1.1 Linear and Absolute Value Equations

linear (or **first-degree**) **equation in single variable** -
an equation that can be written in the form $Ax + B = 0$, where $A, B \in \mathbb{R}$.

solution or **root** of an equation – the value of the variable that will satisfy the equation
solution set – a set of all possible solutions

ex. $2x - 7 = 3$ $5x - 1 = 5x + 4$ $1 = 1$

conditional	**contradiction**	**identity**
one solution	no solutions	infinitely many solutions (all real numbers)

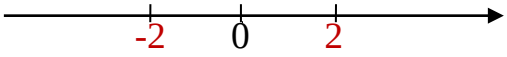
equivalent equations – equations with the same solution sets

We can produce equivalent equations by
- adding to both sides of the equation the same value,
- multiplying both sides of the equation by the same, nonzero value

Example 1: Solve.

a) $4[2x - (3 - x) + 5] = -(2 + 7x)$ b) $\frac{1}{8}(2x - 1) + 3 = \frac{5}{6}(5 - 3x)$

Absolute Value Equations:
Remember: Absolute value represents "**distance from zero**", so $|x| = 2$ tells us that x is 2 steps from zero; therefore $x = 2$ or $x = -2$.

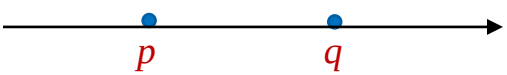


Generally, to solve an absolute value equation $|expression| = k$,
we must consider **two cases**

$expression = k$ or $expression = -k$

and solve them separately.

The solution set usually consists of two numbers $\{p, q\}$.



Example 1: Solve.

a) $|3x + 2| = 14$

b) $2|x| - 1 = 3$ ***isolate*** *abs. value first!*

c) $\left|\frac{3x+2}{3}\right| = 5$

d) $|1 - x| = -2$ *abs. value can't be negative!*

Example 2: A retailer determines the retail price of a coat by first computing 175% of the wholesale price of the coat and then adding a markup of $8.00. What is the wholesale price of a coat that has a retail price of $156.75?