

1. A car radiator has a 6-liter capacity. If the liquid in the radiators 40% antifreeze, how much liquid must be replaced with pure anitfreeze to bring the mixture up to a 50% solutions? If I told you the answer is 1 liter, in your own words, using complete sentences explain how you would solve this problem.

Let x represent the amount of liquid that must be replaced with pure antifreeze.

When x liters of liquid is removed from the radiator, the amount of the liquid left is $6 - x$ liters.

The quantity of antifreeze in the radiator is $0.4(6 - x)$.

When x liters of antifreeze is added then the amount of antifreeze in the radiator is $0.4(6 - x) + x$.

We are given that the resulting mixture is 50% antifreeze so the amount of antifreeze in the radiator is $0.5(6) = 3$ liters.

Equating these two quantities we get

$$0.4(6 - x) + x = 3$$

$$2.4 - 0.4x + x = 3$$

$$2.4 + 0.6x = 3$$

$$0.6x = 3 - 2.4$$

$$0.6x = 0.6$$

$$x = 1$$

Answer: To obtain 50% antifreeze we must replace 1 liter of the initial solution with 1 liter of pure antifreeze.

2. A college student invested part of a \$25,000 inheritance at 7% interest and the rest at 6%. If his annual interest is \$1,671 how much did he invest at 6%? If I told you the answer is \$8,000, in your own words, using complete sentences, explain how you would solve the problem.

Let x represent the amount invested at 6%. Then the amount invested at 7% is $25000 - x$.

The interest earned at 6% is $0.06x$ and the interest earned at 7% is $0.07(25000 - x)$.

The total interest earned is $0.06x + 0.07(25000 - x)$. On the other hand, the annual interest is \$1,671.

Equating these two quantities, we get

$$0.06x + 0.07(25000 - x) = 1671$$

$$0.06x + 1750 - 0.07x = 1671$$

$$1750 - 0.01x = 1671$$

$$1750 = 1671 + 0.01x$$

$$1750 - 1671 = 0.01x$$

$$79 = 0.01x$$

$$7900 = x$$

Answer: \$7900 was invested at 6%.