

**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