Set Notation

$A = \{\star \mid \star$ has properties $blah_1$, $blah_2$, and $blah_3$ $\}$ *means*:

A is the set of all things that have properties $blah_1$, $blah_2$, and $blah_3$.

Number Systems (Refer to Common Math Symbols below)

$\mathbb{N}$ Natural numbers: $\{1, 2, 3, \dots\}$

$\mathbb{Z}$ Integers: $\{\dots, -3,\ -2,\ -1,\ 0,\ 1,\ 2,\ 3,\ \dots\}$ (Comes from the German word for "numbers:" *Zahlen.*)

$\mathbb{Q}$ Rational numbers: $\{\frac{a}{b} \mid a \in \mathbb{Z},\ b \in \mathbb{Z},\ b \neq 0\ \}$ (The *Quotients* of the integers.)

$\mathbb{R}$ Real numbers: The limit of all sequences of numbers in $\mathbb{Q}$. Includes all rational numbers plus all irrational numbers such as $\sqrt{2}$, π, e, and others that have non-terminating, non-repeating decimal forms.

$\mathbb{C}$ Complex numbers: $\{a + b\mathrm{i} \mid a \in \mathbb{R},\ b \in \mathbb{R}\}$ (where $\mathrm{i}=\sqrt{-1}$)

$\mathbb{R}^n = \{(a_1, a_2, \dots, a_n) \mid a_i \in \mathbb{R}\ \forall i = 1, 2, \dots, n\}$

In other words, $\mathbb{R}^n$ is the set of all n-tuples, where each entry is an element of $\mathbb{R}$.

So using our subset notation (shown below), we can say $\mathbb{N} \subset \mathbb{Z} \subset \mathbb{Q} \subset \mathbb{R} \subset \mathbb{C}$.

Common Math Symbols

Symbol	Means	Example
$\subset$	is a subset of	$\mathbb{N} \subset \mathbb{Z}$
$\in$	is an element of	$\frac{17}{3} \in \mathbb{Q}$
$\notin$	is not an element of	$\frac{17}{3} \notin \mathbb{Z}$
$\forall$	For all	$\forall x \in \mathbb{Q}$, x is also in $\mathbb{R}$
$\exists$	There exists	$\exists x \in \mathbb{C}$ such that $x \notin \mathbb{R}$
$\implies$	implies	$x \in \mathbb{Q} \implies x \in \mathbb{R}$
$\iff$	if and only if	$a + b\mathrm{i} \in \mathbb{R} \iff a \in \mathbb{R},\ b = 0$

<u>A note about $\implies$</u>

$P \implies Q$ means "If P, then Q."

Example: A student is getting at least a B $\implies$ the student is getting at least a C.