Answer on Question #60375 – Math – Algebra

Question

Use algebra to solve these two simultaneous equations, Show each step of your working clearly.

y = 6.5x + 40, y = 4.5x + 80

Solution

The following system is given

$$\begin{cases} y = 6.5x + 40 \\ y = 4.5x + 80 \end{cases}$$

Using both equations of the system equate expressions for y

$$\begin{cases} y = 6.5x + 40 \\ 6.5x + 40 = 4.5x + 80 \end{cases}$$

Subtract $(4.5x + 40)$ from both sides of the second equation

$$\begin{cases} y = 6.5x + 40 \\ 6.5x - 4.5x = 80 - 40 \end{cases}$$

Collect similar terms and simplify the second equation

$$\begin{cases} y = 6.5x + 40 \\ 2x = 40 \end{cases}$$

Divide both sides of the second equation by 2

$$\begin{cases} y = 6.5x + 40 \\ x = \dfrac{40}{2} \end{cases}$$

Evaluate the right-hand side of the second equation

$$\begin{cases} y = 6.5x + 40 \\ x = 20 \end{cases}$$

Swap the equations

$$\begin{cases} x = 20 \\ y = 6.5x + 40 \end{cases}$$

Plug $x = 20$ into the second equation of the system

$$\begin{cases} x = 20 \\ y = 6.5 \cdot 20 + 40 \end{cases}$$

$$\begin{cases} x = 20 \\ y = 130 + 40 \end{cases}$$

Find the sum in the second equation

$$\begin{cases} x = 20 \\ y = 170 \end{cases}$$

Answer: $x = 20; y = 170.$