WARM-UP QUIZ!!!!

Can use powers sheet
perfect squares
perfect cubes
calculator

4.3 Mixed and Entire Radicals

LESSON FOCUS Express an entire radical as a mixed radical, and vice versa.

Make Connections

We can name the fraction $\frac{3}{12}$ in many different ways:

$$\frac{1}{4} \qquad \frac{5}{20} \qquad \frac{30}{120} \qquad \frac{100}{400}$$

How do you show that each fraction is equivalent to $\frac{3}{12}$?

Why is $\frac{1}{4}$ the simplest form of $\frac{3}{12}$?

Reducing Radicals

Multiplication Property of Radicals

$$\sqrt[n]{ab} = \sqrt[n]{a} \cdot \sqrt[n]{b},$$

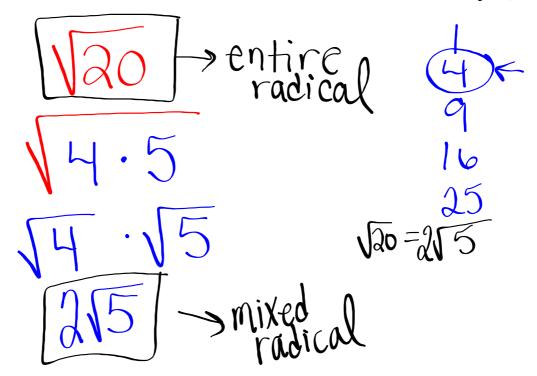where n is a natural number, and a and b are real numbers

greatest perfect n^{th} factor

Radicals

Just as with fractions, Radicals expressions have equivalent expressions:

$$\sqrt{16 \cdot 9} = \sqrt{16} \cdot \sqrt{9}$$
$$= 4 \cdot 3$$
$$= 12$$

or

$$\sqrt{16 \cdot 9} = \sqrt{144}$$
$$= 12$$

Same works if we change the "index":

$$\sqrt[3]{8 \cdot 27} = \sqrt[3]{8} \cdot \sqrt[3]{27}$$
$$= 2 \cdot 3$$
$$= 6$$

or

$$\sqrt[3]{8 \cdot 27} = \sqrt[3]{216}$$
$$= 6$$

$$\sqrt{20} \approx 4.45$$

$$\boxed{\sqrt{20}} \rightarrow \text{entire radical}$$

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

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

$$\boxed{2\sqrt{5}} \rightarrow \text{mixed radical}$$

$$\boxed{4}$$
$$9$$
$$16$$
$$25$$

$$\sqrt{20} = 2\sqrt{5}$$

Radicals

Mixed Radical - has a coefficient in front of the radical sign.

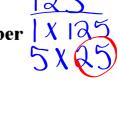ex: $3\sqrt{5}$ OR $\dfrac{2\sqrt{26}}{3}$ OR $-3\sqrt{3}$.

Entire Radical - has a coefficient of 1 or -1 in front of the radical sign. Everything is entirely under the radical sign

ex: $\sqrt{12}$ OR $-\sqrt{45}$

$$3\sqrt[3]{27}$$

Reducing Radicals

To reduce $\sqrt{125}$
**you must find the largest square number
that will divide into 125 evenly!**

$$125$$
$$1 \times 125$$
$$5 \times 25$$

$$\sqrt[n]{a \cdot b} = \sqrt[n]{a} \cdot \sqrt[n]{b}$$

Greatest perfect nth

$$\sqrt{125} = \sqrt{25 \cdot 5}$$

$$\sqrt{125} = \sqrt{25} \times \sqrt{5}$$
$$= 5\sqrt{5}$$

4
9
16
25
36
49
64
81
100
121

**Use your life line
to help you choose
the proper square number.**

$$25 \times 5 = 125$$

$$\sqrt{125}$$

$$\sqrt{25 \bullet 5}$$

$$5\sqrt{5}$$

Your Turn:

4
9
16
25
36
49
64
81
100
121

Try these:

a) $\sqrt{12}$

$\sqrt{4 \cdot 3}$

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

$2\sqrt{3}$

b) $\sqrt{72}$

c) $\sqrt{54}$

d) $\sqrt{81}$

e) $7\sqrt{128}$

$7 \cdot \sqrt{64 \cdot 2}$

$7 \cdot \sqrt{64} \cdot \sqrt{2}$

$7 \cdot 8\sqrt{2}$

$56\sqrt{2}$

$\sqrt{72}$

$\sqrt{36 \cdot 2}$

$\sqrt{36} \cdot \sqrt{2}$

$\boxed{6\sqrt{2}}$

$\sqrt{72}$

$\sqrt{9 \cdot 8}$

$\sqrt{9} \cdot \sqrt{8}$

$3\sqrt{8}$

$3\sqrt{4 \cdot 2}$

$3 \cdot \sqrt{4} \boxed{\sqrt{2}}$

$\boxed{6\sqrt{2}}$

$\sqrt{54}$

$\sqrt{9 \cdot 6}$

$\sqrt{9} \cdot \sqrt{6}$

$3\sqrt{6}$

$$\sqrt[3]{24}$$

$$\sqrt[3]{24}$$

$$\sqrt[3]{8 \cdot 3}$$

$$\sqrt[3]{8} \cdot \sqrt[3]{3}$$

$$2 \cdot \sqrt[3]{3}$$