**SQUARE ROOTS & PERFECT SQUARES**

To understand square roots, first let’s take a look at squares.

How to Square a Number: Just multiply it by itself.

Squares from 12 to 122 PERFECT SQUARES

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| --- | --- | --- | --- | --- | --- | --- |
| 1 Squared | = | 12 | = | 1 × 1 | = | **1** |
| 2 Squared | = | 22 | = | 2 × 2 | = | **4** |
| 3 Squared | = | 32 | = |  | = |  |
| 4 Squared | = | 42 | = |  | = |  |
| 5 Squared | = | 52 | = |  | = |  |
| 6 Squared | = | 62 | = |  | = |  |
| 7 Squared | = | 72 | = |  | = |  |
| 8 Squared | = | 82 | = |  | = |  |
| 9 Squared | = | 92 | = |  | = |  |
| 10 Squared | = | 102 | = |  | = |  |
| 11 Squared | = | 112 | = |  | = |  |
| 12 Squared | = | 122 | = |  | = |  |

 | **Multiplication Table.PNG** |

**Square Roots:**

 A square root goes the other way:



3 squared is 9, so a **square root** of 9 is 3

A square root of a number is a value that can be**multiplied by itself** to give the original number.

A square root of **9** is **3**, because **when 3 is multiplied by itself** we get **9**.

It is like asking “what can we multiply by itself to get this?”

The Square Root Symbol

$√$ This is the special symbol that means "square root". It is called the **radical.**

To Help You Remember: Think of the root of a tree.

      

$\sqrt{64}$4

$\sqrt{49}$4

$\sqrt{36}$4

$\sqrt{25}$4

$\sqrt{9}$4

$\sqrt{4}$4

$$\sqrt{81}$$

 2 2

 Or

-2 -2

**OPERATIONS WITH SQUARE ROOTS**

Just follow the same BEDMAS rule when operating with fractions.

Simplify each expression:

a) $\sqrt{25}+\sqrt{16}$ Read: Add the square roots of 25 and 16.

b) $\sqrt{3+6}$ Read: Square root the sum of 3 and 6. If there are more than one term inside the radical (square root sign), we simplify then square root.

c) $\sqrt{31+ \sqrt{25}}$ Read: Square root the sum of 31 and square root of 25. If there are more than one radical

 start simplifying / evaluating from right to left.

d) $\sqrt{\sqrt{169}+ \sqrt{144}}$ Read: Square root the sum of square root of 169 and square root of 144.

e) 2$\sqrt{25}$ Read: 2 times square root 25.

f) 3$\sqrt{100}$ + 2$\sqrt{16}$ g) $\sqrt{12-\sqrt{6+ \sqrt{8+1}}}$