Inequalities

$3 < 7$ $9 > 1$

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

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

$12 < 24$ T

$12 + 1 < 24 + 1$
$13 < 25$ T

$12 - 5 < 24 - 5$
$7 < 19$ T

$12 \times 3 < 24 \times 3$
$36 < 72$ T

$12 \div 6 < 24 \div 6$
$2 < 4$ T

$$12 < 24$$

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

$$-24 < -48 \qquad F$$

$$12 < 24$$

$$-12 < -24 \qquad F$$

$$12 < 24$$

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

$$-6 < -12 \qquad F$$

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

$2x + 3 = 11$	$2x + 3 < 11$
$2x = 11 - 3$	$2x < 11 - 3$
$2x = 8$	$2x < 8$

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

$$x = 4$$

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

$$x < 4$$

Ex2

$$5x + 1 = 16$$
$$5x = 16 - 1$$
$$5x = 15$$
$$x = \frac{15}{5}$$
$$x = 3$$

$$5x + 1 \geq 16$$
$$5x \geq 16 - 1$$
$$5x \geq 15$$
$$x \geq \frac{15}{5}$$
$$x \geq 3$$

Ex 3

$$3x + 7 = 5x + 27$$
$$3x - 5x = +27 - 7$$
$$-2x = 20$$
$$x = \frac{20}{-2}$$
$$x = -10$$

$$3x + 7 < 5x + 27$$
$$3x - 5x < +27 - 7$$
$$-2x < 20$$
$$x > \frac{20}{-2}$$
$$x > -10$$

$$3x + 7 < 5x + 27$$
$$+7 - 27 < 5x - 3x$$
$$-20 < 2x$$
$$-20 < x$$

$$\frac{}{2}$$
$$-10 < x$$
$$\text{or} \quad x > -10$$

Examples For File

Solving inequalities is very similar to solving equations

Example 1

$3x - 5 = 13$	$3x - 5 \leq 13$
$3x = 13 + 5$	$3x \leq 13 + 5$
$3x = 18$	$3x \leq 18$
$x = \dfrac{18}{3}$	$x \leq \dfrac{18}{3}$
$x = 6$	$x \leq 6$

Ex 2

$10x + 5 = 53$	$10x + 5 > 53$
$10x = 53 - 5$	$10x > 53 - 5$
$10x = 48$	$10x > 48$
$x = \dfrac{48}{10}$	$x > \dfrac{48}{10}$
$x = 4.8$	$x > 4.8$

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 $x + 4 < 7$

b $t - 3 > 5$

c $p + 2 \geqslant 12$

d $2x - 3 < 7$

e $4y + 5 \leqslant 17$

f $3t - 4 > 11$

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

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

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

j $3(x - 2) < 15$

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

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

a)
$$x + 4 < 7$$
$$x < 7 - 4$$
$$\underline{x < 3}$$

b)
$$t - 3 > 5$$
$$t > 5 + 3$$
$$\underline{t > 8}$$

c)
$$p + 2 \geq 12$$
$$p \geq 12 - 2$$
$$\underline{p \geq 10}$$