

9.1 Simplifying Radical Expressions

DAY FIVE 1 4 9 16 25 36 49

REMINDER: Simplify the expression.

1. $\sqrt{24}$ (4) (6) $\sqrt{2 \cdot 2 \cdot 2 \cdot 3}$ (2) $2\sqrt{6}$

2. $-\sqrt{80}$ (16) (5) $-\sqrt{4 \cdot 4 \cdot 5}$ (4) $-4\sqrt{5}$

3. $\sqrt{49x^3}$ $\sqrt{7 \cdot 7 \cdot x \cdot x \cdot x}$ (7) $7x\sqrt{x}$

4. $\sqrt{75n^5}$ (144) (69) $\sqrt{5 \cdot 5 \cdot 3 \cdot n \cdot n \cdot n \cdot n \cdot n}$ (n²) $5n^2\sqrt{3n}$

Monitoring Progress 1-4

c. $\sqrt[3]{\frac{y}{216}}$ = $\frac{\sqrt[3]{y}}{\sqrt[3]{216}}$ Quotient Property of Cube Roots

index = $\frac{\sqrt[3]{y}}{6}$ Simplify.

d. $\sqrt[3]{\frac{8x^4}{27y^3}}$ = $\frac{\sqrt[3]{8x^4}}{\sqrt[3]{27y^3}}$ Quotient Property of Cube Roots

= $\frac{\sqrt[3]{2 \cdot 2 \cdot 2 \cdot x \cdot x \cdot x \cdot x}}{\sqrt[3]{3 \cdot 3 \cdot 3 \cdot y \cdot y \cdot y}}$ Factor using the greatest perfect cube factors.

= $\frac{2x\sqrt[3]{x}}{3y}$ Product Property of Cube Roots

= $\frac{2x\sqrt[3]{x}}{3y}$ Simplify.

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9.1 Simplifying Radical Expressions Cube Roots & Rationalizing DAY FIVE with work

a. $\sqrt[3]{-128} = \sqrt[3]{-4 \cdot 4 \cdot 4 \cdot 2}$ Factor using the greatest perfect cube factor.

$1 \quad 8 \quad 27 \quad 64 \quad 125$

$= -1 \cdot 4 \sqrt[3]{2}$ Product Property of Cube Roots

$= \boxed{-4\sqrt[3]{2}}$ Simplify.

b. $\sqrt[3]{125x^7} = \sqrt[3]{5 \cdot 5 \cdot 5 \cdot x^2 \cdot x}$ Factor using the greatest perfect cube factors.

$1 \quad 8 \quad 27 \quad 64 \quad \boxed{125}$

$= \boxed{5x^2\sqrt[3]{x}}$ Product Property of Cube Roots

$=$ Simplify.

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Examples & Practice:

Simplify the expression.

5. $\sqrt{\frac{23}{9}} = \frac{\sqrt{23}}{\sqrt{9}}$

$= \boxed{\frac{\sqrt{23}}{3}}$

6. $\sqrt{\frac{17}{100}} = -\frac{\sqrt{17}}{\sqrt{100}}$

$= \boxed{\frac{-\sqrt{17}}{10}}$

7. $\sqrt{\frac{36}{z^2}} = \frac{\sqrt{36}}{\sqrt{z^2}}$

$= \boxed{\frac{6}{z}}$

8. $\sqrt{\frac{4x^2}{64}} = \frac{\sqrt{4x^2}}{\sqrt{64}}$

$= \frac{2x}{8} = \boxed{\frac{x}{4}}$

9. $\sqrt[3]{54}$

$\sqrt[3]{27 \cdot 2}$

$\sqrt[3]{3 \cdot 3 \cdot 3 \cdot 2}$

$= \boxed{3\sqrt[3]{2}}$

10. $\sqrt[3]{16x^4}$

$\sqrt[3]{2 \cdot 2 \cdot 2 \cdot 2 \cdot x \cdot x \cdot x \cdot x}$

$= \boxed{2x\sqrt[3]{2x}}$

11. $\sqrt[3]{\frac{a}{-27}} = \frac{\sqrt[3]{a}}{\sqrt[3]{-27}}$

$= \frac{\sqrt[3]{a}}{-3}$

12. $\sqrt[3]{\frac{25c^7d^3}{64}}$

$= \frac{\sqrt[3]{25c^7d^3}}{\sqrt[3]{64}}$

$= \frac{\sqrt[3]{25c^6d^3} \cdot \sqrt[3]{c}}{4}$

9.1 Simplifying Radical Expressions Cube Roots & Rationalizing DAY FIVE with work

Rationalizing the denominator:

eliminate radicals from denominator..

$$a. \frac{\sqrt{5}}{\sqrt{3n}} = \frac{\sqrt{5}}{\sqrt{3n}} \cdot \frac{\sqrt{3n}}{\sqrt{3n}}$$

Multiply by $\frac{\sqrt{3n}}{\sqrt{3n}}$.

$$= \frac{\sqrt{15n}}{\sqrt{9n^2}}$$

Product Property of Square Roots

$$= \frac{\sqrt{15n}}{\sqrt{9} \cdot \sqrt{n^2}}$$

Product Property of Square Roots

$$= \frac{\sqrt{15n}}{3n}$$

Simplify.

$$b. \frac{2}{\sqrt[3]{9}} = \frac{2}{\sqrt[3]{9}} \cdot \frac{\sqrt[3]{3}}{\sqrt[3]{3}}$$

Multiply by $\frac{\sqrt[3]{3}}{\sqrt[3]{3}}$.

$$= \frac{2\sqrt[3]{3}}{\sqrt[3]{27}}$$

Product Property of Cube Roots

$$= \frac{2\sqrt[3]{3}}{3}$$

Simplify.

Example 4

Simplify the expression.

$$13. \frac{1}{\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}} = \frac{\sqrt{5}}{5}$$

$$14. \frac{\sqrt{10}}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{\sqrt{30}}{3}$$

$$15. \frac{7}{\sqrt{2x}} \cdot \frac{\sqrt{2x}}{\sqrt{2x}} = \frac{7\sqrt{2x}}{2x}$$

$$16. \sqrt{\frac{2y^2}{3}} = \frac{\sqrt{2y^2}}{\sqrt{3}} = \frac{y\sqrt{2}}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{y\sqrt{6}}{3}$$

$$17. \frac{5}{\sqrt[3]{32}} = \frac{5}{\sqrt[3]{4 \cdot 4 \cdot 2}} \cdot \frac{\sqrt[3]{2}}{\sqrt[3]{2}} = \frac{5\sqrt[3]{2}}{\sqrt[3]{4 \cdot 4 \cdot 4}} = \frac{5\sqrt[3]{2}}{4}$$

Rationalizing the denominator using conjugates.**Conjugates**

$$(x + y)(x - y) = x^2 - y^2$$

$$(3x - 2y)(3x + 2y) = 9x^2 - 4y^2$$

$$(3 + 2\sqrt{5})(3 - 2\sqrt{5}) = 9 - 4(5) = -11$$

Example:

$$\frac{4}{4 - 3\sqrt{3}} = \frac{4}{4 - 3\sqrt{3}} \cdot \frac{4 + 3\sqrt{3}}{4 + 3\sqrt{3}}$$

$$= \frac{16 + 12\sqrt{3}}{4^2 - (3\sqrt{3})^2}$$

$$= \frac{16 + 12\sqrt{3}}{16 - 9(3)}$$

$$= \frac{16 + 12\sqrt{3}}{-11} = \frac{-16 - 12\sqrt{3}}{11}$$

Example 5

HW Assignment:**9.1 DAY FIVE****9.1 WS from WB**