

Problem Solving and Applications

Mixture Problems

EXAMPLE 1 The owner of Corner Health Foods wishes to mix raisins that sell at \$5.75 per kilogram with nuts that sell at \$4.00 per kilogram to make a 100-kilogram mixture that sells at \$4.70 per kilogram. How many kilograms of raisins and how many kilograms of nuts must be used?

EXAMPLE 2 A soil analysis of a lawn determines that 50 pounds of fertilizer containing 20% nitrogen is needed. How can this mixture be made from two different fertilizers, one containing 15% nitrogen and the other containing 24% nitrogen?

1. Cashews that sell for \$6.50 per kilogram are mixed with almonds that sell for \$8.00 per kilogram to make a 100-kilogram mixture. The mixture will sell for \$7.40 per kilogram. How many kilograms of cashews and how many kilograms of almonds must be used?
2. A 20-kilogram mixture of coffee is made from two brands. Brand A sells at \$5.50 per kilogram and Brand B at \$6.50 per kilogram. The mixture will sell at \$6.10 per kilogram. How many kilograms of Brand A and of Brand B must be used?
3. A baker mixes cookies worth \$0.95 per pound with cookies worth \$1.70 per pound. How many of each kind must be used to produce a 45-pound mixture that sells for \$1.25 per pound?
4. Solution A, which is 10% iodine, is mixed with Solution B, which is 18% iodine, to obtain 320 grams of a solution that is 15% iodine. How many grams of Solution A and how many grams of Solution B are needed for the 15%-solution?
5. A 4% salt solution is mixed with an 8% salt solution. How many grams of each solution are needed to obtain 400 grams of a 5% solution?
6. A 25% silver alloy is to be melted with a 55% silver alloy. How many grams of each must be used to obtain 30 grams of a 32% silver alloy?
7. An alloy that is 35% copper is melted with a second alloy that is 65% copper. How many kilograms of each alloy must be melted to obtain 20 kilograms of an alloy that is 41% copper?
8. A milk distributor has cream that is 24% butterfat and cream that is 18% butterfat. How many quarts of each must be used to obtain 90 quarts of cream that is 22% butterfat?
9. A chemist has one solution that is 40% acid and a second solution that is 15% acid. How many grams of each should be used to obtain 40 grams of a solution that is 25% acid?
10. Pecans priced at \$5.85 per kilogram are mixed with almonds priced at \$4.93 per kilogram to make a 40-kilogram mixture that is to sell at \$5.62 per kilogram. How many kilograms of each kind of nut must be used?

Ex 1

Mixture Problems

①

R: # kg of raisins @ \$5.75/kg
N: # kg of Nuts @ \$4.00/kg

Total 100 kg * \$4.70/kg = \$470

$$\begin{array}{r} * -4 \left(\begin{array}{l} R + N = 100 \\ 5.75R + 4N = 470 \\ \rightarrow -4R + -4N = -400 \end{array} \right. \\ \hline 1.75R = 70 \end{array}$$

$R = 40 \text{ kg of raisins}$	$40 + N = 100$
$N = 60 \text{ kg of nuts}$	$N = 60$

Ex 2

②

x: Fertilizer Lb @ 15% Nitrogen

y: Fertilizer Lb @ 24% Nitrogen

Total 50 Lb @ 20% = 10 Lb of Nit.

$$\begin{array}{r} * -15 \left(\begin{array}{l} x + y = 50 \\ .15x + .24y = 10 \end{array} \right. \\ * 100 \left(\begin{array}{l} \rightarrow 15x + 24y = 1000 \\ \rightarrow -15x + -15y = -750 \end{array} \right. \\ \hline 9y = 250 \end{array}$$

$$y \approx 28 \text{ Lb}$$

$$x + 28 = 50$$

$$x = 22$$

x: 22 Lb of 15%
y: 28 Lb of 24%