# Exercise 7.3

**Q1. Solve the following in equalities.**

**i)** $3x+1<5x-4$

$1+4<5x-3x$

$5<2x$

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

or $x>\frac{5}{2}$

Solution Set $=\left\{x \mid x>\frac{5}{2}\right\}$

**ii)** $4x-10.3\leq 21x-1.8$

$4x-21x\leq 10.3-1.8$

$-17x\leq 8.5$

$17x\geq -8.5$

$x\geq -\frac{8.5}{17}$

$x\geq -0.5$

Solution Set $=\{x \mid x\geq -0.5\}$

**iii)** $4-\frac{1}{2}x\geq -7+\frac{1}{4}x$

$4+7\geq \frac{1}{4}x+\frac{1}{2}x$

$11\geq \frac{x+2x}{4}$

$11\geq \frac{3}{4}x$

$\frac{11\times 4}{3}\geq x$

$\frac{44}{3}\geq x$

or $x\leq \frac{44}{3}$

Solution Set $=\left\{x \mid x\leq \frac{44}{3}\right\}$

**iv)** $x-2(5-2x)\geq 6x-3\frac{1}{2}$

$x-2(5-2x)\geq 6x-\frac{7}{2}$

Multiplying both sides by 2

$2x-4(5-2x)\geq 12x-7$

$2x-20+8x\geq 12x-7$

$2x+8x-12x\geq 20-7$

$-2x\geq 13$

$2x\leq -13$

$x\leq -\frac{13}{2}$

Solution Set $=\left\{x \mid x\leq -\frac{13}{2}\right\}$

**v)** $\frac{3x+2}{9}-\frac{2x+1}{3}>-1$

Multiplying both sides by 9

$3x+2-3(2x+1)>-9$

$3x+2-6x-3>-9$

$-3x-1>-9$

$-3x>1-9$

$-3x>-8$

$x<\frac{-8}{-3}$

$x<\frac{8}{3}$

Solution Set $= \left\{x \mid x < \frac{8}{3}\right\}$

**vi)** $3(2x+1)-2(2x+5)<5(3x-2)$

$6x+3-4x-10<15x-10$

$2x-7<15x-10$

$10-7<15x-2x$

$3<13x$

$\frac{3}{13}<x$

or $x>\frac{3}{13}$

Solution Set $= \left\{x \mid x > \frac{3}{13}\right\}$

**vii)** $3(x-1)-(x-2)>-2(x+4)$

$3x-3-x+2>-2x-8$

$2x-1>-2x-8$

$2x+2x>1-8$

$4x>-7$

$x>-\frac{7}{4}$

Solution Set $= \left\{x \mid x > -\frac{7}{4}\right\}$

**viii)** $2\frac{2}{3}x+\frac{2}{3}(5x-4)>-\frac{1}{3}(8x+7)$

$\frac{8}{3}x+\frac{2}{3}(5x-4)>-\frac{1}{3}(8x+7)$

Multiplying both sides by 3

$8x+2(5x-4)>-(8x+7)$

$8x+10x-8>-8x-7$

$18x-8>-8x-7$

$18x+8x>8-7$

$26x>1$

$x>\frac{1}{26}$

Solution Set $= \left\{x \mid x > \frac{1}{26}\right\}$

**Q2. Solve the following inequalities.**

**i)** $-4<3x+5<8$

$-4<3x+5$ and $3x+5<8$

$-4-5<3x$ and $3x<8-5$

$-9<3x$ and $3x<3$

$-\frac{9}{3}<x$ and $x<\frac{3}{3}$

$-3<x$ and $x<1$

$-3<x<1$

Solution Set $= \{x \mid -3<x<1\}$

**ii)** $-5 \le \frac{4-3x}{2} < 1$

$-5 \le \frac{4-3x}{2}$ and $\frac{4-3x}{2}<1$

$-10x \le 4-3x$ and $4-3x<2$

$-10-4 \le -3x$ and $-3x<2-4$

$-14 \le -3x$ and $-3x<-2$

$14 \ge 3x$ and $3x>2$

$\frac{14}{3} \ge x$ and $x>\frac{2}{3}$

$\frac{14}{3} \ge x > \frac{2}{3}$

Solution Set $= \left\{x \mid \frac{14}{3} \ge x > \frac{2}{3}\right\}$

**iii)** $-6<\frac{x-2}{4}<6$

$-6<\frac{x-2}{4}$ and $\frac{x-2}{4}<6$

$-24<x-2$ and $x-2<24$

$-24+2<x$ and $x<24+2$

$-22<x$ and $x<26$

Solution Set $= \{x \mid -22<x<26\}$

**iv)** $3 \ge \frac{7-x}{2} \ge 1$

$3 \geq \frac{7-x}{2}$ and $\frac{7-x}{2} \geq 1$

$6 \geq 7-x$ and $7-x \geq 2$

$6-7 \geq -x$ and $-x \geq 2-7$

$-1 \geq -x$ and $-x \geq -5$

$1 \leq x$ and $x \leq 5$

$1 \leq x \leq 5$

Solution Set = $\{x \mid 1 \leq x \leq 5\}$

**v)** $3x-10 \leq 5 < x+3$

$3x-10 \leq 5$ and $5 < x+3$

$-5-10 \leq -3x$ and $-x < 3-5$

$-15 \leq -3x$ and $-x < -2$

$15 \geq 3x$ and $x > 2$

$5 \geq x$ and $x > 2$

$5 \geq x > 2$

Solution Set = $\{x \mid 5 \geq x > 2\}$

**vi)** $-3 \leq \frac{x-4}{-5} < 4$

$-3 \leq \frac{x-4}{-5}$ and $\frac{x-4}{-5} < 4$

$\Rightarrow$ $3 \geq \frac{x-4}{5}$ and $\frac{x-4}{5}$

$15 \geq x-4$ and $x-4$

$15+4 \geq x$ and $x > 4$

$19 \geq x$ and $x >$ –

$19 \geq x \geq -16$

Solution Set = $\{x \mid 19 \geq x > -16\}$

**vii)** $1-2x < 5-x \leq 25-6x$

$1-2x < 5-x$ and $5-x \leq 2$

$1-5 \leq 2x-x$ and $6x-x \leq$

$-4 < x$ and $5x \leq 20$

$-4 < x$ and $x \leq 4$

$-4 < x \leq 4$

Solution Set = $\{x \mid -4 < x \leq 4\}$

**viii)** $3x-2 < 2x+1 < 4x+17$

$3x-2 < 2x+1$ and $2x+1 < 4x+17$

$-2-1 < 2x-3x$ and $2x-4x < 17-1$

$-3 < -x$ and $-2x < 16$

$3 > x$ and $2x > -16$

$3 > x$ and $x > -8$ $3 > x > -8$

Solution Set = $\{x \mid 3 > x > -8\}$