27}}{\sqrt{2}}$	**24.** $\frac{5}{\sqrt{5}}$