* 1. Linear Equations
* As you recall from Algebra 1, linear equations always have exactly 1 or 0 solutions or they may have an infinite set of solutions.
* The set of all solutions to an equation is called the solution set and is denoted with braces, $\{ \}$.
* For example, the solution set of $3x-5=7$ is $\{4\}$ since $x=4$ is the only solution to this equation. Equations that have countable numbers of solutions are called conditional equations.
* Note that the equation $2\left(x-1\right)=2x-2$ is true for all real numbers chosen for $x$. The solution set of this equation is $\left\{x|x\in R\right\}$ where $R$ denotes the set of all real numbers. Equations in which all real numbers are solutions are called identities.
* The equation $x-3=x$ is not true for any real number, $x$. It’s solution set is empty, denoted $∅$. We say that this equation forms a contradiction.
* By the way, this would be a good time to review the symbols used for the most common sets of numbers.
	+ $N=\{1,2,3,4,5,…\}$ is the set of natural numbers
	+ $Z=\{…,-3,-2,-1,0,1,2,3,…\}$ is the set of integers
	+ $Q=\{\frac{m}{n} such that m and n are integers and n\ne 0\}$ is the set of rational numbers
	+ The set of irrational numbers is the set of all real numbers that are not rational. Sometimes, this set is denoted with $P$.
	+ $R$ is the set of all real numbers. A very important property of real numbers is that they can be ordered and thus placed on a number line. We will use this conceptual “definition” for this course.
	+ $C$ is the set of complex numbers. We’ll define these next time.

Examples. Solve each equation and state whether it is conditional, an identity, or a contradiction.

* $\frac{5}{3}x-4x+\frac{2}{3}=\frac{1}{6}$
* $4x+7=-2x+5$
* $3\left(x-6\right)-3x=4$
* $2x+4=2(x+2)$
* $8\left(x+2\right)-2\left(-x-3\right)=-5x+7$
* $0.2x-3=-.5(-0.3x+1)$
* $P=2l+2w$ for $w$.
* $K=\frac{1}{2}mv^{2}$ for $m$.
* $4a-ax=3b+bx$ for $x$.
* $S=2πr^{2}+2πrh$ for $h$
* $\frac{x}{a+1}=2x-a$ for $x$.
* $F=\frac{9}{5}C+32$ tells us the relationship between Fahrenheit and Celsius temperatures.
	+ Find the Fahrenheit temperature that is equivalent to $100℃$.
	+ Find the Celsius temperature that is equivalent to $77℉$.