

Simultaneous Equations

A pair of "Simultaneous equations" is two equations which are both true at the same time. You have two equations which have two unknowns to be found.

Methods

- Method 1- Elimination

This involves changing the two equations so that one can be added/ subtracted from the other to leave us with an equation with only one unknown (which we can solve). We can 'change' the equations by multiplying them through by a constant- as long as we multiply both sides of the equation by the same number it will remain true.

- Method 2 - Substitution

The method of substitution involves transforming one equation into $x = (\text{something})$ or $y = (\text{something})$ and then substituting this something into the other equation.

Example of simultaneous Equations Using both the methods

- $3f + 2c = 280$ (1)
 $f + 4c = 260$ (2)

Substitution Method

- Making 'F' the subject in equation 2

$$\begin{aligned} &= f + 4c - 4c = 260 - 4c \\ &= f = 260 - 4c \end{aligned}$$

- Substituting F in equation 1

$$\begin{aligned} &= 3(260 - 4c) + 2c = 280 \\ &= 780 - 12c + 2c = 280 \\ &= 780 - 10c = 280 \\ &= 780 - 10c - 780 = 280 - 780 \\ &= -10c = -500 \\ &= C = 50 \end{aligned}$$

- Implementing the value of C in equation 2 and then finding the value of F.

$$\begin{aligned} &= f = 260 - 4(50) \\ &= f = 260 - 200 \\ &= f = 60 \end{aligned}$$

Elimination method

- Multiplying equation 2 by -3 so that we can add -3f.

$$\begin{aligned} &= -3(f + 4c = 260) \\ &= -3f + -12c = -780 \end{aligned}$$

- Adding equation 1 with equation 2.

$$\begin{aligned} &= (-3f + -12c = -780) + (3f + 2c = 280) \\ &= -10c + -500 \\ &= c = 50 \end{aligned}$$

- Implementing the value of C in equation 1

$$\begin{aligned} &= 3f + 2(50) = 280 \\ &= 3f + 100 = 280 \\ &= 3f + 100 - 100 = 280 - 100 \\ &= 3f = 180 \\ &= f = 60 \end{aligned}$$

$$\begin{aligned}\therefore F &= 60 \\ C &= 50\end{aligned}$$

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