Name: _____ Date: _____

Notes: Operations with Radicals

Do Now: Simplify each expression.

1) $7x + 9x$

2) $7x^2 + 9x$

3) $7\sqrt{2} + 9\sqrt{2}$

4) $7\sqrt{3} + 9\sqrt{2}$

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

LIKE TERMS

Simplify each of the following radical expressions:

A) $10\sqrt{11} + 2\sqrt{11}$

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

C) $5\sqrt{13} + 3\sqrt{7}$

D) $\sqrt{3} - 8\sqrt{3}$

But what if we have …

UNLIKE TERMS

$5\sqrt{3} - \sqrt{12}$

1) **SIMPLIFY** all radicals.

2) Combine all like terms.

$3\sqrt{27} + 2\sqrt{12}$

Checkpoint:

Completely simplify each of the following expressions.

A) $2\sqrt{32} + 7\sqrt{98}$

B) $10\sqrt{27} - 9\sqrt{18}$

C) $\frac{2}{3}\sqrt{27} - 3\sqrt{108} + 1.2\sqrt{75}$

D) $\sqrt{98} - 4\sqrt{8} + 3\sqrt{128}$

MULTIPLYING

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

1) **MULTIPLY** coefficients.

2) **MULTIPLY** radicands.

3) If possible, simplify the result.

$2\sqrt{15}(3\sqrt{3})$

Checkpoint:

Completely simplify each of the following expressions.

1) $3\sqrt{27} \cdot 5\sqrt{2}$

2) $\left(\frac{1}{2}\sqrt{3}\right)^2$

3) $-4\sqrt{a}(3\sqrt{a})$

4) $(4-\sqrt{6})(3+\sqrt{6})$

Dividing Radicals

We must first RATIONALIZE THE DENOMINATOR!

$\frac{\sqrt{3}}{\sqrt{7}}$

$\frac{2\sqrt{3}}{\sqrt{5}}$

$\frac{5\sqrt{3}}{2\sqrt{5}}$

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

$\frac{9-2\sqrt{3}}{\sqrt{3}+6}$

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Classwork: Operations with Radicals

Completely simplify each expression.

1) $\sqrt{5} + 6\sqrt{5}$

2) $-8.7\sqrt{3} - 3\sqrt{3}$

3) $2\sqrt{72} + 3\sqrt{98}$

4) $\sqrt{7}(24 + \sqrt{7})$

5) $3\sqrt{18}(-4\sqrt{8})$

6) $\sqrt{75} - 4\sqrt{12} + 3\sqrt{192}$

7) $\sqrt{81x} + \sqrt{16x}$

8) $\left(\frac{1}{3} + \sqrt{18}\right)^2$

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

Completely simplify each expression.

10) $\frac{\sqrt{27}}{\sqrt{15}}$

11) $\frac{4-\sqrt{768}}{4}$

12) $\frac{2-\sqrt{5}}{-3+\sqrt{5}}$

13) The length of a rectangle is $(3\sqrt{8}+2)$ and the width is $\left(2\sqrt{2}+1\right)$. Express the perimeter of the rectangle in simplest radical form. Express the area of the rectangle in simplest radical form.

14) If $A = -3 + 8\sqrt{5}$ and $B = \sqrt{5} - 9$, then $A - B$ equals

(1) $-12 + 7\sqrt{5}$
(2) $6 + 7\sqrt{5}$
(3) $-12 + 8\sqrt{5}$
(4) $6 + 8\sqrt{5}$

15) Dominque is installing a rectangular window in his neighbor's house. If the width of the window is $\frac{8+2\sqrt{10}}{3+\sqrt{5}}$ in. and the length is $\frac{5-\sqrt{5}}{\sqrt{3}}$ in. Find the window's total area, keeping your answer in simplest radical form.