Absolute Value

|a| means "make it positive".

So, |4| = 4, and |-4| = 4, etc.

In general: |u| = |-u|

Solving eq's

eg $|u| = 2$ $u = ?$ $|2| = 2$, $|-2| = 2$

$\Rightarrow \boxed{u = 2}$ $-u = 2 \Rightarrow \boxed{u = -2}$

$\Rightarrow$ **If $|u| = a \Rightarrow u = a$, or $-u = a$ (ie $u = -a$)**

Inequalities Pretend that $<, \leq, >, \geq$ is an $=$

eg Solve $|u| > 5 \Rightarrow \boxed{u > 5}$ or $-u > 5 \Rightarrow u < -5$ ($-5 > u$)

Multiply or divide inequality by negative $\Rightarrow$ inequality flips

$\Rightarrow u > 5$ or $u < -5$

$\Rightarrow$ **$|u| > a \Rightarrow u > a$, or $u < -a$**
$|u| \geq a \Rightarrow u \geq a$ or $u \leq -a$

eg Solve $|u| < 6 \Rightarrow \boxed{u < 6}$ or $-u < 6 \Rightarrow \boxed{u > -6}$ or $\boxed{-6 < u}$

$\Rightarrow \boxed{-6 < u < 6}$

$\Rightarrow$ **$|u| < a \Rightarrow -a < u < a$**
$|u| \leq a \Rightarrow -a \leq u \leq a$

eg $|\overbrace{2x+5}^{u}| \geq 3 \Rightarrow |u| \geq 3 \Rightarrow$

$\Rightarrow u \geq 3$ or $u \leq -3$

$2x+5 \geq 3$ or $2x+5 \leq -3$

$2x \geq -2$ or $2x \leq -8$

$\boxed{x \geq -1}$ $\boxed{x \leq -4}$

$\Rightarrow \boxed{x \geq -1 \text{ or } x \leq -4}$

eg $\left|\underbrace{\frac{3-x}{2}}_{u}\right| < 6 \Rightarrow |u| < 6$

$\Rightarrow -6 < u < 6 \Rightarrow -6 < \overbrace{\frac{3-x}{2}}^{} < 6$

① $-6 < \frac{3-x}{2}$ or ② $\frac{3-x}{2} < 6$

$\Rightarrow -12 < 3-x$ or $3-x < 12$

$-15 < -x$ $\quad -x < 9$

$15 > x$ $\quad \boxed{x > -9} \rightarrow -9 < x$

or $\boxed{x < 15}$

$\Rightarrow \boxed{-9 < x < 15}$