

QUESTION:

System of equation: in a restaurant, some people have chosen the same menu. If each one pays 75000 ₽ the amount of 28000 ₽ is still needed. If each one pays 85000 ₽ the restaurant manager repays them 42000 ₽. Find the number of guests and price of the menu per person?

SOLUTION:

Let us assume that n is the number of people in the restaurant, and s is the price of the menu per person. Then $s \cdot n$ is the amount of money that must be paid. So, if each one pays 75000 ₽ then restaurant gets $75000 \cdot n$ money and the amount of 28000 ₽ is still needed. Hence, we can write the first equation:

$$75000 \cdot n + 28000 = s \cdot n$$

And if each one pays 85000 ₽, then the restaurant gets $85000 \cdot n$ money and manager repays them 42000 ₽. Hence, we can write the second equation

$$85000 \cdot n - 42000 = s \cdot n$$

The first and the second equations form a system:

$$\begin{cases} 75000 \cdot n + 28000 = s \cdot n \\ 85000 \cdot n - 42000 = s \cdot n \end{cases}$$

The right sides of the equations are equal; therefore the left sides of the equations are equal too. Hence

$$\begin{aligned} \begin{cases} 75000 \cdot n + 28000 = 85000 \cdot n - 42000 \\ 85000 \cdot n - 42000 = s \cdot n \end{cases} &\Rightarrow \begin{cases} 75000 \cdot n - 85000 \cdot n = -42000 - 28000 \\ \frac{85000 \cdot n - 42000}{n} = s \end{cases} \Rightarrow \\ &\Rightarrow \begin{cases} 10000 \cdot n = 70000 \\ \frac{85000 \cdot n - 42000}{n} = s \end{cases} \Rightarrow \begin{cases} n = \frac{70000}{10000} \\ \frac{85000 \cdot n - 42000}{n} = s \end{cases} \Rightarrow \begin{cases} n = 7 \\ \frac{85000 \cdot 7 - 42000}{7} = s \end{cases} \Rightarrow \\ &\Rightarrow \begin{cases} n = 7 \\ s = 79000 \end{cases} \end{aligned}$$

Let us check the answer:

The total amount of money that must be paid is $7 \cdot 79000 = 553000$. If each one pays 75000 ₽, then restaurant gets $75000 \cdot 7 = 525000$, and $553000 - 525000 = 28000$ ₽ is needed. If each one pays 85000 ₽, then restaurant gets $85000 \cdot 7 = 595000$, and $595000 - 553000 = 42000$ ₽ must be repaid.

ANSWER

There are **7** guests and menu costs **79000** per person