

Equations and inequalities 3D

$$\begin{aligned} 1 \text{ a } \quad & 2x < 5 + 3 \\ & 2x < 8 \\ & x < 4 \end{aligned}$$

$$\begin{aligned} \text{b } \quad & 5x \geq 39 - 4 \\ & 5x \geq 35 \\ & x \geq 7 \end{aligned}$$

$$\begin{aligned} \text{c } \quad & 6x - 2x > 7 + 3 \\ & 4x > 10 \\ & x > 2\frac{1}{2} \end{aligned}$$

$$\begin{aligned} \text{d } \quad & 5x + x \leq -12 - 6 \\ & 6x \leq -18 \\ & x \leq -3 \end{aligned}$$

$$\begin{aligned} \text{e } \quad & -x > 4 - 15 \\ & -x > -11 \\ & x < 11 \end{aligned}$$

$$\begin{aligned} \text{f } \quad & 21 - 8 > 3x + 2x \\ & 13 > 5x \\ & 5x < 13 \\ & x < 2\frac{3}{5} \end{aligned}$$

$$\begin{aligned} \text{g } \quad & x - 3x < 25 - 1 \\ & -2x < 24 \\ & x > -12 \end{aligned}$$

$$\begin{aligned} \text{h } \quad & 7x + 7x < 7 + 7 \\ & 14x < 14 \\ & x < 1 \end{aligned}$$

$$\begin{aligned} \text{i } \quad & -0.5x \geq 1 - 5 \\ & -0.5x \geq -4 \\ & x \leq 8 \end{aligned}$$

$$\begin{aligned} \text{j } \quad & 5x + 2x > 12 - 4 \\ & 7x > 8 \\ & x > 1\frac{1}{7} \end{aligned}$$

$$\begin{aligned} 2 \text{ a } \quad & 2x - 6 \geq 0 \\ & 2x \geq 6 \\ & x \geq 3 \end{aligned}$$

$$\begin{aligned} 2 \text{ b } \quad & 8 - 8x > x - 1 \\ & 8 + 1 > x + 8x \\ & 9 > 9x \\ & 1 > x \\ & x < 1 \end{aligned}$$

$$\begin{aligned} \text{c } \quad & 3x + 21 \leq 8 - x \\ & 3x + x \leq 8 - 21 \\ & 4x \leq -13 \\ & x \leq -3\frac{1}{4} \end{aligned}$$

$$\begin{aligned} \text{d } \quad & 2x - 6 - x - 12 < 0 \\ & 2x - x < 6 + 12 \\ & x < 18 \end{aligned}$$

$$\begin{aligned} \text{e } \quad & 1 + 22 - 11x < 10x - 40 \\ & 1 + 22 + 40 < 10x + 11x \\ & 63 < 21x \\ & 3 < x \\ & x > 3 \end{aligned}$$

$$\begin{aligned} \text{f } \quad & 2x - 10 \geq 12 - 3x \\ & 2x + 3x \geq 12 + 10 \\ & 5x \geq 22 \\ & x \geq 4\frac{2}{5} \end{aligned}$$

$$\begin{aligned} \text{g } \quad & 12x - 3x + 9 < 45 \\ & 12x - 3x < 45 - 9 \\ & 9x < 36 \\ & x < 4 \end{aligned}$$

$$\begin{aligned} \text{h } \quad & x - 10 - 4x < 11 \\ & x - 4x < 11 + 10 \\ & -3x < 21 \\ & x > -7 \end{aligned}$$

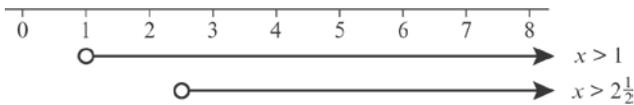
$$\begin{aligned} \text{i } \quad & x^2 - 4x \geq x^2 + 2 \\ & x^2 - x^2 - 4x \geq 2 \\ & -4x \geq 2 \\ & x \leq -\frac{1}{2} \end{aligned}$$

2 j $5x - x^2 \geq 3 + x - x^2$
 $5x - x - x^2 + x^2 \geq 3$
 $4x \geq 3$
 $x \geq \frac{3}{4}$

k $3x + 2x^2 - 6x \leq 10 + 2x^2$
 $-3x \leq 10$
 $x \geq -\frac{10}{3}$

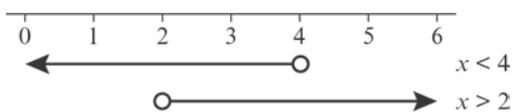
l $2x^2 - 5x \leq \frac{4x^2 + 12x}{2} - 9$
 $4x^2 - 10x \leq 4x^2 + 12x - 18$
 $18 \leq 22x$
 $x \geq \frac{9}{11}$

3 a $3x - 6 > x - 4$
 $2x > 2$
 $x > 1$
 $4x + 12 > 2x + 17$
 $2x > 5$
 $x > 2\frac{1}{2}$



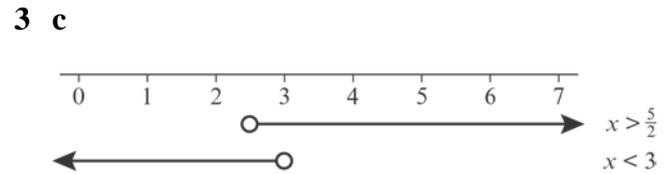
So the required set of values is $x > 2\frac{1}{2}$
 $\{x: x > 2\frac{1}{2}\}$

b $2x - 5 < x - 1$
 $x < 4$
 $7x + 7 > 23 - x$
 $8x > 16$
 $x > 2$



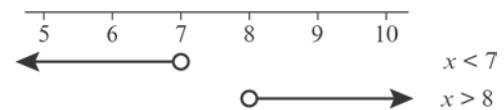
So the required set of values is $2 < x < 4$
 $\{x: 2 < x < 4\}$

c $2x - 3 > 2$
 $2x > 5$
 $x > \frac{5}{2}$
 $3x + 6 < 12 + x$
 $2x < 6$
 $x < 3$



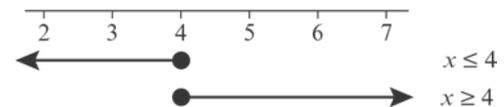
So the required set of values is $\frac{5}{2} < x < 3$
 $\{x: \frac{5}{2} < x < 3\}$

d $15 - x < 22 - 2x$
 $x < 7$
 $15x - 5 > 12x + 19$
 $3x > 24$
 $x > 8$



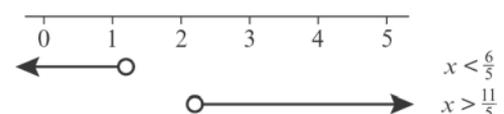
So there are no values that satisfy the inequality.

e $3x + 8 \leq 20$
 $3x \leq 12$
 $x \leq 4$
 $6x - 14 \geq x + 6$
 $5x \geq 20$
 $x \geq 4$



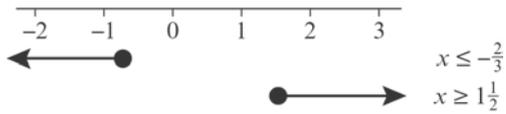
So the required set of values is $x = 4$
 $\{x: x = 4\}$

f $5x + 3 < 9$
 $5x < 6$
 $x < \frac{6}{5}$
 $10x + 5 > 27$
 $10x > 22$
 $x > \frac{11}{5}$



So the required set of values is $x < \frac{6}{5}$ or $x > \frac{11}{5}$
 $\{x: x < \frac{6}{5}\} \cup \{x: x > \frac{11}{5}\}$

$$\begin{aligned}
 \text{3 g } 12x + 28 &\leq 20 \\
 12x &\leq -8 \\
 x &\leq -\frac{2}{3} \\
 6x - 10 &\geq \frac{7-6x}{2} \\
 12x - 20 &\geq 7 - 6x \\
 18x &\geq 27 \\
 x &\geq 1\frac{1}{2}
 \end{aligned}$$



So the required set of values is

$$x \leq -\frac{2}{3} \text{ or } x \geq 1\frac{1}{2}$$

$$\{x: x \leq -\frac{2}{3}\} \cup \{x: x \geq 1\frac{1}{2}\}$$

Challenge

$$\begin{aligned}
 \text{A: } 3x + 5 &> 2 \\
 3x &> -3 \\
 x &> -1
 \end{aligned}$$

$$\begin{aligned}
 \text{B: } \frac{x}{2} + 1 &\leq 3 \\
 \frac{x}{2} &\leq 2 \\
 x &\leq 4
 \end{aligned}$$

$$\begin{aligned}
 \text{C: } 11 &< 2x - 1 \\
 12 &< 2x \\
 x &> 6
 \end{aligned}$$

$$p = -1, q = 4, r = 6$$