Practice in Taking the Square Root

The **square** of a number is, by definition, the answer you get when you multiply the number times itself. The square of a number x is denoted by x^2. Two numbers can have the same square. For example $(-3)^2$ is 9, and 3^2 is also 9.

If x is a non-negative real number, then the **square root** of x, denoted by **$\sqrt{x}$**, is that unique non-negative real number whose square is x. For example, $\sqrt{9} = 3$. Note that $x^2 = y$ fif $x = \pm\sqrt{y}$.

Evaluate each of the following expressions:

#1. $\sqrt{25}$ = __________

#2. $\sqrt{36}$ = __________

#3. $\sqrt{49}$ = __________

#4. $\sqrt{100}$ = __________

#5. $\sqrt{121}$ = __________

If x is a negative real number, then $\sqrt{x}$ is, by definition, $\sqrt{(-x)}i$, where i is an certain point, outside of the set of real numbers, called the **imaginary unit**.

Evaluate each of the following expressions.

$\sqrt{(-49)}$ = __________

$\sqrt{(-144)}$ = __________

The square root is a certain **function**. Whether a given function can be **evaluated** at a given point is dependent on the computing environment. (There are certain evaluations that would require a computing environment having **infinite** resources for their evaluation - as opposed to their **approximation**. Such values are said to be irrational. For example, $\sqrt{2}$ is irrational.) For example, if your computing environment cannot handle numbers of more than 2 digits, then you cannot evaluate $\sqrt{121}$.

What is $\sqrt{64} \times \sqrt{64}$? You might say that since $\sqrt{64} = 8$, $\sqrt{64} \times \sqrt{64} = 8 \times 8 = 64$. That would be true, but it is not necessary to evaluate $\sqrt{64}$, since $\sqrt{x}$ by definition has the property that $\sqrt{x} \times \sqrt{x} = x$. In those cases where $\sqrt{x}$ can be evaluated, doing so can provide a check, or give physical intuition, about what is happening. But the fact that $\sqrt{x} \times \sqrt{x} = x$ applies to the cases that are not able to be evaluated, as well. For example, $\sqrt{2} \times \sqrt{2} = 2$.

The expression $\sqrt{x} \times \sqrt{x}$, or, more simply, $(\sqrt{x})^2$, is important because we sometimes need to express a quantity x as a square. So, we simply write $x = (\sqrt{x})^2$. For example, in the derivation of the Quadratic Formula, it is necessary to re-write the expression $b^2 - 4ac$ as a square. We do so simply by re-writing it as $(\sqrt{(b^2 - 4ac)})^2$.

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