

## Combined Inequalities

### Aim

To demonstrate how to solve combined inequalities.

### Learning Outcomes

At the end of this section you will be able to:

- Identify combined inequalities,
- Successfully manipulate combined inequalities,
- Solve combined inequalities.

A **combined inequality** is formed when two linear inequalities are *combined* together. For example,

$$-4 \leq x \quad \text{and} \quad x < 7,$$

can be joined together to give the following combined inequality

$$-4 \leq x < 7.$$

We read this as “ $x$  is greater than or equal to  $-4$  and less than  $7$ .” Seeing as it is the same variable “ $x$ ” that is being solved for in both of the linear inequalities it is therefore possible to merge these two inequalities into one single combined inequality.

The method for solving combined inequalities is exactly the same as for solving linear inequalities.

### Example

$$\begin{aligned} 11 &\geq 3x + 2 > -7, \\ \Rightarrow 11 - 2 &\geq (3x + 2) - 2 > -7 - 2, && \text{subtract 2 from each part of the inequality,} \\ \Rightarrow 9 &\geq 3x > -9, && \text{now divide by 3,} \\ \Rightarrow 3 &\geq x > -3. \end{aligned}$$

Like linear inequalities, if you have to multiply or divide a combined inequality by a negative number then the inequality signs will have to be reversed.

## Related Reading

Morris, O.D. 1987. *Text & Tests 1*. The Celtic Press.