1.1 Roots of Fractions

1.1 Roots of Fractions   Name: _____ Blk: _____

Recall:

$\sqrt[n]{x}$

x = radicand

n = index

radical
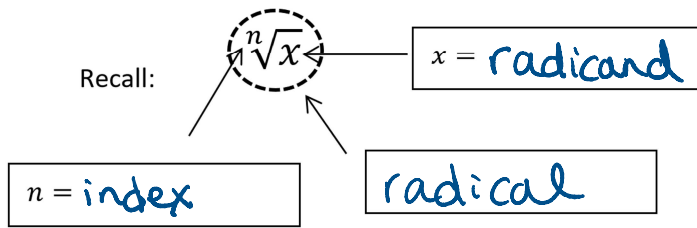
Fill in the table below

a	a as a product of prime factors	$\sqrt{a}$	$\sqrt[3]{a}$
1	$1 \cdot 1$	$\sqrt{1} = 1$	$\sqrt[3]{1} = 1$
4	$2 \cdot 2$	$\sqrt{4} = 2$	$\sqrt[3]{4} = 1.3$
8	$2 \cdot 2 \cdot 2$	$\sqrt{8} = 2.8$ $\boxed{2\sqrt{2}}$	$\sqrt[3]{8} = 2$
9	$3 \cdot 3$	$\sqrt{9} = 3$	$\sqrt[3]{9} = 2.1$
16	$2 \cdot 2 \cdot 2 \cdot 2$	$\sqrt{16} = 4$	$\sqrt[3]{16} = 2.5$ $\boxed{2\sqrt[3]{2}}$
27	$3 \cdot 3 \cdot 3$	$\sqrt{27} = 3\sqrt{3} = 5.2$	$\sqrt[3]{27} = 3$
64	$2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2$	$\sqrt{64} = 8$	$\sqrt[3]{64} = 4$
81	$3 \cdot 3 \cdot 3 \cdot 3$	$\sqrt{81} = 9$	$\sqrt[3]{81} = 4.3$ $3\sqrt[3]{3}$
0.5 $\frac{1}{2}$	$1 \cdot \frac{1}{2}$	$\sqrt{\frac{1}{2}} = 0.7$	$\sqrt[3]{\frac{1}{2}} = 0.8$
0.25 $\frac{1}{4}$	$\frac{1}{2} \cdot \frac{1}{2}$	$\sqrt{\frac{1}{4}} = \frac{1}{2}$	$\sqrt[3]{\frac{1}{4}} = 0.6$

How else can you write these?

What did you notice?

DEFINITIONS:

Perfect square – The product of ___TWO equal integers___

Perfect cube – The product of ___THREE equal integers.___

Principle square root – the ___POSITIVE___ square root of a number

Example: 36 = (6)(6) or (-6)(-6)....

$\sqrt{36}$ could be 6 or -6

For now we will only consider the positive case $\sqrt{x^2} = |x|$

ESTIMATING SQUARE ROOTS AND CUBE ROOTS

We estimate roots by using 'bench marks'.

Example 1) Estimate the value of each radical to 1 decimal place. Verify.

'Bench marks'
choose 2 closest perfect squares/cubes.

a) $\sqrt{40}$

40 is between 36 and 49

$\sqrt{36}$ ← $\sqrt{40}$ → $\sqrt{49}$

40 is closer to 36

$\sqrt{36} = 6$ $\sqrt{40} \approx 6.3$
$\sqrt{49} = 7$ 6.4

b) $\sqrt[3]{40}$

$\sqrt[3]{27}$ ← → $\sqrt[3]{64}$
      | |
      3   4

closer to 3

$\sqrt[3]{40} \approx 3.4$

c) $\sqrt{65}$

$\sqrt{64}$ ← → $\sqrt{81}$
   | |
   8   9

closer to 8

$\sqrt{64} \approx 8.1$

d) $\sqrt[3]{80}$

$\sqrt[3]{64}$ ← → $\sqrt[3]{125}$
   | |
   4   5

$\sqrt[3]{80} \approx 4.3$

DIVISION PROPERTY OF RADICALS

$$\sqrt[n]{\frac{a}{b}} = \frac{\sqrt[n]{a}}{\sqrt[n]{b}} \text{ where } a \text{ and } b \text{ are positive numbers if } n \text{ is even}$$

DETERMINING THE SQUARE ROOT AND CUBE ROOT OF A FRACTION

Example 1) Evaluate. Write each answer as a fraction in lowest terms.

1) check for common factors/simplify (into a perfect square or cube)

a) $\sqrt{\frac{72}{98}} \begin{matrix} \div 2 \\ \div 2 \end{matrix}$

$= \frac{\sqrt{36}}{\sqrt{49}}$ $\sqrt{\frac{36}{49}}$

$= \boxed{\frac{6}{7}}$

b) $\sqrt[3]{\frac{64}{125}}$

No common factors, we have perfect cubes!

$= \frac{\sqrt[3]{64}}{\sqrt[3]{125}}$

$= \boxed{\frac{4}{5}}$

c) $\sqrt{\frac{162}{50}} \begin{matrix} \div 2 \\ \div 2 \end{matrix}$

$= \frac{\sqrt{81}}{\sqrt{25}}$

$= \boxed{\frac{9}{5}}$

d) $\sqrt[3]{\frac{27}{343}}$

$= \frac{\sqrt[3]{27}}{\sqrt[3]{343}}$

$= \boxed{\frac{3}{7}}$

Assignment: p. 5 - 10   You choose how many questions you need to do.

Quiz wed on 1.1, 1.2, 1.3