

10-16-17

Aim: SWBAT multiply and divide radical expressions.

HW: Packet Page 13 # 1 - 6 & Packet Page 16

Test Friday

Do Now: Packet Page 14 # 1 - 3

Multiplying and Dividing with Square Roots

Aim: SWBAT express multiply and divide radical expressions.

Do Now: Write each of the following in simplest form.

1)  $\sqrt{63}$

$$\begin{aligned} &\sqrt{9 \cdot 7} \\ &\sqrt{9} \cdot \sqrt{7} \\ &3\sqrt{7} \end{aligned}$$

2)  $4\sqrt{12}$

$$\begin{aligned} &4 \cdot \sqrt{4 \cdot 3} \\ &4 \cdot \sqrt{4} \cdot \sqrt{3} \\ &4 \cdot 2 \cdot \sqrt{3} \rightarrow 8\sqrt{3} \end{aligned}$$

3)  $\frac{3}{2}\sqrt{80}$

$$\begin{aligned} &\frac{3}{2} \cdot \sqrt{16 \cdot 5} \\ &\frac{3}{2} \cdot \sqrt{16} \cdot \sqrt{5} \\ &\frac{3}{2} \cdot 4 \cdot \sqrt{5} \\ &6\sqrt{5} \end{aligned}$$

An expression is in SIMPLEST RADICAL FORM if all of the following statements are true:

- The radicand has no perfect square factors OTHER THAN 1.
- The radicand contains NO FRACTIONS.
- No radicals appear in the DENOMINATOR of a fraction.

**Multiplying Square Roots:**

- Multiply the coefficients
- Multiply the radicands
- Simplify when necessary

Express each product in simplest radical form:

Example 1:  $\sqrt{2} \cdot \sqrt{6}$

$$\begin{aligned} &\sqrt{12} \\ &\sqrt{4 \cdot 3} \\ &\sqrt{4} \cdot \sqrt{3} \\ &2\sqrt{3} \end{aligned}$$

Example 2:  $2\sqrt{3} \cdot 5\sqrt{2}$

$$10\sqrt{6}$$

Example 3:  $-3\sqrt{6} \cdot 2\sqrt{3}$

$$\begin{aligned} &-6\sqrt{18} \\ &-6 \cdot \sqrt{9 \cdot 2} \\ &-6 \cdot \sqrt{9} \cdot \sqrt{2} \\ &-6 \cdot 3 \cdot \sqrt{2} \\ &-18\sqrt{2} \end{aligned}$$

Example 4:  $5\sqrt{8} \cdot -3\sqrt{8}$

$$\begin{aligned} &-15 \cdot \sqrt{8^2} \\ &-15 \cdot 8 \\ &-120 \end{aligned}$$

**Dividing Square Roots:**

- Divide the coefficients
- Divide the radicands
- Simplify when necessary (No square roots allowed in the denominator)

Example 1:  $\frac{\sqrt{15}}{\sqrt{5}}$

$\sqrt{3}$

Example 2:  $\frac{6\sqrt{10}}{2\sqrt{2}}$

$3\sqrt{5}$

Example 3:  $\frac{-12\sqrt{26}}{3\sqrt{13}}$

$-4\sqrt{2}$

Example 4:  $\frac{-15\sqrt{54}}{3\sqrt{6}}$

$-5\sqrt{9}$   
 $-5 \cdot 3$   
 $-15$

**Square Roots to Memorize:**

$\sqrt{8}$   
 $\frac{\sqrt{2^2 \cdot 2}}{\sqrt{2^2 \cdot \sqrt{2}}}$   
 $2\sqrt{2}$

$\sqrt{12}$   
 $\frac{\sqrt{2^2 \cdot 3}}{\sqrt{2^2 \cdot \sqrt{3}}}$   
 $2\sqrt{3}$

$\sqrt{20}$   
 $\frac{\sqrt{2^2 \cdot 5}}{\sqrt{2^2 \cdot \sqrt{5}}}$   
 $2\sqrt{5}$

$\sqrt{18}$   
 $\frac{\sqrt{3^2 \cdot 2}}{\sqrt{3^2 \cdot \sqrt{2}}}$   
 $3\sqrt{2}$

$\sqrt{27}$   
 $\frac{\sqrt{3^2 \cdot 3}}{\sqrt{3^2 \cdot \sqrt{3}}}$   
 $3\sqrt{3}$

$\sqrt{80}$



$\sqrt{2^2 \cdot 2^2 \cdot 5}$   
 $\sqrt{2^2 \cdot \sqrt{2^2} \cdot \sqrt{5}}$   
 $2 \cdot 2 \cdot \sqrt{5}$   
 $4\sqrt{5}$

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**Homework - Simplifying Radical Expressions**

List the first 15 perfect squares starting with 1.

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**Simplify each radical expression. Justify your answer.**

1)  $\sqrt{63}$

2)  $\sqrt{99}$

3)  $3\sqrt{99}$

4)  $\sqrt{108}$

5)  $\sqrt{242}$

6)  $\sqrt{128}$

7)  $5\sqrt{18}$

8)  $3\sqrt{8}$

9)  $4\sqrt{200}$

10)  $\frac{2}{3}\sqrt{12}$

11)  $\frac{1}{3}\sqrt{18}$

12)  $\frac{1}{2}\sqrt{20}$

Homework:

1)  $(\sqrt{3})(\sqrt{8})$

2)  $(-3\sqrt{5})(2\sqrt{4})$

3)  $(2\sqrt{9})(2\sqrt{4})$

4)  $\frac{-\sqrt{54}}{\sqrt{6}}$

5)  $\frac{20\sqrt{80}}{-5\sqrt{5}}$

6)  $\frac{\sqrt{180}}{\sqrt{5}}$

7)  $\frac{8\sqrt{36}}{2\sqrt{9}}$

8)  $\frac{6\sqrt{24}}{9\sqrt{8}}$

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

10) Find the product of  $3\sqrt{14}$  and  $-2\sqrt{21}$