Solving Equations and Inequations - Lesson 3

Inequations

LI

- Solve inequations.

SC

- Same steps as for solving equations.

Nov 15-13:27

Inequality Symbols

$>$ greater than

$<$ less than

$\geq$ greater than or equal to

$\leq$ less than or equal to

Read from left to right

$5 > 3$ (true)

$5 < 3$ (false)

$5 \geq 5$ (true)

$5 \leq 5$ (true)

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An inequation is a relation between two quantities that are not necessarily equal

I think of a number, I add 7 and the answer must be less than or equal to 10.

What are the possible values of the number ?

This problem involves solving the inequation $x + 7 \leq 10$.

Inequations are solved using the same techniques as for solving equations

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Example 1

$$-x < 2$$

$+x \qquad +x$

$$0 < x + 2$$

$-2 \qquad -2$

$$-2 < x$$

$$(x > -2)$$

In other words,

$$-x < 2$$

$\times(-1)$ or $\div(-1)$ | $\times(-1)$ or $\div(-1)$

$$x > -2$$

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When an inequation is multiplied or divided by a negative quantity, the inequality symbol changes sign

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Example 2

$$2x - 5 > 7x - 3$$
$$-2x \qquad -2x$$

$$-5 > 5x - 3$$
$$+3 \qquad +3$$

$$-2 > 5x$$
$$\div 5 \qquad \div 5$$

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

$$\left(x < -\frac{2}{5}\right)$$

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Example 3

$$8x + 3 \leq -x + 12$$
$$+x \qquad\qquad +x$$

$$9x + 3 \leq 12$$
$$-3 \qquad -3$$

$$9x \leq 9$$
$$\div 9 \qquad \div 9$$

$$\boxed{x \leq 1}$$

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Example 4

$$20 - 2(3x + 8) \geq 8 - 5x$$

$$20 - 6x - 16 \geq 8 - 5x$$

$$4 - 6x \geq 8 - 5x$$

$+ 5x \qquad + 5x$

$$4 - x \geq 8$$

$- 4 \qquad - 4$

$$-x \geq 4$$

$\times (-1) \qquad \times (-1)$

$$\boxed{x \leq -4}$$

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Questions

1 Solve the following.

a $4x + 2 > x + 11$ **b** $7x - 5 < 2x + 30$ **c** $6x + 8 \geqslant 2x - 12$

d $3x + 7 < 15 - x$ **e** $12 - 5x > 3x - 4$ **f** $3x + 6 \leqslant 12 - 3x$

g $7x + 5 > 4x - 10$ **h** $1 - 5x > -2 + 4x$ **i** $2x - 9 < 3 - x$

2 Solve the following.

a $5(x - 2) - 3x > 2 - 6x$ **b** $15 - 2(4 - 3x) > x + 6$

c $2 - (2 - x) \geqslant 2(4x - 5) - 5x$ **d** $4(3x - 1) < 8 - 3(2x + 1)$

e $5(2 - x) - (8 - x) > 7$ **f** $2(3x + 7) - 3(1 - 4x) \leqslant 1 - 2x$

g $3(8 - 2x) \geqslant 4 - 2(6 - x)$ **h** $3x - 2(5x + 1) < 4(1 - x)$

i $20 > 3(1 + 2x) - 4(1 + 3x)$ **j** $-18 < 9x + 4 - (2 - x)$

k $7x - (4 - 5x) > 3(5x - 8) + 2$ **l** $3(1 - 5x) - 8(1 - 2x) > 5x - 3$

m $8x - (4 - 5x) < 3(5x + 2)$ **n** $8x - 2(6x - 1) \geqslant 2 - 4(5 + 2x)$

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Answers

1	a	$x > 3$	2	a	$x > 1\frac{1}{2}$
	b	$x < 7$		b	$x > -\frac{1}{5}$
	c	$x \geq -5$		c	$x \leq 5$
	d	$x < 2$		d	$x < \frac{1}{2}$
	e	$x < 2$		e	$x < -\frac{5}{4}$
	f	$x \leq 1$		f	$x \leq -\frac{1}{2}$
	g	$x > -5$		g	$x \leq 4$
	h	$x < \frac{1}{3}$		h	$x > -2$
	i	$x < 4$		i	$x > -3\frac{1}{2}$
				j	$x > -2$
				k	$x < 6$
				l	$x < -\frac{1}{2}$
				m	$x > -5$
				n	$x \geq -5$

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