



### 3. Vertex (Center of Solutions)

When you solve a basic absolute value equation, like  $|x| = 10$ , the solutions of 10 and -10 are centered around zero on the number line. We call the center of solutions the **vertex**. Solve the following equations and represent the solutions with a number line. Identify the vertex.

$ x-5 =7$ $x-5=7$ $x-5=-7$ $x=12$ $x=-2$ <b>Solutions:</b>	$ x+4 =3$ $x+4=3$ $x+4=-3$ $x=-1$ $x=-7$ <b>Solutions:</b>	$5 x-2 =25$ $ x-2 =5$ $x-2=5$ $x-2=-5$ $x=7$ $x=-3$ <b>Solutions:</b>
<b>Number Line:</b> 	<b>Number Line:</b> 	<b>Number Line:</b> 
<b>Vertex:</b> $x=5$	<b>Vertex:</b> $x=-4$	<b>Vertex:</b> $x=2$

If you are solving the equation  $|x-7|=10$ , what is the vertex?

$$x=7$$

If you are solving the equation  $|x+7|=10$ , what is the vertex?

$$x=-7$$

Generalize your findings, i.e. if you are solving  $|x-h|=y$ , what is the vertex?

$$x=h$$

### 4. Extra Practice

Solve the following equations. Be careful, there will be situations with 1 or no solution.

$ x-2 +2=4$ $ x-2 =2$ $x-2=2$ $x-2=-2$ $x=4$ $x=0$	$-3 x+5 +2=5$ $-3 x+5 =3$ $ x+5 =-1$ <b>No Solution</b>	$4 x+7 +7=7$ $4 x+7 =0$ $ x+7 =0$ $x=-7$
$- x-5 -3=-4$ $- x-5 =-1$ $ x-5 =1$ $x-5=1$ $x-5=-1$ $x=6$ $x=4$	<b>Challenge:</b> $ x-4 =x$ $x-4=x$ $x-4=-x$ $-4=2x$ $-4=-2x$ $-2=x$ $2=x$	<b>Challenge:</b> $ x-4 =5x$ $x-4=5x$ $x-4=-5x$ $-4=4x$ $-4=-6x$ $-1=x$ $2.6=x$