Answer on Question #62523 – Math – Algebra

Question

p can complete a task in x days while q takes $x + 12$ days to do the same task.

A) what fraction of the task can each of them complete in a day?

B) if both of them work together, they can complete the task in 8 days. Find x.

Solution

A) Obviously p can complete $\frac{1}{x}$ of the task in a day while q can complete $\frac{1}{x+12}$ of the task in a day.

B) Working together p and q can complete $\left(\frac{1}{x} + \frac{1}{x+12}\right)$ of the task in a day. Remember that $x \neq 0, x \neq -12$.

On the other hand, it follows from the condition that they can complete $\frac{1}{8}$ of the task in a day. We have the next equation:

$$\frac{1}{x} + \frac{1}{x+12} = \frac{1}{8} \Leftrightarrow \frac{1}{x} + \frac{1}{x+12} - \frac{1}{8} = 0 \Leftrightarrow \frac{8(x+12) + 8x - x(x+12)}{8x(x+12)} = 0 \Leftrightarrow$$

$$\Leftrightarrow \begin{cases} 8x + 96 + 8x - x^2 - 12x = 0 \\ x \neq 0, x \neq -12 \end{cases} \Leftrightarrow \begin{cases} 8x + 96 + 8x - x^2 - 12x = 0 \\ x \neq 0, \quad x \neq -12 \end{cases} \Leftrightarrow$$

$$\Leftrightarrow \begin{cases} -x^2 + 4x + 96 = 0 \\ x \neq 0, x \neq -12 \end{cases} \Leftrightarrow$$

$$\Leftrightarrow \begin{cases} x_1 = \dfrac{-4 - \sqrt{4^2 - 4 \cdot (-1) \cdot 96}}{2 \cdot (-1)}; x_2 = \dfrac{-4 + \sqrt{4^2 - 4 \cdot (-1) \cdot 96}}{2 \cdot (-1)} \\ x_1 \neq 0; \ x_2 \neq 0; \ x_1 \neq -12; \ x_2 \neq -12 \end{cases} \Leftrightarrow$$

$$\Leftrightarrow x_1 = 12; \ x_2 = -8.$$

Comparing x_1 and x_2, take the positive value. Thus, $x = 12$.

Answer:

A) p can complete $\frac{1}{x}$ of the task, q can complete $\frac{1}{x+12}$ of the task.

B) $x = 12$.