

**Answer on Question #77409 – Math – Algebra
Question**

There are 100 persons and 100 plates

Rich one eat in 5 plates

Men with Service eat in 3 plates

And 3 poor eat in 1 plate then how many rich, service and poor people are there

Solution

$$R + S + P = 100$$

$$5R + 3S + \frac{P}{3} = 100$$

where R is the number of rich men, S is the number of service men, P is the number of poor men.

$$R = 100 - S - P$$

$$5(100 - S - P) + 3S + \frac{P}{3} = 100$$

$$500 - 2S - \frac{14P}{3} = 100$$

$$S + \frac{7P}{3} = 200$$

$$S = 200 - \frac{7P}{3}$$

$$0 \leq S \leq \frac{100}{3} \Rightarrow 0 \leq S \leq 33$$

$$0 \leq R \leq \frac{100}{5} = 20$$

$$0 \leq P \leq 100$$

$$0 \leq 200 - \frac{7P}{3} \leq \frac{100}{3} \Rightarrow \frac{500}{7} \leq P \leq \frac{600}{7}$$

$$71 \leq P \leq 85$$

Since P is a multiple of 3, then

$$72 \leq P \leq 84$$

So we have

$$P = 72; S = 200 - \frac{7 \cdot 72}{3} = 32; R = 100 - 72 - 32 = -4 < 0$$

$$P = 75; S = 200 - \frac{7 \cdot 75}{3} = 25; R = 100 - 75 - 25 = 0$$

$$P = 78; S = 200 - \frac{7 \cdot 78}{3} = 18; R = 100 - 78 - 18 = 4$$

$$P = 81; S = 200 - \frac{7 \cdot 81}{3} = 11; R = 100 - 81 - 11 = 8$$

$$P = 84; S = 200 - \frac{7 \cdot 84}{3} = 4; R = 100 - 84 - 4 = 12$$

Answer:

$$P = 75; S = 25; R = 0$$

$$P = 78; S = 18; R = 4$$

$$P = 81; S = 11; R = 8$$

$$P = 84; S = 4; R = 12$$