Complex Numbers

Solve $x^2+9=0$ using the square root property.

$x^2+9=0$ $\quad x^2=-9$ $\quad \sqrt{x^2}=\sqrt{-9}$ $\quad x=\pm\sqrt{-9}$

But the square root of a negative number is not real.
Welcome to the world of imaginary numbers!

Definition of *i*

The number *i* is a number such that $i=\sqrt{-1}$ and $i^2=-1$

These are important to remember!

A **complex number** is a number of standard form $a+bi$,
where a and b are real numbers and $i=\sqrt{-1}$.
a Is called the real part and b is called the imaginary part.

All Reals are a subset of the complex numbers as 7 could be written: $7+0i$

$3i$ could be written $0+3i$. Written as $3i$, it is considered a pure imaginary number.

Finding the square root of a Negative Number

$\sqrt{-25}=\sqrt{-1\cdot 25}=i\sqrt{25}=5i$ $\qquad$ $\sqrt{-75}=\sqrt{-1\cdot 25\cdot 3}=i\sqrt{25\cdot 3}=5i\sqrt{3}$

$\sqrt{-20}=\sqrt{-1\cdot 4\cdot 5}=i\sqrt{4\cdot 5}=2i\sqrt{5}$

Notice the placement of the values in the answer. To maintain the proper form for the complex number, the number of the imaginary part (in this case the 5) , is placed in front of i. To avoid confusion of thinking the $5i$ is under the radical, the imaginary part is always placed in front of any radical sign.

TRY:

$\sqrt{-36}$ $\qquad$ $\sqrt{-49}$ $\qquad$ $\sqrt{-32}$ $\qquad$ $\sqrt{-300}$