

Inequalities

$$3 < 7 \quad 9 > 1$$

$$8 < 9 \quad 3.2 > 1.6 \quad 7 > -2$$

$$-4 < -1 \quad -2.3 > -3.1$$

$$12 < 24 \quad T$$

$$12+1 < 24+1$$

$$13 < 25 \quad T$$

$$12-5 < 24-5$$

$$7 < 19 \quad T$$

$$12 \times 3 < 24 \times 3$$

$$36 < 72 \quad T$$

$$12 \div 6 < 24 \div 6$$

$$2 < 4 \quad T$$

$$12 < 24$$

$$12 \times (-2) < 24 \times (-2)$$

$$-24 < -48 \quad F$$

$$12 < 24$$

$$-12 < -24 \quad F$$

$$12 < 24$$

$$\frac{12}{-2} < \frac{24}{-2}$$

$$-6 < -12 \quad F$$

Adding to both sides

Inequality
remains
true

Subtracting

remains true

Multiplying by +ve

remains true

Dividing by +ve

remains true

Multiplying by -ve

reverses inequality

Dividing by -ve

reverses inequality

$$2x + 3 = 11$$

$$2x = 11 - 3$$

$$2x = 8$$

$$2x + 3 < 11$$

$$2x < 11 - 3$$

$$2x < 8$$

$$x = \frac{8}{2}$$

$$x = 4$$

$$x < \frac{8}{2}$$

$$x < 4$$

Ex2

$$5x + 1 = 16$$

$$5x = 16 - 1$$

$$5x = 15$$

$$x = \frac{15}{5}$$

$$x = 3$$

$$5x + 1 \geq 16$$

$$5x \geq 16 - 1$$

$$5x \geq 15$$

$$x \geq \frac{15}{5}$$

$$x \geq 3$$

Ex3

$$3x + 7 = 5x + 27$$

$$3x - 5x = +27 - 7$$

$$-2x = 20$$

$$x = \frac{20}{-2}$$

$$x = -10$$

$$3x + 7 < 5x + 27$$

$$3x - 5x < +27 - 7$$

$$-2x < 20$$

$$x > \frac{20}{-2}$$

$$x > -10$$

$$3x + 7 < 5x + 27$$

$$+7 - 27 < 5x - 3x$$

$$-20 < 2x$$

$$-20 < x$$

$$\frac{-10}{2}$$

$$-10 < 2x$$

$$\text{or } x > -10$$

Examples For File

Solving inequalities is very similar to solving equations

Example 1

$$3x - 5 = 13$$

$$3x = 13 + 5$$

$$3x = 18$$

$$x = \frac{18}{3}$$

$$x = 6$$

$$3x - 5 \leq 13$$

$$3x \leq 13 + 5$$

$$3x \leq 18$$

$$x \leq \frac{18}{3}$$

$$x \leq 6$$

Ex 2

$$10x + 5 = 53$$

$$10x = 53 - 5$$

$$10x = 48$$

$$x = \frac{48}{10}$$

$$x = 4.8$$

$$10x + 5 > 53$$

$$10x > 53 - 5$$

$$10x > 48$$

$$x > \frac{48}{10}$$

$$x > 4.8$$

Ex 3

$$8x - 7 = 3x + 13$$

$$8x - 3x = +13 + 7$$

$$5x = 20$$

$$x = \frac{20}{5}$$

$$x = 4$$

$$8x - 7 \leq 3x + 13$$

$$8x - 3x \leq +13 + 7$$

$$5x \leq 20$$

$$x \leq \frac{20}{5}$$

$$x \leq 4$$

Ex 4

$$3x + 20 = 5x + 2$$

$$3x - 5x = +2 - 20$$

$$-2x = -18$$

$$x = \frac{-18}{-2}$$

$$x = 9$$

$$3x + 20 < 5x + 2$$

$$3x - 5x < +2 - 20$$

$$-2x < -18$$

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

$$x > 9$$

Homework

1 Solve the following linear inequalities.

a $x + 4 < 7$

d $2x - 3 < 7$

g $\frac{x}{2} + 4 < 7$

j $3(x - 2) < 15$

b $t - 3 > 5$

e $4y + 5 \leq 17$

h $\frac{y}{5} + 3 \leq 6$

k $5(2x + 1) \leq 35$

c $p + 2 \geq 12$

f $3t - 4 > 11$

i $\frac{t}{3} - 2 \geq 4$

l $2(4t - 3) \geq 34$

a) $x + 4 < 7$
 $x < 7 - 4$
 $x < 3$