Answer on Question #57569 – Math – Algebra

Question

A manufacturer has 600 liters of 12% acid solution. How many liters of 30% acid solution must be added to it so that acid content in the resulting mixture will be more than 15% but less than 18%?

Solution

Assume we added X liters of 30% acid solution. In result, we have (600 + X) liters of mixture that contains $(600 * 0.12 + X * 0.3)$ liters of "pure" acid. So,

$$0.15 < \frac{(600 * 0.12 + X * 0.3)}{(600 + X)} < 0.18$$

Let us solve these two inequalities independently:

$$0.15 < \frac{(600 * 0.12 + X * 0.3)}{(600 + X)}$$
$$0.15 * (600 + X) < (600 * 0.12 + X * 0.3)$$
$$600 * (0.15 - 0.12) < X * (0.3 - 0.15)$$
$$X > 120$$

$$\frac{(600 * 0.12 + X * 0.3)}{(600 + X)} < 0.18$$
$$0.18 * (600 + X) > (600 * 0.12 + X * 0.3)$$
$$600 * (0.18 - 0.12) > X * (0.3 - 0.18)$$
$$X < 300$$

$$120 < X < 300$$

Answer: from 120 to 300 liters of 30% acid solution must be added.