

January 13th

Due Today: HW 6.5 + VN 6.5

Due Tomorrow: HW 6.6 + VN 6.6

Unit 6: Exponents and Radicals

Lesson 6.6: Multiplying and Dividing with Radicals

Get Ready: Check your homework answers.

1) 10

2) $6\sqrt{2}$

3) $6\sqrt{5}$

4) $2\sqrt{6}$

5) $\frac{16}{9}$

6) $6\sqrt{6}$

7) $7\sqrt{3}$

8) $8\sqrt{2}$

9) $\sqrt{490}$

10) $\sqrt{80}$

11) $\sqrt{12}$

12) $\sqrt{28}$

13) $6\sqrt{5}$

14) 0

15) $-12\sqrt{5}$

16) $-6\sqrt{6}$

17) $-5\sqrt{3} + 6\sqrt{2}$

18) $8\sqrt{6} - \sqrt{2}$

19) $-3\sqrt{2} + 6\sqrt{6}$

20) $-3\sqrt{5}$

$$\textcircled{14} - 2\sqrt{3} + 2\sqrt{3}$$

$$\sqrt{0} = 0 \quad \textcircled{0}$$

$$-2x + 2x$$

$$\textcircled{0}$$

$$2\sqrt{3}$$

$$= \sqrt{3} + \sqrt{3}$$

$$-\sqrt{3} - \sqrt{3}$$

$$\textcircled{15} - 3\sqrt{45} - \sqrt{45}$$

$$-4\sqrt{45}$$

$$= -4\sqrt{9 \cdot 5}$$

$$= -4\sqrt{9} \cdot \sqrt{5}$$

$$= -4 \cdot 3 \cdot \sqrt{5}$$

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

$$\textcircled{19} - 3\sqrt{2} + 3\sqrt{54} - 3\sqrt{6}$$

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

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

$$- 3\sqrt{2} + 3 \cdot 3 \cdot \sqrt{6} - 3\sqrt{6}$$

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

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

$$\textcircled{20} \cdot \underline{2\sqrt{18}} + \underline{2\sqrt{18}} - 3\sqrt{5}$$
$$= \boxed{-3\sqrt{5}}$$

$$\begin{aligned} \textcircled{17} & - 2\sqrt{3} + 2\sqrt{18} - \sqrt{27} \\ & - 2\sqrt{3} + 2\sqrt{9 \cdot 2} - \sqrt{9 \cdot 3} \\ & - 2\sqrt{3} + 2\sqrt{9} \cdot \sqrt{2} - \sqrt{9} \cdot \sqrt{3} \\ & - 2\sqrt{3} + 2 \cdot 3\sqrt{2} - 3 \cdot \sqrt{3} \\ & = -2\sqrt{3} + 6\sqrt{2} - 3\sqrt{3} \\ & \boxed{-5\sqrt{3} + 6\sqrt{2}} \end{aligned}$$

Simplifying Radicals

$$\sqrt{\text{Big \#}} = \sqrt{\text{Biggest possible perfect square}} \cdot \sqrt{\text{Factor that is not a perfect square}}$$

$$\begin{aligned}\sqrt{72} &= \sqrt{36} \cdot \sqrt{2} \\ &= 6\sqrt{2}\end{aligned}$$

Multiplying Radicals

$$\text{Ex 1) } \sqrt{9} \cdot \sqrt{9}$$

$$= \sqrt{9 \cdot 9}$$

$$= \sqrt{81} = 9$$

$$= \sqrt{9} \cdot \sqrt{9} = (\sqrt{9})^2$$

$$= 9$$

$$\sqrt{27} \cdot \sqrt{27} = 27$$

$$\text{Ex 2) } \sqrt{3} \cdot \sqrt{15}$$

$$= \sqrt{3 \cdot 15}$$

$$= \sqrt{45}$$

$$= \sqrt{9 \cdot 5}$$

$$= \sqrt{9} \cdot \sqrt{5}$$

$$= 3\sqrt{5}$$

Multiplying Radicals

Ex 3) $-2\sqrt{5} \cdot 3\sqrt{10}$

$$\begin{aligned} & -6\sqrt{5 \cdot 10} \\ & = -6\sqrt{50} \\ & = -6\sqrt{25 \cdot 2} \\ & = -6\sqrt{25} \cdot \sqrt{2} \\ & = -6 \cdot 5 \cdot \sqrt{2} \\ & = -30\sqrt{2} \end{aligned}$$

Ex 4) $3\sqrt{8}(2+3\sqrt{6})$

$$\begin{aligned} & = 6\sqrt{8} + 9\sqrt{8 \cdot 6} \\ & = 6\sqrt{4 \cdot 2} + 9\sqrt{48} \\ & = 6\sqrt{4} \cdot \sqrt{2} + 9\sqrt{16 \cdot 3} \\ & = 6 \cdot 2\sqrt{2} + 9\sqrt{16} \cdot \sqrt{3} \\ & = 12\sqrt{2} + 9 \cdot 4 \cdot \sqrt{3} \\ & = 12\sqrt{2} + 36\sqrt{3} \end{aligned}$$

Try these:

$$3\sqrt{4} \cdot \sqrt{6}$$

$$4\sqrt{8} \cdot -4\sqrt{10}$$

Try these:

$$3\sqrt{4} \cdot \sqrt{6}$$

$$= 3\sqrt{24}$$

$$= 3\sqrt{4 \cdot 6}$$

$$= 3\sqrt{4} \cdot \sqrt{6}$$

$$= 3 \cdot 2\sqrt{6}$$

$$= \boxed{6\sqrt{6}}$$

$$4\sqrt{8} \cdot -4\sqrt{10}$$

$$= -16\sqrt{80}$$

$$= -16\sqrt{16 \cdot 5}$$

$$= -16\sqrt{16} \cdot \sqrt{5}$$

$$= -16 \cdot 4\sqrt{5}$$

$$= \boxed{-64\sqrt{5}}$$

Dividing Radicals

No radicals in the denominator! (not in simplest form)

$$\text{Ex 1) } \frac{\sqrt{108}}{\sqrt{6}} = \sqrt{18}$$

$$\begin{aligned} &= \sqrt{9 \cdot 2} \\ &= \sqrt{9} \cdot \sqrt{2} \\ &= \boxed{3\sqrt{2}} \end{aligned}$$

$$\begin{aligned} &= \sqrt{\frac{5}{80}} \\ &= \sqrt{\frac{1}{4}} \end{aligned}$$

$$\text{Ex 2) } \frac{\sqrt{5}}{\sqrt{80}} = \frac{\sqrt{1}}{\sqrt{16}}$$

Dividing Radicals

No radicals in the denominator! (not in simplest form)

$$\text{Ex 3) } \frac{5\sqrt{6}}{\sqrt{32}} = \frac{6}{32} = \frac{3}{16}$$

$$= \frac{5 \cdot \sqrt{3}}{\sqrt{16}} = \frac{5\sqrt{3}}{4}$$

$$\text{Ex 4) } \frac{4\sqrt{15}}{3\sqrt{12}}$$

$$= \frac{4\sqrt{5}}{3\sqrt{4}} = \frac{4\sqrt{5}}{3 \cdot 2}$$

$$= \frac{4\sqrt{5}}{6} = \frac{2\sqrt{5}}{3}$$

Dividing Radicals

$$1) \frac{3\sqrt{20}}{\sqrt{4}}$$

$$2) \frac{\sqrt{8}}{\sqrt{18}}$$

Dividing Radicals

$$1) \frac{3\sqrt{20}}{\sqrt{4}}$$

$$= \boxed{3\sqrt{5}}$$

$$2) \frac{\sqrt{8}}{\sqrt{18}}$$

$$= \frac{\sqrt{4}}{\sqrt{9}} = \boxed{\frac{2}{3}}$$

Practice: Simplify as much as possible.

$$1) -4\sqrt{20} \cdot -2\sqrt{8} \quad 2) \frac{\sqrt{2}}{\sqrt{32}} \quad 3) \sqrt{6}(3 + \sqrt{3})$$

$$4) \frac{\sqrt{4}}{4\sqrt{25}} \quad 5) -3\sqrt{27} - \sqrt{3} \quad 6) \sqrt{150}$$

$$7) 2\sqrt{8} \cdot 2\sqrt{8} \quad 8) \frac{6\sqrt{36}}{3\sqrt{16}} \quad 9) \sqrt{3}(-\sqrt{3} + 2)$$

$$10) \frac{2\sqrt{12}}{\sqrt{4}} \quad 11) -2\sqrt{5} - \sqrt{45} + 3\sqrt{5} \quad 12) 6\sqrt{32}$$

Practice: Simplify as much as possible.

1) $-4\sqrt{20} \cdot -2\sqrt{8}$

$= 8\sqrt{160}$
 $= 8\sqrt{16 \cdot 10}$
 $= 8\sqrt{16} \cdot \sqrt{10}$
 $= 8 \cdot 4 \cdot \sqrt{10} = \boxed{32\sqrt{10}}$

2) $\frac{\sqrt{2}}{\sqrt{32}} = \frac{\sqrt{1}}{\sqrt{16}}$

$= \frac{1}{4}$

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

$= 3\sqrt{6} + \sqrt{18}$
 $= 3\sqrt{6} + \sqrt{9 \cdot 2}$
 $= 3\sqrt{6} + \sqrt{9} \cdot \sqrt{2}$
 $= \boxed{3\sqrt{6} + 3\sqrt{2}}$

4) $\frac{\sqrt{4}}{4\sqrt{25}} = \frac{2}{4 \cdot 5} = \frac{2}{20}$

$= \frac{1}{10}$

5) $-3\sqrt{27} - \sqrt{3}$

$= -3\sqrt{9 \cdot 3} - \sqrt{3}$
 $= -3\sqrt{9} \cdot \sqrt{3} - \sqrt{3}$
 $= -3 \cdot 3 \cdot \sqrt{3} - \sqrt{3}$
 $= -9\sqrt{3} - \sqrt{3} = \boxed{-10\sqrt{3}}$

6) $\sqrt{150}$

$= \sqrt{25 \cdot 6}$
 $= \sqrt{25} \cdot \sqrt{6}$
 $= \boxed{5\sqrt{6}}$

7) $2\sqrt{8} \cdot 2\sqrt{8}$

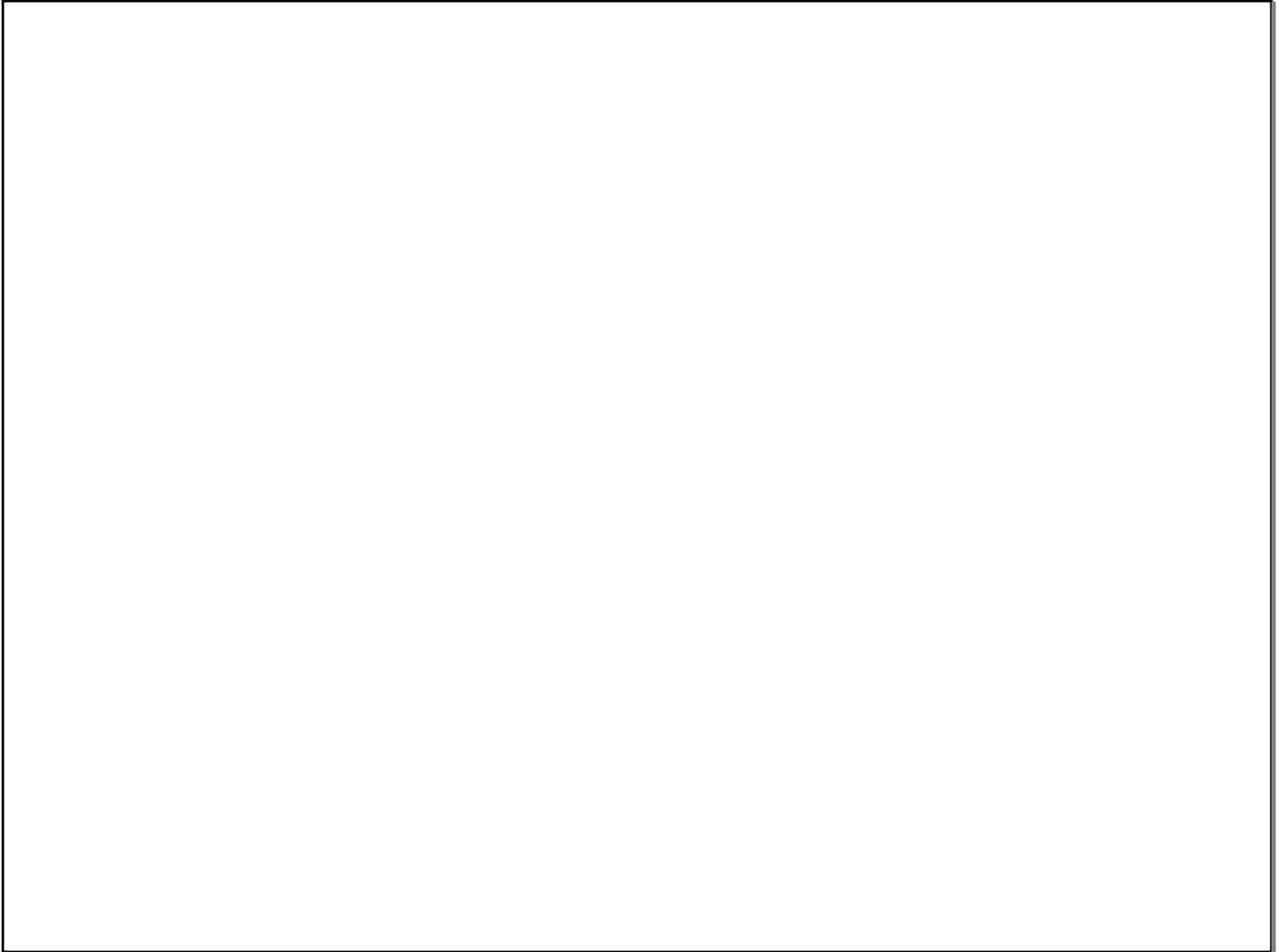
8) $\frac{6\sqrt{36}}{3\sqrt{16}}$

9) $\sqrt{3}(-\sqrt{3} + 2)$

10) $\frac{2\sqrt{12}}{\sqrt{4}}$

11) $-2\sqrt{5} - \sqrt{45} + 3\sqrt{5}$

12) $6\sqrt{32}$



Recap

What did we do today?

Multiplying + Dividing

Homework:

HW 6.6 + Video 6.6