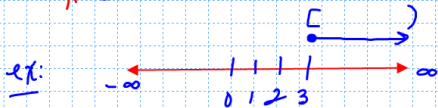
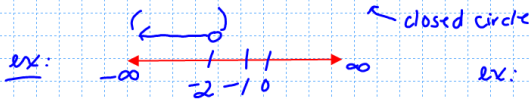


* Interval Notation



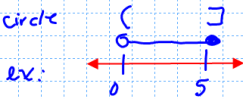
inequality notation: $x \geq 3$

interval notation: $[3, \infty)$



$x < -2$

$(-\infty, -2)$ ← open circle



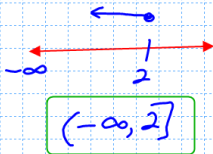
$0 < x \leq 5$

$(0, 5]$

P.5 Inequalities

Ex.: Solve $2x + 1 \leq 5$

$$\begin{array}{r} -1 \quad -1 \\ \hline 2x \leq 4 \\ x \leq 2 \end{array}$$



Ex.: Solve $2 - 6x > 5x + 7$

$$\begin{array}{r} -5x \quad -5x \\ \hline 2 - 11x > 7 \\ -11x > 5 \\ x < -\frac{5}{11} \end{array}$$

ans. $(-\infty, -\frac{5}{11})$

* Change the direction of the inequality when mult./div. by a negative coefficient!

Ex.: Solve $-5 < 1 - 3x \leq 7$

$$\begin{array}{ccc} -5 < 1 - 3x \leq 7 \\ -1 & -1 & -1 \\ \hline -6 < -3x \leq 6 \\ -3 & -3 & -3 \end{array}$$

$$2 > x \geq -2$$

$$[-2, 2)$$

State the
smallest
value first

Absolute Value Inequalities - Two rules:

1. $|x| < a$ -----> $-a < x < a$

2. $|x| > a$ -----> $x < -a$ or $x > a$

Ex.: Solve $|2 - x| < 5$

$$\frac{-5 < 2 - x < 5}{-2 \quad -2 \quad -2}$$

$$-7 < -x < 3$$

$$7 > x > -3$$

$$(-3, 7)$$

Ex.: Solve $|x + 4| \geq 2$

$$x + 4 \geq 2$$

$$x \geq -2$$

$$x + 4 \leq -2$$

$$x \leq -6$$



$$(-\infty, -6] \cup [-2, \infty)$$

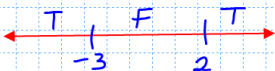
Ex.: Solve $x^2 + x - 6 > 0$

① Solve for x :

$$x^2 + x - 6 = 0$$

$$(x+3)(x-2) = 0$$

$$x = -3, x = 2$$



② Plot values on a number line.

③ Test each interval to determine the solution.

$$\begin{aligned} \text{ex: } x = -5 &\rightarrow (-5)^2 + (-5) - 6 > 0? \\ 25 - 5 - 6 &> 0 \\ 14 &> 0 \text{ True!} \end{aligned}$$

$$\text{ex: } x = 0 \rightarrow 0^2 + 0 - 6 > 0? \text{ False!}$$

$$\text{ex: } x = 3 \rightarrow 3^2 + 3 - 6 > 0? \text{ True!}$$

Answer:

$$(-\infty, -3) \cup (2, \infty)$$