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:

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

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

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

$$\frac{3^{\div 3}}{12_{\div 3}} = \frac{6}{24} = \frac{1}{4}$$

$$\frac{3}{6} = \frac{1}{2}$$

$$\frac{17}{34} = \frac{1}{2}$$

Reducing Radicals

Multiplication Property of Radicals

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

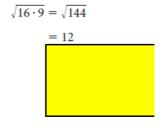where n is a natural number, and a and b are real numbers

Radicals

Just as with fractions, Radicals expressions have equivalent expressions:

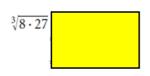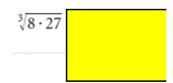$$\sqrt{16 \cdot 9} = \sqrt{16} \cdot \sqrt{9}$$
$$= 4 \cdot 3$$
$$= 12$$

or

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

Same works if we change the "index":

$$\sqrt[3]{8 \cdot 27}$$ **or** $$\sqrt[3]{8 \cdot 27}$$

Radicals

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

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

Entire Radical - has a coefficient of 1 or -1 in front of the radical sign. Everything is entirely under the radical sign
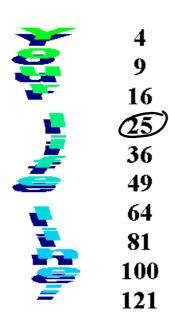
ex: $\sqrt{12}$ OR $-\sqrt{45}$

Reducing Radicals

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

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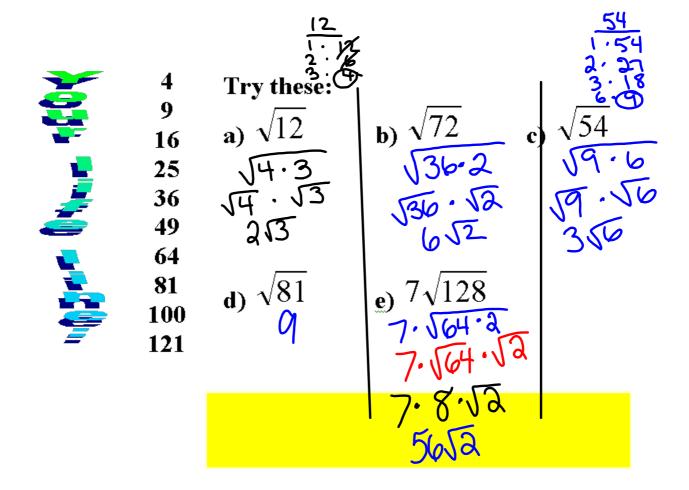
Greatest perfect n[th]

Your lifeline

4
9
16
(25)
36
49
64
81
100
121

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

$$\frac{3}{2} = 1\frac{1}{2}$$

$$25 \times 5 = 125$$

$$\sqrt{125}$$

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

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

$$5\sqrt{5}$$

Your lifeline

4
9
16
25
36
49
64
81
100
121

Try these:

12
1 : 12
2 : 6
3 : 4

a) $\sqrt{12}$

$\sqrt{4 \cdot 3}$

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

$2\sqrt{3}$

b) $\sqrt{72}$

$\sqrt{36 \cdot 2}$

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

$6\sqrt{2}$

54
1 · 54
2 · 27
3 · 18
6 · 9

c) $\sqrt{54}$

$\sqrt{9 \cdot 6}$

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

$3\sqrt{6}$

d) $\sqrt{81}$

9

e) $7\sqrt{128}$

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

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

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

$56\sqrt{2}$

Homework pg 218
handout

#4 → ALL
#10 → a-d

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Homework

Page: 218-219
#4 and 10 a-d

7 (b)   8 (b)

10 (a,c,e,g, i)   11 (a,c,e, g,i)   12 (a,c,e,g,i)

13   14   15   17 a,c   18 a,c

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