

8th Grade

3.5 Multiply/Divide/Add/Subtract Radicals

Multiplying Radicals

- Multiply outside #'s
- Multiply inside #'s
- Simplify

Ex)  $3\sqrt{2} \cdot 5\sqrt{5}$   
 $15\sqrt{10}$

Ex)  $1\sqrt{10} \cdot 5\sqrt{8}$   
 $5\sqrt{80}$   
 $5\sqrt{16 \cdot 5}$   
 $5 \cdot 4\sqrt{5}$   
 $20\sqrt{5}$

Try this:

1)  $-7\sqrt{8} \cdot 1\sqrt{20}$   
 $28\sqrt{10}$

$-7 \cdot 1 \sqrt{8 \cdot 20}$   
 $-7 \sqrt{160} = -7 \cdot \sqrt[4]{16} \sqrt{10}$

2)  $(3\sqrt{15})(-4\sqrt{45})$

$-12 \sqrt{675} = -12 \sqrt[5]{225} \sqrt{3}$   
 $= -180\sqrt{3}$

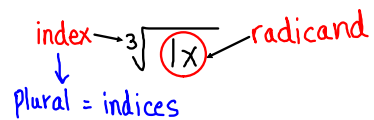
3)  $(2\sqrt{24})(3\sqrt{3})$

$6\sqrt{72} = 6\sqrt[6]{36} \sqrt{2}$   
 $6\sqrt[3]{9 \cdot 8} = 36\sqrt{2}$   
 $18\sqrt{8} = 24\sqrt{2}$   
 $36\sqrt{2}$

Dividing Radicals

$\frac{2\sqrt{48}}{\sqrt[3]{27}} = 2\sqrt{\frac{48}{27}}$   
 $\frac{8\sqrt{3}}{3\sqrt{3}} = \frac{8}{3}$   
 $2\sqrt{\frac{16}{9}} = 2\sqrt{\frac{4}{3}} = \frac{4\sqrt{3}}{3}$   
 $\frac{8}{3}$

$\frac{9\sqrt{15}}{2\sqrt{243}} = \frac{9\sqrt{15}}{2\sqrt{243}}$   
 $\frac{9\sqrt{5}}{2\sqrt{81}} = \frac{9\sqrt{5}}{2 \cdot 9} = \frac{9\sqrt{5}}{18}$   
 $\frac{\sqrt{5}}{2}$



Like Radical Expressions

- indices are the same
- radicands are the same

ex)  $2\sqrt{3} + 5\sqrt{3}$

Nonex)  $4\sqrt{5} + 4\sqrt{7}$

$\sqrt{3} + \sqrt[3]{3}$

### Adding & Subtracting Radicals

- Radicands must be exactly the same
- Indices must be exactly the same
- Add/Subtract #'s in front of the radical
- Keep the radicand the same

$$\text{ex) } 2\sqrt{3} + 4\sqrt{3} - 1\sqrt{3} = 2+4-1\sqrt{3} = 5\sqrt{3}$$

Sometimes u must simplify 1<sup>st</sup>

$$\text{Ex) } 2\sqrt{12} - 3\sqrt{27} + 2\sqrt{48}$$

$$2 \cdot 2\sqrt{4}\sqrt{3} \quad 3 \cdot 3\sqrt{9}\sqrt{3} \quad 4 \cdot 2\sqrt{16}\sqrt{3}$$

$$4\sqrt{3} - 9\sqrt{3} + 8\sqrt{3}$$

$$(4-9+8)\sqrt{3} = 3\sqrt{3}$$

Try this:

$$1) \quad 3\sqrt{45} - 5\sqrt{80} + 4\sqrt{20} = -3\sqrt{5}$$

$$\begin{array}{ccc} 3 \cdot 3\sqrt{9}\sqrt{5} & - & 4 \cdot 5\sqrt{16}\sqrt{5} & + & 2 \cdot 4\sqrt{4}\sqrt{5} \\ 9\sqrt{5} & - & 20\sqrt{5} & + & 8\sqrt{5} \end{array}$$

$$2) \quad \sqrt{54} - \sqrt{24} = \sqrt{6}$$

$$\begin{array}{ccc} \sqrt{9 \cdot 6} & - & \sqrt{4 \cdot 6} \\ 3\sqrt{6} & - & 2\sqrt{6} \end{array}$$

$$3) \quad 2\sqrt{75} + 4\sqrt{243} = 46\sqrt{3}$$

$$\begin{array}{ccc} 5 \cdot 2\sqrt{25}\sqrt{3} & + & 9 \cdot 4\sqrt{81}\sqrt{3} \\ 10\sqrt{3} & + & 36\sqrt{3} \end{array}$$



Worksheet