CHECK YOUR UNDERSTANDING

Use a number line to order these numbers from least to greatest.

$\sqrt{2}$, $\sqrt[3]{-2}$, $\sqrt[3]{6}$, $\sqrt{11}$, $\sqrt[4]{30}$

2 1 3 5 4

$\sqrt{2} = 1.41$ $\sqrt[3]{6} = 1.82$

$\sqrt[3]{-2} = -1.26$ $\sqrt{11} = 3.31$

$\sqrt[4]{30} = 2.34$

Classify the following as either Rational (Q) or Irrational ($\overline{Q}$)

$\sqrt{14}$ $\sqrt[5]{\frac{-1}{32}}$ $\sqrt[3]{64}$ $\sqrt[4]{\frac{81}{16}} = \frac{3}{2}$

$\overline{Q}$ Q Q Q

4.2 Irrational Numbers

19. $\frac{1+\sqrt{5}}{2} : 1$

$$\frac{\frac{1+\sqrt{5}}{2}}{1}$$

$\doteq \underline{1.62}$

755 feet

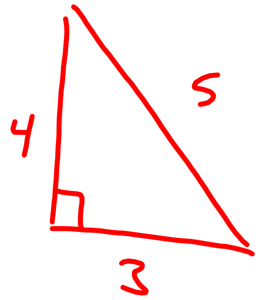
481 feet (height)

Pyramid

$$\frac{755}{481}$$

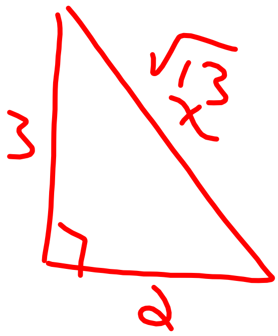
$\doteq \underline{1.57}$

22. (a)



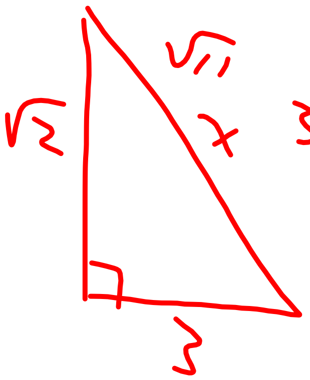
$3^2+4^2=5^2$
$9+16=25$
$25=25$

b)



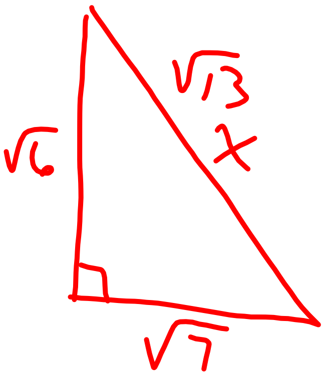
$2^2+3^2=x^2$
$4+9=x^2$
$13=x^2$
$\sqrt{13}=x$

c)



$3^2+(\sqrt{2})^2=x^2$
$9+2=x^2$
$11=x^2$
$\sqrt{11}=x$

d)



$(\sqrt{6})^2+(\sqrt{7})^2=x^2$
$6+7=x^2$
$13=x^2$
$\sqrt{13}=x$

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:

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

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

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

Just as with fractions, equivalent expressions for any number have the same value.

- $\sqrt{16 \cdot 9}$ is equivalent to $\sqrt{16} \cdot \sqrt{9}$ because:

$$\sqrt{16 \cdot 9} = \sqrt{144} \qquad \text{and} \qquad \sqrt{16} \cdot \sqrt{9} = 4 \cdot 3$$
$$= 12 \qquad\qquad\qquad\qquad = 12$$

- Similarly, $\sqrt[3]{8 \cdot 27}$ is equivalent to $\sqrt[3]{8} \cdot \sqrt[3]{27}$ because:

$$\sqrt[3]{8 \cdot 27} = \sqrt[3]{216} \qquad \text{and} \qquad \sqrt[3]{8} \cdot \sqrt[3]{27} = 2 \cdot 3$$
$$= 6 \qquad\qquad\qquad\qquad = 6$$

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

Identifying the factors of a number...

List all factors for each of the following numbers...

24

1

3 x 8 24 x 1

12 x 2

6 x 4

72

36 x 2 72 x 1

6 x 12 24 x 3

8 x 9 4 x 18

Use your results to express $\sqrt{24}$ and $\sqrt{72}$ as mixed radicals in simplest form

RULE: $\sqrt{ab} = \sqrt{a} \times \sqrt{b}$

LARGEST Perfect Square

$1\sqrt{24}$ Entire Radical

$\sqrt{4 \times 6}$

$\sqrt{4} \times \sqrt{6}$

$2\sqrt{6}$

Mixed Radical

$\frac{10 \div 2}{20 \div 2} = \frac{5}{10}$

$\sqrt{72}$

$\sqrt{36 \times 2}$

$\sqrt{36} \times \sqrt{2}$

$6\sqrt{2}$

$\sqrt{9 \times 8}$

$\sqrt{9} \times \sqrt{8}$

$3\sqrt{8}$

$3\sqrt{4 \times 2}$

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

$3(2\sqrt{2})$

$= 6\sqrt{2}$

Some numbers, such as 200, have more than one perfect square factor.
The factors of 200 are: 1, 2, 4, 5, 8, 10, 20, 25, 40, 50, 100, 200
Since 4, 25, and 100 are perfect squares, we can simplify $\sqrt{200}$ in these ways.

Show TWO different ways that this radical could be simplified ...

$\sqrt{200}$

'Hard Way'

200
100 2
10 10
5 2 5 2

$= 5 \times 5 \times 2 \times 2 \times 2$

$\sqrt{5 \times 5 \times 2 \times 2 \times 2}$

$\sqrt{5 \times 5} \times \sqrt{2 \times 2} \times \sqrt{2}$

$5 \times 2\sqrt{2}$

$10\sqrt{2}$

'Easy Way'

$\sqrt{100 \times 2}$

$\sqrt{100} \times \sqrt{2}$

$10\sqrt{2}$

RULE: Find the LARGEST Perfect Square Factor when simplifying square roots

Entire Radical - everything is under the radical sign

EXAMPLES:

$\sqrt{18}$

$\sqrt{9 \times 2}$

$\sqrt{9} \times \sqrt{2}$

$3\sqrt{2}$

$\sqrt{75}$

$\sqrt{25 \times 3}$

$\sqrt{25} \times \sqrt{3}$

$5\sqrt{3}$

$\sqrt{48}$

$\sqrt{4 \times 12}$

$\sqrt{4} \times \sqrt{12}$

$2\sqrt{12}$

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

Multiply $2(\sqrt{4} \times \sqrt{3})$

$2(2\sqrt{3})$

$4\sqrt{3}$

$\sqrt{16 \times 3}$

$\sqrt{16} \times \sqrt{3}$

$4\sqrt{3}$

HOMEWORK...

Worksheet - Simplifying Radicals (Square Roots).pdf

Attachments

4.1 Page 206 Questions.pdf

Introductory worksheet.doc

Worksheet - Simplifying Radicals (Square Roots).pdf