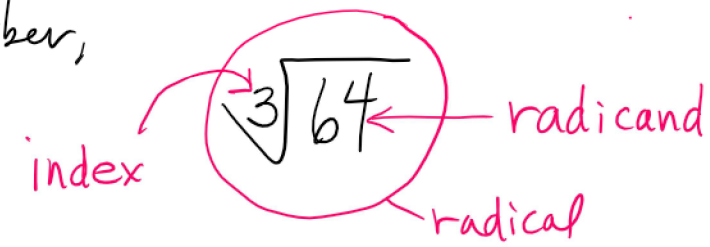
1.1 Square Roots and Cube Roots of Fractions

Remember,



Perfect Square – a number that is the product of two identical factors

eg. $4 \rightarrow 2 \cdot 2$

$64 \rightarrow 8 \cdot 8$

Perfect Cube – a number that is the product of three identical factors

eg. $8 \rightarrow 2 \cdot 2 \cdot 2$

$64 \rightarrow 4 \cdot 4 \cdot 4$

Principle Square Root is the positive square root of a number

$\sqrt{36} = 6$

but $-6 \cdot -6 = 36$

[in general $\sqrt{x^2} = |x|$ (absolute value)]

Estimating Roots

eg. $\sqrt{65}$

$\sqrt{64}$ ← closest $\sqrt{81}$ are perfect squares

0

$\sqrt{64}$ ← closest $\sqrt{81}$ are perfect squares

8 9

$\sqrt{65} = 8.1$ ✓ Estimate

8.05 ✓

$\sqrt{65} = 8.06$ Approximate — calc.

ex. $\sqrt{72}$ (8 ↗, 9 ↖)

$\sqrt{64}$ 8 $\sqrt{81}$ 9

8.5 ← estimate

$8.\underline{4}\,\underline{9}$ ← calculate/approx.

eg. $\sqrt[3]{40}$ (13 ↗, 24 ↘)

$\sqrt[3]{27}$ ← closer $\sqrt[3]{64}$

3 4

estimate → 3.4

calc/approx → 3.42

$1^3 = 1$
$2^3 = 8$
$3^3 = 27$
$4^3 = 64$
$5^3 = 125$

$\sqrt[3]{8} = 2$ exact

$\sqrt{x}$

$\sqrt[3]{}$

ex. $\sqrt[3]{91}$ (27 ↖, 34 ↗)

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

1

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

estimate = 4.4

calc/approx = 4.50

Division Property of Radicals

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

eg. $\sqrt{\frac{16}{25}} = \frac{\sqrt{16}}{\sqrt{25}} = \frac{4}{5}$

$\sqrt[3]{\frac{64}{125}} = \frac{\sqrt[3]{64}}{\sqrt[3]{125}} = \frac{4}{5}$

ex 1 $\sqrt{\frac{162}{50}}$ ÷2 ÷2

- not perfect squares
- can you reduce

$= \sqrt{\frac{81}{25}} = \frac{9}{5}$

2. $\sqrt[3]{\frac{54}{16}} = \sqrt[3]{\frac{27}{8}} = \frac{3}{2}$

p6 #3-5, 6-8 (minimum 5 each), 11