2.5 Solving Inequalities

Standards:

A.REI.3

A.REI.12

Old Solving Linear Equations

① $3x+6=2x+10$

$3x+6-6=2x+10-6$

$3x=2x+4$

$3x-2x=2x-2x+4$

$x=4.$

② $5(x+2)=7x+5-5x$

$5x+10=7x+5-5x$

$5x+10=2x+5$

$5x+10-10=2x+5-10$

$5x=2x-5$

$5x-2x=2x-2x-5$

$\frac{3x}{3}=\frac{-5}{3}$

$x=\frac{-5}{3}.$

New Solving Linear Inequalities

- solve linear inequalities just like solve equations.
- Rules:
  - $<$, $>$ — open circle, dotted line
  - $\leq$, $\geq$ — closed circle, solid line
  - When dividing (or multiplying) by a negative number, flip the inequality sign.

[Examples] Solve the inequalities.

① $x+5>10$

$x+5-5>10-5$

$x>5.$

② $15\leq 5+\frac{a}{-5}$

$15-5\leq 5-5+\frac{a}{-5}$

$(-5)\,10\leq \frac{a}{-5}(-5)$

$-50\geq a$

$a\leq -50$

③ $-5x+2\geq 12$

$-5x+2-2\geq 12-2$

$\frac{-5x}{-5}\geq\frac{10}{-5}$

$x\leq -2.$

[Examples] Graph the inequalities.

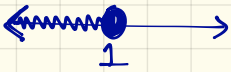
① $5y + 5 \leq 10$

$5y + 5 - 5 \leq 10 - 5$

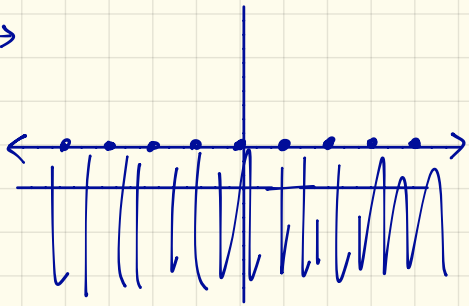
$\frac{5y}{5} \leq \frac{5}{5}$

$y \leq 1$

Number line



Cartesian Plane



② $2x - 6 > 4x - 10$

$2x - 6 + 6 > 4x - 10 + 6$

$2x > 4x - 4$

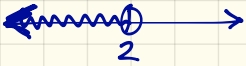
$2x - 4x > 4x - 4x - 4$

$-2x > -4$

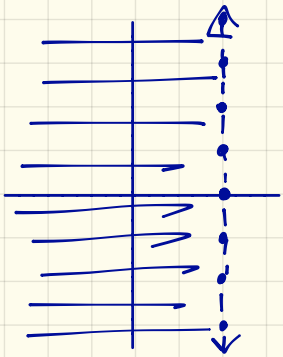
$\frac{-2x}{-2} < \frac{-4}{-2}$

$x < 2$

Number line



Cartesian Plane



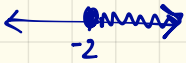
③ $6 - 2y \leq 10$

$6 - 6 - 2y \leq 10 - 6$

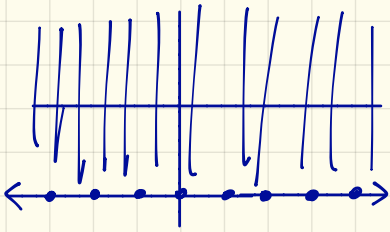
$\frac{-2y}{-2} \leq \frac{4}{-2}$

$y \geq -2$

Number line

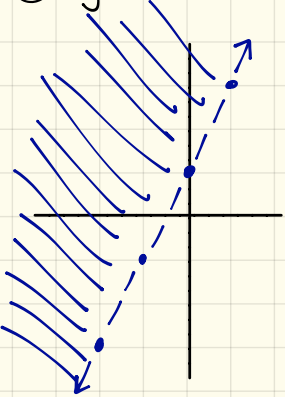


Cartesian Plane

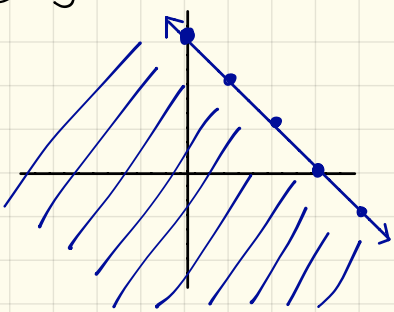


[Examples] Graph the following inequalities.

① $y > 2x+1$



② $y \leq -x+3$



③ $2x-y>-3$

$2x-y>-3$

$2x-2x-y>-2x-3$

$-y>-2x-3$

$\frac{-y}{-1} > \frac{-2x-3}{-1}$

$y<2x+3$