

L10-1 Squares and Square Roots



Key Concept

Square Root

Words A **square root** of a number is one of its two equal factors.

Symbols If $x^2 = y$, then x is a square root of y .

Find Square Roots

A. Find $\sqrt{64}$.

$$\sqrt{64} = \begin{matrix} +8 \\ -8 \end{matrix} \begin{matrix} \text{pos.} \\ \text{or} \\ \text{neg.} \end{matrix} 8$$

$$\begin{matrix} -8 \\ +8 \end{matrix} \cdot \begin{matrix} -8 \\ +8 \end{matrix} = 64$$

B. Find $-\sqrt{121}$.

$$-1(11) = -11$$

C. Find $\pm\sqrt{256}$.

$$\pm 16$$

D. Find $\sqrt{-9}$.

\emptyset no solution

In order to get -9

$$-3 \cdot 3 \quad \text{or}$$

$$3 \cdot -3$$

Estimate Square Roots

A. Estimate $\sqrt{22}$ to the nearest integer.

$$\begin{array}{ccc} \sqrt{16} & \sqrt{22} & \sqrt{25} \\ 4 & 6 & 3 \quad 5 \end{array}$$

$$\sqrt{22} \approx 5$$

$$\sqrt{22} \approx 4.69\dots$$

B. Estimate $-\sqrt{319}$ to the nearest integer.

$$\begin{array}{ccc} -\sqrt{289} & \underbrace{\hspace{2em}} & -\sqrt{319} & \underbrace{\hspace{2em}} & -\sqrt{324} \\ & 30 & & 5 & \\ -17 & & & & -18 \end{array}$$

$$-\sqrt{319} \approx -18$$

$$-\sqrt{319} = -17.865\dots$$

Use a Calculator to Estimate a Square Root

Use a calculator to estimate $\sqrt{57}$ to the nearest tenth.

Use a Calculator to Estimate a Negative Square Root

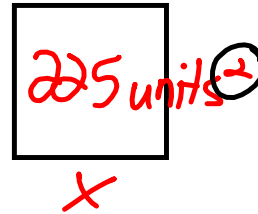
Use a calculator to estimate $-\sqrt{42}$ to the nearest tenth.

A square has an area of 225 units².
Find the length of one side as well as
its perimeter.

$$x = \sqrt{\text{Area}}$$

$$x = \sqrt{225}$$

$$x = 15 \text{ units.}$$



SKYSCRAPER The tallest building in Houston, Texas, is the JP Morgan Chase Tower, standing at 1002 feet. About how far to the horizon can a person standing on the top floor see? Round your answer to the nearest tenth.

Use the formula $d = 1.22 \times \sqrt{h}$, where d is the distance in miles and h is the height in feet.

$$\begin{aligned}d &= 1.22 \cdot \sqrt{1002} \\ &\approx 38.62 \text{ miles to} \\ &\quad \text{horizon}\end{aligned}$$

SKYSCRAPER If a person can see 23.7 miles while standing on top of a skyscraper, how tall is the skyscraper?

$$\frac{23.7}{1.22} = \frac{1.22 \cdot \sqrt{h}}{1.22}$$
$$\textcircled{19.426} = \sqrt{h}$$
$$377.37 \text{ ft} = h \quad \leftarrow \text{square } \sqrt{h} \cdot \sqrt{h} = h$$

