

Solving Multi-Steps Inequality

1) $-2x-1 < 0$

2) $2x-4 \leq 0$

3) $-5x+10 \leq 0$

4) $2x-1 > 0$

5) $7x-6 \leq 2$

6) $8x-4 \leq 18$

7) $6x-8 \leq 11$

8) $9x - 5 \leq 9$

9) $3x - 4 \leq 17$

10) $7x - 4 \leq 13$

11) $-3 > -3t + 6$

12) $8n + 2 - 10n < 20$

13) $\frac{2w}{3} - 3 \leq 7$

14) $6p - 2 \leq 4p + 12$

$$15) \quad 5 - 4m + 8 + 2m > -17$$

$$16) \quad 3(x - 2) - 8x < 44$$

$$17) \quad -5(k + 4) \geq 3(k - 4)$$

$$18) \quad x < \frac{2x - 15}{3}$$

$$19) \quad 3x + 4 \leq 2(x - 1)$$

$$20) \quad 7x + 13 > 12x - 7$$

$$21) \quad 3(x + 10) \geq 7 + 5x$$

$$22) \quad 2(x+8) \geq 3+4x$$

$$23) \quad 6\left(\frac{x-1}{3} - \frac{x+1}{2}\right) > 6\left(\frac{2}{3} - \frac{x}{6}\right) \quad (\text{multiply both sides by 6 the LCM}(2,3,6))$$

$$24) \quad \frac{3x}{2} + \frac{2x}{3} - \frac{5}{6} \leq \frac{x}{3} - \frac{x}{2} + \frac{1}{3} \quad (\text{multiply both sides by 6 the LCM}(2,3,6))$$

$$25) \quad 2x-1 + \frac{x}{2} \geq \frac{3x+1}{2} + x$$

$$26) \quad \frac{x}{2} - \frac{3}{4} \geq \frac{3x}{2} + \frac{1}{4}$$

$$27) \quad \frac{3x-1}{2} - x < \frac{2x-1}{5} + \frac{x-1}{10}$$

28) $x+17 > 26$

29) $x-7 \leq 12$

30) $2x-4 < 3x$

31) $8+4x > 5x$

32) $3(x+7) > 5x-13$

33) $x+135 \geq 174$

Answer Key

Solving Multi-Steps Inequality

$$\begin{aligned} 1) \quad & -2x - 1 < 0 \\ & -2x < 1 \\ & x > \frac{-1}{2} \end{aligned}$$

$$\begin{aligned} 2) \quad & 2x - 4 \leq 0 \\ & 2x \leq 4 \\ & x \leq 2 \end{aligned}$$

$$\begin{aligned} 3) \quad & -5x + 10 \leq 0 \\ & -5x \leq -10 \\ & x \geq 2 \end{aligned}$$

$$\begin{aligned} 4) \quad & 2x - 1 > 0 \\ & 2x > 1 \\ & x > \frac{1}{2} \end{aligned}$$

$$\begin{aligned} 5) \quad & 7x - 6 \leq 2 \\ & 7x \leq 2 + 6 \\ & 7x \leq 8 \\ & x \leq \frac{8}{7} \end{aligned}$$

$$\begin{aligned} 6) \quad & 8x - 4 \leq 18 \\ & 8x \leq 18 + 4 \\ & 8x \leq 22 \\ & x \leq \frac{22}{8} \\ & x \leq \frac{11}{4} \end{aligned}$$

$$7) \quad 6x - 8 \leq 11$$

$$6x \leq 11 + 8$$

$$6x \leq 19$$

$$x \leq \frac{19}{6}$$

$$8) \quad 9x - 5 \leq 9$$

$$9x \leq 9 + 5$$

$$9x \leq 14$$

$$x \leq \frac{14}{9}$$

$$9) \quad 3x - 4 \leq 17$$

$$3x \leq 17 + 4$$

$$3x \leq 21$$

$$x \leq \frac{21}{3}$$

$$x \leq 7$$

$$10) \quad 7x - 4 \leq 13$$

$$7x \leq 13 + 4$$

$$7x \leq 17$$

$$x \leq \frac{17}{7}$$

$$11) \quad -3 > -3t + 6$$

$$3t > 6 + 3$$

$$3t > 9$$

$$t > \frac{9}{3}$$

$$t > 3$$

$$12) \quad 8n + 2 - 10n < 20$$

$$-2n + 2 < 20$$

$$-2n < 20 - 2$$

$$-2n < 18$$

$$n > \frac{18}{-2}$$

$$n > -9$$

$$13) \quad \frac{2w}{3} - 3 \leq 7$$

$$\frac{2w}{3} \leq 7 + 3$$

$$\frac{2w}{3} \leq 10$$

$$\frac{3}{2} \times \frac{2w}{3} \leq 10 \times \frac{3}{2}$$

$$w \leq 15$$

$$14) \quad 6p - 2 \leq 4p + 12$$

$$6p - 4p \leq 12 + 2$$

$$2p \leq 14$$

$$p \leq \frac{14}{2}$$

$$p \leq 7$$

$$15) \quad 5 - 4m + 8 + 2m > -17$$

$$-2m + 13 > -17$$

$$-2m > -17 - 13$$

$$-2m > -30$$

$$m < \frac{-30}{-2}$$

$$m < 15$$

$$16) \quad 3(x - 2) - 8x < 44$$

$$3x - 6 - 8x < 44$$

$$-5x - 6 < 44$$

$$-5x < 44 + 6$$

$$-5x < 50$$

$$x > \frac{-50}{5}$$

$$x > -10$$

$$17) \quad -5(k+4) \geq 3(k-4)$$

$$-5k - 20 \geq 3k - 12$$

$$-20 + 12 \geq 3k + 5k$$

$$-8 \geq 8k$$

$$-1 \geq k$$

$$k \leq -1$$

$$18) \quad x < \frac{2x-15}{3}$$

$$3x < 2x - 15$$

$$3x - 2x < -15$$

$$x < -15$$

$$19) \quad 3x + 4 \leq 2(x-1)$$

$$3x + 4 \leq 2x - 2$$

$$3x - 2x \leq -2 - 4$$

$$x \leq -6$$

$$20) \quad 7x + 13 > 12x - 7$$

$$13 + 7 > 12x - 7x$$

$$20 > 5x$$

$$x < 4$$

$$21) \quad 3(x+10) \geq 7+5x$$

$$3x + 30 \geq 7 + 5x$$

$$30 - 7 \geq 5x - 3x$$

$$23 \geq 2x$$

$$\frac{23}{2} \geq x$$

$$22) \quad 2(x+8) \geq 3+4x$$

$$2x + 16 \geq 3 + 4x$$

$$16 - 3 \geq 4x - 2x$$

$$13 \geq 2x$$

$$\frac{13}{2} \geq x$$

$$23) \quad 6\left(\frac{x-1}{3} - \frac{x+1}{2}\right) > 6\left(\frac{2}{3} - \frac{x}{6}\right) \quad (\text{multiply both sides by 6 the LCM}(2,3,6))$$

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

$$2x - 2 - 3x - 3 > 4 - x$$

$$-x - 5 > 4 - x$$

$$-x + x > 4 + 5$$

$$0 > 9 \quad (\text{impossible})$$

no solution the solution set is the empty set \emptyset

$$24) \quad \frac{3x}{2} + \frac{2x}{3} - \frac{5}{6} \leq \frac{x}{3} - \frac{x}{2} + \frac{1}{3} \quad (\text{multiply both sides by 6 the LCM}(2,3,6))$$

$$6\left(\frac{3x}{2} + \frac{2x}{3} - \frac{5}{6}\right) \leq 6\left(\frac{x}{3} - \frac{x}{2} + \frac{1}{3}\right)$$

$$9x + 4x - 5 \leq 2x - 3x + 2$$

$$13x - 5 \leq -x + 2$$

$$14x \leq 2 + 5$$

$$14x \leq 7$$

$$x \leq \frac{7}{14}$$

$$x \leq \frac{1}{2}$$

$$25) \quad 2x - 1 + \frac{x}{2} \geq \frac{3x+1}{2} + x$$

$$2\left(2x - 1 + \frac{x}{2}\right) \geq 2\left(\frac{3x+1}{2} + x\right)$$

$$4x - 2 + x \geq 3x + 1 + x$$

$$5x - 2 \geq 4x + 1$$

$$5x - 4x \geq 1 + 2$$

$$x \geq 3$$

$$26) \quad \frac{x}{2} - \frac{3}{4} \geq \frac{3x}{2} + \frac{1}{4}$$

$$4\left(\frac{x}{2} - \frac{3}{4}\right) \geq 4\left(\frac{3x}{2} + \frac{1}{4}\right)$$

$$2x - 3 \geq 6x + 1$$

$$-3 - 1 \geq 6x - 2x$$

$$-4 \geq 4x$$

$$\frac{-4}{4} \geq x$$

$$x \leq -1$$

$$27) \quad \frac{3x-1}{2} - x < \frac{2x-1}{5} + \frac{x-1}{10}$$

$$10\left(\frac{3x-1}{2} - x\right) < 10\left(\frac{2x-1}{5} + \frac{x-1}{10}\right)$$

$$5(3x-1) - 10x < 2(2x-1) + x + 1$$

$$15x - 5 - 10x < 4x - 2 + x + 1$$

$$5x - 5 < 5x - 1$$

$$5x - 5x < -1 + 5$$

$$0 < 4 \quad (\text{always true for all values of } x)$$

so the solution set is the set of all real numbers \square

$$28) \quad x + 17 > 26$$

$$x > 26 - 17$$

$$x > 9$$

$$29) \quad x - 7 \leq 12$$

$$x \leq 12 + 7$$

$$x \leq 19$$

$$30) \quad 2x - 4 < 3x$$

$$-4 < 3x - 2x$$

$$-4 < x$$

$$31) \quad 8 + 4x > 5x$$

$$8 > 5x - 4x$$

$$8 > x$$

$$x < 8$$

$$32) \quad 3(x + 7) > 5x - 13$$

$$3x + 21 > 5x - 13$$

$$21 + 13 > 5x - 3x$$

$$34 > 2x$$

$$\frac{34}{2} > x$$

$$x < 17$$

$$33) \quad x + 135 \geq 174$$

$$x \geq 174 - 135$$

$$x \geq 39$$