Inequalities

$x - 3 \geqslant 5$, $\quad t + 2 < 7$, $\quad 4 \leqslant 3q$, $\quad \frac{z}{10} > 1 \cdot 6$, $\quad 3 - p > 5$, $\quad -2y > 6$,

$3(1 + 2u) < 4$, $\quad 2(5 - \pi) \geqslant 3\pi + 7$, $\quad x^2 < 9$, $\quad q^2 + 3 > 2$,

$(3t + 1)^2 \geqslant 4$

Inequalities

$a < b$ "a is _less than_ b"
  $\Leftarrow$ b is greater than a

$a > b$ "a is _greater than_ b"

$a > 0$ "a is _positive_"

$b < 0$ "b is _negative_"

— strict

$\leq \leqslant$

$a \leq b$ "a is _less than or equal to_ b"
  $\Leftrightarrow$ a is no greater than b
  $\Leftrightarrow$ $a \ngtr b$

$a \geqslant b$ "a is _greater than or equal to_ b"
  $\Leftrightarrow$ a is at least b
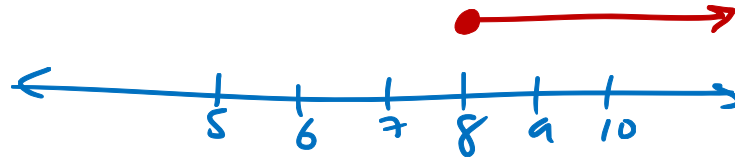 $\Leftrightarrow$ a is no smaller than b

$a \nless b$

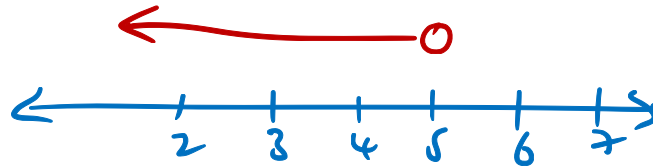$a \geqslant 0$ "a is _non-negative_"

$b \leqslant 0$ "b is _non-positive_"

— weak

$a \neq b$ "a is not equal to b"

Inequalities

$+3 \{ x - 3 \geqslant 5 \} +3$

$x \geqslant 5 + 3$

$\underline{x \geqslant 8}$

$8 \leq x < \infty$

x is in $[8, \infty)$

$-2 \{ t + 2 < 7 \} -2$

$t < 7 - 2$

$\underline{t < 5}$

$-\infty < t < 5$

t is in $(-\infty, 5)$

$\times \ (-\infty, 5[$

$+p \{ 3 - p > 5 \} +p$

$-5 \{ 3 > 5 + p \} -5$

$3 - 5 > p$

$-2 > p \iff p < -2$

$-\infty < p < -2$
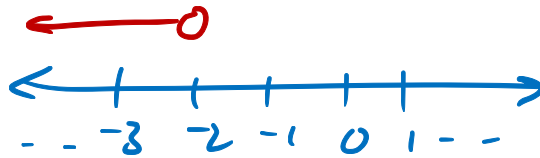
p is in $(-\infty, -2$

Inequalities

$\div 3 \Bigg\{ \; 4 \leq 3q \; \Bigg\} \div 3$

$\dfrac{4}{3} \leq q$

$q \geq \dfrac{4}{3} = 1.33...$

try $q = 1.5$
$3q = 4.5$
$4 < 4.5$ ✓

$q = 1.2$
$3q = 3.6$
$4 \not< 3.6$ ✓

$-3 \Bigg\{ \; 3 - p > 5 \; \Bigg\} -3$

$-p > 5 - 3$

$-p \; \boxed{>} \; 2$

$\times(-1) \Bigg\{ \qquad \Bigg\} \times(-1)$

$p \; \boxed{<} \; -2$

⚠️ direction flips if we $\times$ or $\div$ by negative

$\times 10 \Bigg\{ \; \dfrac{z}{10} > 1.6 \; \Bigg\} \times 10$

$z > 1.6 \times 10$

$z > 16$

$-2y > 6 \; \Bigg\} \div(-2)$

$y < \dfrac{6}{-2}$

$y < -3$

−5 −4 −3
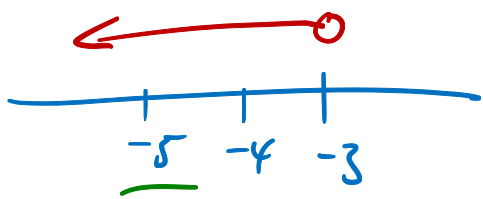
try $y = -5$, $\quad -2y = (-2)(-5) = +10$
> 6 ✓

Inequalities

$3(1+2u) < 4$

$\quad \Big\} \div 3$

$\quad 1 + 2u < \dfrac{4}{3}$

$\quad\quad \Big\} -1$

$\quad 2u < \dfrac{4}{3} - 1 = \dfrac{1}{3}$

$\quad\quad\quad \Big\} \div 2$

$\quad u < \dfrac{\left(\frac{1}{3}\right)}{2} = \dfrac{1}{6}$

$2(5 - \pi) \geqslant 3\pi + 7$

$\quad 10 - 2\pi \geqslant 3\pi + 7$

$\quad\quad \Big\} + 2\pi$

$\quad\quad 10 \geqslant 5\pi + 7$

$\quad\quad\quad \Big\} -7$

$\quad\quad\quad 3 \geqslant 5\pi$

$\quad\quad\quad\quad \Big\} \div 5$

$\quad\quad\quad\quad \dfrac{3}{5} \geqslant \pi$

$2(5 - \pi) \geqslant 3\pi + 7$

$\quad 10 - 2\pi \geqslant 3\pi + 7$

$\quad\quad \Big\} -3\pi$

$\quad 10 - 5\pi \geqslant 7$

$\quad\quad \Big\} -10$

$\quad\quad -5\pi \geqslant -3$

$\quad\quad\quad \Big\} \div (-5)$

$\quad\quad\quad \pi \leqslant \dfrac{-3}{-5}$

$\quad\quad\quad\quad \pi \leqslant 3/5$

Inequalities

$x^2 < 9$ ↳ $\sqrt{\ }$

~~$x < \sqrt{9}$~~
~~$x < 3$~~

$-5 \quad 1 \quad 2 \quad 3$

$(-5)^2 = 25 \not< 9$
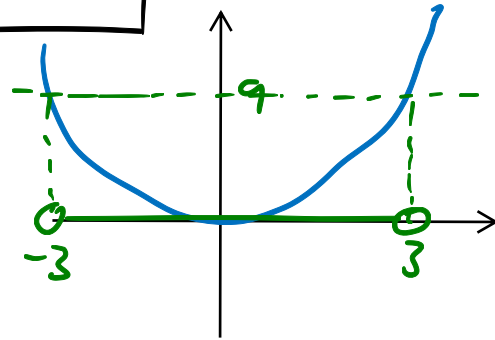
$x^2 < 9$

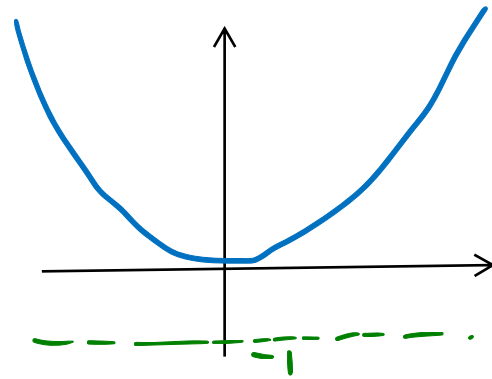$\Longleftrightarrow$

$-3 < x < 3$

x is in $(-3, 3)$

$q^2 + 3 > 2$ ↳ -3

$q^2 > 2 - 3$

$q^2 > -1$

so all q are solutions

$-\infty < q < \infty$,

q is anything in $(-\infty, \infty)$

$(3t + 1)^2 \geq 4$

$3t + 1 \geq 2$ $\quad$ OR $\quad$ $3t + 1 \leq -2$

$3t \geq 1$ $\qquad\qquad$ $3t \leq -3$

$t \geq \frac{1}{3}$ $\qquad$ OR $\qquad$ $t \leq -1$

$-1 \qquad \frac{1}{3}$

$(-\infty, -1) \cup (\frac{1}{3}, \infty)$