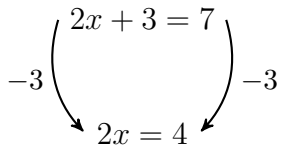
Solving Linear Equations - Level 7-8

Linear equations are written with one unknown variable which is shown by a letter.
It is necessary to **rearrange** the equation in order to find the value of x.

Keywords:
- Linear
- Solve
- Unknown

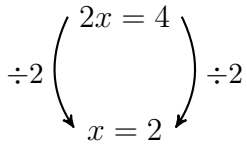
1. Solve 2x+3 = 7 for the unknown.

   Start by looking at the section of the equation that contains the unknown. In this case the left hand side.

   The next step is to collect all constants (numbers) on the side of the equation that does not contain the unknown. We want to move the 3 to the right hand side. Because it is +3, to move it to the other side we must -3.

   We can see that there are still numbers on the right hand side with the unknown. The coefficient (multiplier) of x is 2. Since the 2 is times x we need to divide by 2 to get the x by itself.

   We can see that there are no more numbers on the side of x so the solution is: $x = 2$

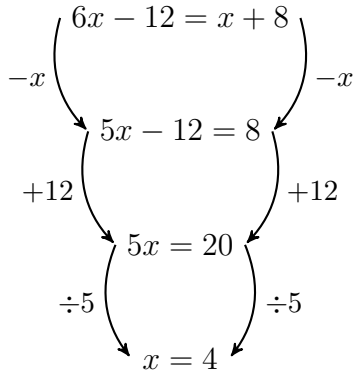
   To check the solution, put the unknown back into the original equation. $2 \times 2 + 3 = 7$

Key things to remember:
- Collect all **terms** involving the **unknown** to one side of the equation.
- The opposite of addition is subtraction.
- The opposite of multiplication is division.
- If you do something to one side of the equation you MUST do the same thing to the other side.

Higher Level Questions

A harder question is shown below, the steps taken are shown on the arrows. The first step is to bring all **unknowns** to the same side of the equation.

2. Find the value of x: $6x - 12 = x + 8$

   Check:

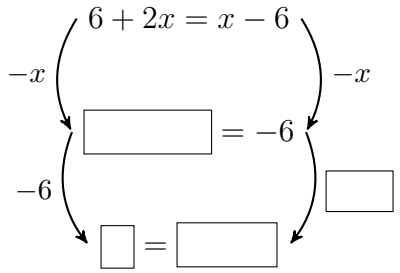
On the left hand side of the **original** equation:
$6(4) - 12 = 24 - 12 = 12$

On the right hand side of the **original** equation:
$4 + 8 = 12$

The left hand side and right hand side of the equation are equal so you know that your solution is correct: $x = 4$

Practice Questions

1. Find the value of x: $6 + 2x = x - 6$



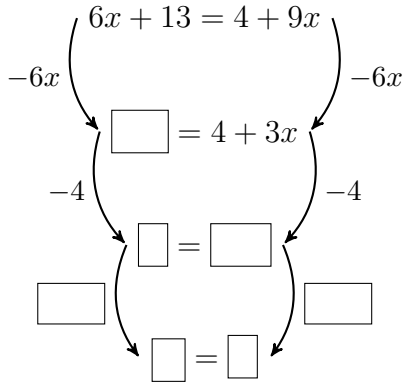
Check:

$6 + \square x = 6 + 2 \times -12 = \square$

$\square - 6 = \square - 6 = \square$

Solving Linear Equations

1. Find the value of x: $6x + 13 = 4 + 9x$ (3)



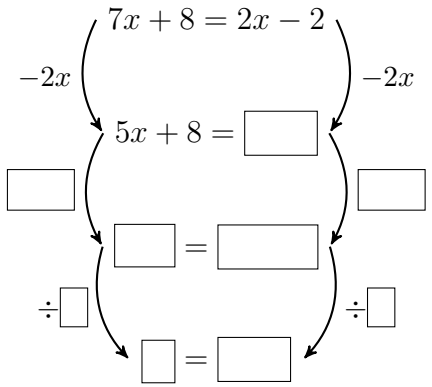
TIP:
When you have unknowns on both sides of the equations you can choose which one to move.
Try and move the lower number of unknowns to avoid negatives.

Check:

$6\square + 13 = 6\square + 13 = 31$

$4 + 9\square = 4 + \square = 31$

2. Find the value of x: $7x + 8 = 2x - 2$ (3)

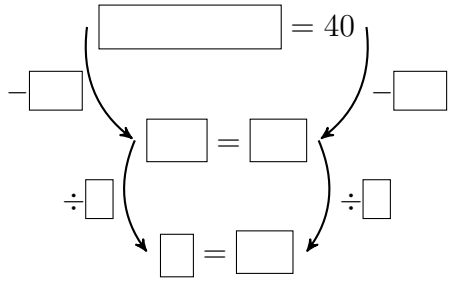


Check:

$7\square + 8 = \square + 8 =$

$2\square - 2 = \square - 2 =$

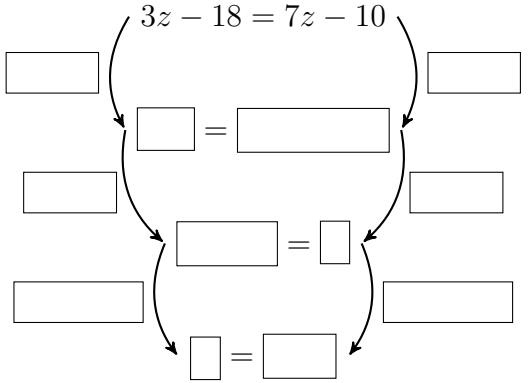
3. Susie clears out boxes on the weekend. She gets paid £10 for the weekend and an extra £2 for each box she clears. If Susie is paid £40, how many boxes did she clear? (3)



LOOK!:
This question is asking you to make the linear equation yourself.
HINT:
What is the unknown?

Check:

4. Rearrange to find the unknown:
$3z - 18 = 7z - 10$ (3)



NOTE:
This question uses z as the unknown. Any letter may be used as the unknown.

Check:

$3\square - 18 = \square - 18 = \square$

$7\square - 10 = \square - 10 = \square$