Rational Equations Word Problems

1. You have 10 liters of a juice blend that is 60% juice.

a) How many liters of pure juice need to be added in order to make a blend that is 75% juice?

b) How many liters of pure juice need to be added in order to make a blend that is 90% juice?

c) Suppose that you have added 15 liters of juice to the original 10 liters. What is the percentage of juice in this blend?

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1. You have 10 liters of a juice blend that is 60% juice.

a) How many liters of pure juice need to be added in order to make a blend that is 75% juice?

We start off with 10 liters of a blend containing 60% juice. Then, this blend contains $0.60(10) = 6$ liters of juice in the 10 liters of mixture. If we add A liters of pure juice, then the concentration of juice in the blend is $\frac{6+A}{10+A}$. We want to know which value of A makes this blend 75% juice.

$$\frac{6 + A}{10 + A} = 0.75$$
$$6 + A = 0.75(10 + A)$$
$$6 + A = 7.5 + 0.75A$$
$$0.25A = 1.5$$
$$A = 6$$

Thus, if we add 6 liters of pure juice, we have 16 liters of a blend that contains 12 liters of juice, meaning that the concentration of juice in this blend is 75%.

b) How many liters of pure juice need to be added in order to make a blend that is 90% juice?

$$\frac{6 + A}{10 + A} = 0.90$$
$$6 + A = 0.9(10 + A)$$
$$6 + A = 9 + 0.9A$$
$$3 = 0.1A$$
$$A = 30$$

Thus, if we add 30 liters of pure juice, we will have 40 liters of a blend that contains 36 liters of pure juice, meaning that the concentration of juice in this blend is 90%.

c) Suppose that you have added 15 liters of juice to the original 10 liters. What is the percentage of juice in this blend?

$$\frac{p}{100} = \frac{6 + 15}{10 + 15} = 0.84$$

So, the new blend contains 84% pure juice.