

Solving 1- and 2-step Linear Inequalities **Answers**

✓ Check In

Solve the following equations.

1. $x + 3 = 7$

$x = 4$

2. $x - 5 = 3$

$x = 8$

3. $3x + 2 = 11$

$x = 3$

4. $5x - 4 = 31$

$x = 7$

5. List the integer values greater than -2 but less than 4.

-1, 0, 1, 2 and 3

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Exam Style Questions

1. Solve the following inequalities.

a. $3x > 18$

(1)

$x > 6$

c. $x + 6 \leq 11$

(1)

$x \leq 5$

b. $x - 14 < 11$

(1)

$x < 25$

d. $\frac{x}{4} \geq 11$

(1)

$x \geq 44$

2. Solve the following inequalities.

a. $3y + 5 > 17$

(2)

$y > 4$

c. $\frac{m}{2} + 5 \geq 14$

(2)

$m \geq 18$

b. $3t - 8 > -2$

(2)

$t > 2$

d. $\frac{h}{5} - 2 \leq -3$

(2)

$h \leq -5$

3. Solve the following inequalities.

a. $11 < 2x + 3 < 17$

(2)

$4 < x < 7$

c. $-3 < 5x - 8 < 7$

(2)

$1 < x < 3$

b. $-5 < 3x + 1 < 16$

(2)

$-2 < x < 5$

d. $-4 < \frac{x}{4} - 2 \leq 1$

(2)

$-8 < x \leq 12$

4. Jared is asked to solve the inequality $2x + 5 < 7$. His workings are shown below. What mistake did he make? (1)

$$\begin{array}{r}
 2x + 5 < 7 \\
 -5 \qquad \qquad \qquad -5 \\
 \hline
 2x = 2 \\
 \div 2 \qquad \qquad \qquad \div 2 \\
 \hline
 x = 1
 \end{array}$$

He wrote an equals sign instead of the inequality symbol.

5. a. Harry has £55 to go shopping with. He picks a pair of jeans for £20 and two of the same T-shirt with no price on. If the price of a T-shirt is x , write an inequality to represent this situation. (2)

$$2x + 20 \leq 55$$

- b. Solve the inequality to work out the maximum cost of a T-shirt Harry could afford. (2)

$$x \leq 17.5$$

Harry can afford the T-shirts if they are £17.50 or less.

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This guide has everything you need to know on solving linear inequalities in 1- and 2-steps. This includes how to multiply or divide by a negative, which causes problems in inequalities and should be avoided if possible! Once you've mastered this, you may want to move on to representing inequalities on a number line or solving harder linear inequalities.

The method for solving inequalities is almost identical to solving equations, so you should be confident in solving linear equations before trying this. If not, you might like to try the solving linear equations in 1- and 2-steps sheet first.

The main difference between solving equations and inequalities is the use of the symbol. The two sides are no longer equal; instead of an equals sign, we use an inequality symbol. There are four possible symbols:

>	The left side is greater than the right.	e.g. $x > 3$ means the value of x is greater than 3.
<	The left side is less than the right.	e.g. $y < -2$ means the value of y is less than -2.
≥	The left side is greater than or equal to the right.	e.g. $m \geq 5$ means the value of m is 5 or more.
≤	The left side is less than or equal to the right.	e.g. $p \leq 7$ means the value of p is 7 or less.

Example 1

Solving 1-step Inequalities

<p>Addition</p> $x + 4 > 9$ $\begin{array}{r} -4 \qquad \qquad -4 \\ \hline x > 5 \end{array}$	<p>Subtraction</p> $x - 5 < 3$ $\begin{array}{r} +5 \qquad \qquad +5 \\ \hline x < 8 \end{array}$
<p>Multiplication</p> $3x > 18$ $\begin{array}{r} \div 3 \qquad \qquad \div 3 \\ \hline x > 6 \end{array}$	<p>Division</p> $\frac{x}{2} < 7$ $\begin{array}{r} \times 2 \qquad \qquad \times 2 \\ \hline x < 14 \end{array}$

Example 2**Solving 2-step Inequalities**Solve $2x + 3 > 7$

Again, almost everything about these is the same as when dealing with equations. Just remember to take the same inequality symbol with you throughout your workings and avoid multiplying or dividing by any negative values.

$$\begin{array}{r}
 2x + 3 > 7 \\
 -3 \qquad -3 \\
 \hline
 2x > 4 \\
 \div 2 \qquad \div 2 \\
 \hline
 x > 2
 \end{array}$$

- Some inequalities will have an upper and a lower limit, e.g. $12 < x < 26$. When solving these types of inequality, ensure that you do the same to each of the three sections.

Example 3**Solving Inequalities with Three Parts**

<p>Addition</p> $8 < x + 4 < 17$ $-4 \quad -4 \quad -4$ $4 < x < 13$	<p>Subtraction</p> $-2 < x - 5 \leq 11$ $+5 \quad +5 \quad +5$ $3 < x \leq 16$
<p>Multiplication</p> $9 \leq 3x < 15$ $\div 3 \quad \div 3 \quad \div 3$ $3 \leq x < 5$	<p>Division</p> $2 < \frac{x}{2} < 6$ $\times 2 \quad \times 2 \quad \times 2$ $4 < x < 12$

Solving 1- and 2-step Linear Inequalities



Exam Style Questions

1. Solve the following inequalities.

a. $3x > 1$ (1) c. $x + 6 \leq 11$ (1)

b. $x - 14 < 11$ (1) d. $\frac{x}{4} \geq 11$ (1)

2. Solve the following inequalities.

a. $3y + 5 > 17$ (2) c. $\frac{m}{2} + 5 \geq 14$ (2)

b. $3t - 8 > -2$ (2) d. $\frac{h}{5} - 2 \leq -3$ (2)

3. Solve the following inequalities.

a. $11 < 2x + 3 < 17$ (2) c. $-3 < 5x - 8 < 7$ (2)

b. $-5 < 3x + 1 < 16$ (2) d. $-4 < \frac{x}{4} - 2 \leq 1$ (2)

4. Jared is asked to solve the inequality $2x + 5 < 7$. His workings are shown below. What mistake did he make? (1)

$$2x + 5 < 7$$

$$\begin{array}{r} -5 \qquad \qquad \qquad -5 \\ \hline \end{array}$$

$$2x = 2$$

$$\begin{array}{r} \div 2 \qquad \qquad \qquad \div 2 \\ \hline \end{array}$$

$$x = 1$$

5. a. Harry has £55 to go shopping with. He picks a pair of jeans for £20 and two of the same T-shirt with no price on. If the price of a T-shirt is x , write an inequality to represent this situation. (2)

b. Solve the inequality to work out the maximum cost of a T-shirt Harry could afford. (2)