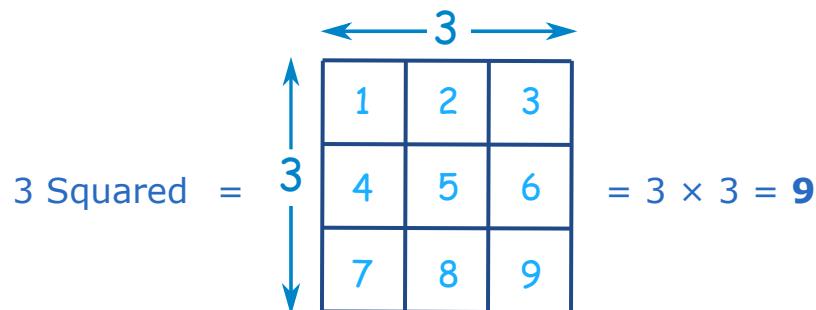




Exponents, Roots and Logarithms

[Exponents](#), Roots (such as [square roots](#)), cube roots etc) and [Logarithms](#) are all related!

Let's start with the simple example of $3 \times 3 = 9$:



Using Exponents we write it as:

$$3^2 = 9$$

When any of those values are missing, we have a question. And (sadly) a **different notation**:

$$3^2 = ?$$
 is the [exponent](#) question "what is 3 squared?": $3^2 = 9$

$$?^2 = 9$$
 is the [root](#) question "what is the square root of 9?": $\sqrt{9} = 3$

$$3^? = 9$$
 is the [logarithm](#) question "what is log base 3 of 9?": $\log_3(9) = 2$

So when you are stuck trying to solve questions with logs, roots or exponents just remember that!

One more example:

$$10^3 = 1000$$

$$10^3 = ? \quad \text{"What is 10 cubed?": } 10^3 = 1000$$

$$?^3 = 1000 \quad \text{"What is the cube root of 1000?": } \sqrt[3]{1000} = 10$$

$$10^? = 1000 \quad \text{"What is log base 10 of 1000?": } \log_{10}(1000) = 3$$

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