Balancing Equations

Important note: You are learning the **balancing method** for solving equations (since it is much more versatile and useful in the long run). You must show that you have used this. Therefore single number answers won’t get any marks even if they are correct.

1. The equations below have been solved using the balancing method. **Write next to each arrow what has been done to both sides of each equation.**

   a) \[x + 12 = 20\]
   
   b) \[6x = 48\]

   c) \[x - 15 = 20\]

   d) \[10 + x = 42\]

   e) \[2x + 5 = 19\]

   f) \[5x - 1 = 24\]

2. Solve the following equations, using the balancing method. **Make sure you write down what you have done to each side at every step as well as the equation you get after every change (just as in the question above)**

   a) \[x + 15 = 18\]

   b) \[9x = 36\]

   c) \[3x - 2 = 13\]

   d) \[2x + 5 = 19\]
3. Solve the following equations, using the balancing method.  
Don’t forget to include arrows showing what you are doing to each side.

\[
\begin{align*}
\text{a)} & \quad 4x + 10 &= 410 \\
\text{b)} & \quad 10x - 6 &= 34 \\
\text{c)} & \quad 6x - 3 &= 21 \\
\text{d)} & \quad 11x - 10 &= 67
\end{align*}
\]

4. The equations below have been solved using the balancing method.  
Write next to each arrow what has been done to both sides of each equation.

\[
\begin{align*}
\text{a)} & \quad 2x + 5 &= x + 9 \\
& \quad x + 5 &= 9 \\
& \quad x &= 4 \\
\text{b)} & \quad 4x + 1 &= 6x - 5 \\
& \quad 1 &= 2x - 5 \\
& \quad 6 &= 2x \\
& \quad 3 &= x \\
\text{c)} & \quad 10x + 14 &= 6x + 34 \\
& \quad 4x + 14 &= 34 \\
& \quad 4x &= 20 \\
& \quad x &= 5 \\
\text{d)} & \quad 7x + 9 &= 12x + 4 \\
& \quad 9 &= 5x + 4 \\
& \quad 5 &= 5x \\
& \quad 1 &= x
\end{align*}
\]
Balancing Equations  SOLUTIONS

Important note: You are learning the balancing method for solving equations (since it is much more versatile and useful in the long run). You must show that you have used this. Therefore single number answers won’t get any marks even if they are correct.

1. The equations below have been solved using the balancing method.
   Write next to each arrow what has been done to both sides of each equation.

   **a)** \[ x + 12 = 20 \]
   \[ -12 \]
   \[ x = 8 \]
   \[ -12 \]

   **b)** \[ 6x = 48 \]
   \[ \div 6 \]
   \[ x = 8 \]
   \[ \div 6 \]

   **c)** \[ x - 15 = 20 \]
   \[ +15 \]
   \[ x = 35 \]
   \[ +15 \]

   **d)** \[ 10 + x = 42 \]
   \[ -10 \]
   \[ x = 32 \]
   \[ -10 \]

   **e)** \[ 2x + 5 = 19 \]
   \[ -5 \]
   \[ 2x = 14 \]
   \[ \div 2 \]
   \[ x = 7 \]
   \[ \div 2 \]

   **f)** \[ 5x - 1 = 24 \]
   \[ +1 \]
   \[ 5x = 25 \]
   \[ \div 5 \]
   \[ x = 5 \]
   \[ \div 5 \]

2. Solve the following equations, using the balancing method.
   Make sure you write down what you have done to each side at every step as well as the equation you get after every change (just as in the question above)

   **a)** \[ x + 15 = 18 \]
   \[ -15 \]
   \[ x = 3 \]
   \[ -15 \]

   **b)** \[ 9x = 36 \]
   \[ \div 9 \]
   \[ x = 4 \]
   \[ \div 9 \]

   **c)** \[ 3x - 2 = 13 \]
   \[ +2 \]
   \[ 3x = 15 \]
   \[ \div 3 \]
   \[ x = 5 \]
   \[ \div 3 \]

   **d)** \[ 2x + 5 = 19 \]
   \[ -5 \]
   \[ 2x = 14 \]
   \[ \div 2 \]
   \[ x = 7 \]
   \[ \div 2 \]
3. Solve the following equations, using the balancing method.

   Don’t forget to include arrows showing what you are doing to each side.

   a) \[ \begin{align*}
   4x + 10 &= 410 \\
   -10 \quad \downarrow &= \quad -10 \\
   4x &= 400 \\
   \div 4 \quad \downarrow &= \quad \div 4 \\
   x &= 100 
   \end{align*} \]

   b) \[ \begin{align*}
   10x - 6 &= 34 \\
   +6 \quad \downarrow &= \quad +6 \\
   10x &= 40 \\
   \div 10 \quad \downarrow &= \quad \div 10 \\
   x &= 4 
   \end{align*} \]

4. The equations below have been solved using the balancing method.

   Write next to each arrow what has been done to both sides of each equation.

   a) \[ \begin{align*}
   6x - 3 &= 21 \\
   +3 \quad \downarrow &= \quad +3 \\
   6x &= 24 \\
   \div 6 \quad \downarrow &= \quad \div 6 \\
   x &= 4 
   \end{align*} \]

   b) \[ \begin{align*}
   11x - 10 &= 67 \\
   +10 \quad \downarrow &= \quad +10 \\
   11x &= 77 \\
   \div 11 \quad \downarrow &= \quad \div 11 \\
   x &= 7 
   \end{align*} \]