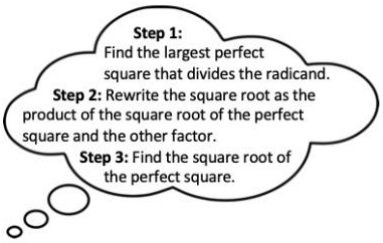
Name: _____ Date: _____

Notes: Operations with Radicals

Do Now: Simplify each expression.

1) $\sqrt{72}$ 2) $\sqrt{x^{11}}$ 3) $\sqrt{243x^8}$ 4) $\sqrt{1728a^{15}bc^{29}}$



Remember how to simplify radicals...

1) $5x + 8x$ 2) $5x^2 + 8x$

3) $5\sqrt{2} + 8\sqrt{2}$ 4) $5\sqrt{3} + 8\sqrt{2}$

What Should I Be Able to Do?

- I can completely simplify radical expressions with both numbers and variables.

- I can explain the process of completely simplifying a radical.

- I can add and subtract radical expressions.

- I can multiply radical expressions.

- I can divide radical expressions.

- I can explain the process of dividing radical expressions

Simplifying Radicals

Simplify each of the following radical expressions.

$\sqrt{108x^9y^{13}}$

$\sqrt[3]{108x^9y^{13}}$

$\sqrt{160a^5b^6c^7d^8}$

$\sqrt[3]{160a^5b^6c^7d^8}$

$\sqrt[4]{160a^5b^6c^7d^8}$

$\sqrt[5]{160a^5b^6c^7d^8}$

When **ADDING** or **SUBTRACTING** radicals, you must have ....

LIKE TERMS

Simplify each of the following radical expressions:

A) $7\sqrt{6} + 2\sqrt{6}$

B) $4\sqrt{5} + 3\sqrt{10}$

C) $\sqrt{14} - 3\sqrt{14}$

But what if we have ...

UNLIKE TERMS

$3\sqrt{24} - 9\sqrt{6}$

1) **SIMPLIFY** all radicals.

2) Combine all like terms.

$-\sqrt{27} + 2\sqrt{12}$

Multiplying Radicals

$\sqrt{5}(\sqrt{10})$

Step 1: Simplify any radicals possible.

Step 2: **MULTIPLY** coefficients

MULTIPLY radicands.

Step 3: If possible, simplify the product.

$3\sqrt{192} \cdot 5\sqrt{2}$

$\left(\frac{1}{5}\sqrt{5}\right)^2$

$-4\sqrt{98a^7}(3\sqrt{54a^8})$

$(2-\sqrt{10})(7+\sqrt{10})$

Dividing Radicals

$\frac{\sqrt{15}}{\sqrt{3}}$ $\frac{3\sqrt{6x}}{\sqrt{5x}}$ $\frac{\sqrt{45}}{2\sqrt{20}}$

$\frac{5\sqrt{3}}{6+\sqrt{7}}$

> **Vocab Corner**
>
> **Conjugate:** A conjugate of a binomial is made by changing the operation with + to – or from – to +.

$\frac{4-3\sqrt{8}}{\sqrt{5}-9}$

Success Criteria

- I can completely simplify radical expressions with both numbers and variables.

Completely simplify the following radical expressions.

1) $\sqrt{507}$ 2) $\sqrt[3]{384x^7y^{32}z^{66}}$ 3) $\sqrt{3920m^{107}n}$

- I can explain the process of completely simplifying a radical.

Explain each step to completely simplifying the following radical expression.

$$\sqrt{108x^5}$$

- I can add and subtract radical expressions.

Completely simplify the following radical expressions.

1) $7\sqrt{8}+2\sqrt{8}$ 2) $\sqrt{2}-18\sqrt{72}$ 3) $\sqrt{56x^{11}}-3\sqrt{60x^7}+\sqrt{20x^8}$

- I can multiply radical expressions.

Completely simplify the following radical expressions.

1) $5\sqrt{150}\cdot 2\sqrt{128}$ 2) $4\sqrt{6h^{27}}(-3\sqrt{24h^{13}})$ 3) $\left(4-\sqrt{30}\right)^2$

- I can divide radical expressions.

Completely simplify the following radical expressions.

1) $\frac{3-\sqrt{3}}{3\sqrt{3}}$

2) $\frac{12-\sqrt{10}}{\sqrt{2}+8\sqrt{5}}$

- I can explain the process of dividing radical expressions.

Explain each step to completely simplifying the following radical expression.

$$\frac{a}{b-\sqrt{c}}$$

Name: _____ Date: _____

Classwork: Operations with Radicals

Completely simplify each radical expression.

1) $\sqrt{108h^{57}j^{29}k^{10}}$

2) $\frac{-3\sqrt{3}}{8\sqrt{27}}$

3) $\sqrt{216m^{22}} + 3\sqrt{96m^{23}} + \sqrt{24m^{22}}$

4) $-4\sqrt{72}(-3\sqrt{128})$

5) $\frac{9}{-4-\sqrt{11}}$

6) $\sqrt{1445} - \sqrt{1280} - \sqrt{3125}$

7) $(13 - 2\sqrt{288})(\sqrt{160} - 3\sqrt{98})$

8) $\frac{\sqrt{18}+4}{\sqrt{14}+3}$

9) Determine whether the following statement is true or false. Explain your reasoning.

The cube root of -42 is not a real number.

10) Given $b \geq 0$, completely simplify the product of $a - \sqrt{b}$ and its conjugate.

11) Completely simplify the following expression:

$$\frac{(9)^{-3/2} + (5)^{3/2}}{(32)^{2/5} - (3)^{1/2}}$$