## 2.7: Find Square Roots and Compare Real Numbers

## Goals:

*Find square roots of perfect squares
*Estimate square roots of non-perfect squares
Square root: one of two $\qquad$ equal $\qquad$ factors of a number
$\sqrt{ }=$ " Radical "sign....**IT TALKS!!**
It asks the question:
"WHAT $\qquad$ number $\qquad$ TIMES $\qquad$ _itself $\qquad$ IS _the number inside $\qquad$ $? "$

## Evaluate the given expression:

Ex: $\sqrt{16}$
Ex: $\sqrt{64}$
Ex: $\sqrt{81}$
4
8
9
Ex: $\sqrt{100}$
Ex: $\sqrt{121}$
Ex: $\sqrt{49}$

$$
10
$$

$$
11
$$

7

Perfect squares: a number whose $\qquad$ square $\qquad$ root $\qquad$ is an $\qquad$ integer $\qquad$ .
$1, \_4$ $\qquad$ , _9 $\qquad$ 16 $\qquad$ __36__, -49__,
$\qquad$ _64 $\qquad$ , _81 $\qquad$ , _100 $\qquad$ _121 $\qquad$ 144 $\qquad$ , 169 $\qquad$ _,
_196 $\qquad$ , _225

## Estimate Square Roots:

Ex: $\sqrt{40}$

1. Find the two closest $\qquad$ perfect $\qquad$ squares $\qquad$ .

$$
\begin{array}{ccc}
\sqrt{36} & \sqrt{40} & \sqrt{49} \\
6 & \sqrt{40} & 7
\end{array}
$$

2. Put the numbers in order from _least $\qquad$ to
$\qquad$ greatest $\qquad$ -.
3. Find the $\qquad$ square $\qquad$ roots $\qquad$ of the two
___perfect $\qquad$ squares $\qquad$ -.
4. Pick the _closer $\qquad$ one.

## Estimate the following square roots:

Ex: $\sqrt{110}$
$\sqrt{100} \sqrt{110} \sqrt{121}$
$10 \quad 11$
Closer to 10

Ex: $-\sqrt{38}$

$$
\begin{array}{crr}
-\sqrt{49} & -\sqrt{39} & -\sqrt{36} \\
-7 & -\sqrt{39} & -6
\end{array}
$$

Evaluate the expression for the given value of $x$ :
Ex: $11-\sqrt{x}$ when $x=81$
$11-\sqrt{81}$
11-9
2

$$
\mathbf{E x}: \sqrt{20}
$$

$$
\sqrt{16} \sqrt{20} \sqrt{25}
$$

$4 \quad 5$
Closer to 4
$\sqrt{4} \sqrt{8} \sqrt{9}$
23
Ex: $6 \sqrt{x}+3$ when $x=100$
$6 \sqrt{100}+3$
$6 \cdot 10+3$
$60+3$
63

## *OUESTION*

What number times itself would be 9 ? $\qquad$ 3 $\qquad$
Is there any other number times itself that could be 9 ? $\qquad$ $-3$ $\qquad$

All numbers have __2 _ square roots. One is ___positive $\qquad$ and one is $\qquad$ negative $\qquad$ .

Ex: $\sqrt{25}$

5

Ex: $\pm \sqrt{25}$
$\pm 5$

## *QUESTION*

What number times itself would be -16 ? $\qquad$ There isn't one $\qquad$
Prove it by multiplying that number by itself. $\qquad$ x $\qquad$
Did you get -16 ?
Nothing times itself will ever be negative. If a number is positive, then positive times a positive is a positive.

If a number is negative, then a negative times a negative is also positive.

## Extension:

If $\sqrt{x}$ means to find the square root (the number times itself) that equals $x$, what do you think $\sqrt[3]{\boldsymbol{x}}$ means?
Cube root - The number times itself three times.

## Evaluate:

## Ex: $\sqrt[3]{8}$

2

## Ex: $\sqrt[3]{27}$

3
Proof: $3 \cdot 3 \cdot 3=27$

Ex: $\sqrt[3]{64}$

4
Proof: $4 \cdot 4 \cdot 4=64$

