

7-7 Mixture Problems

Objective: To solve mixture problems.

Example 1 A health food store sells a mixture of raisins and roasted nuts. Raisins sell for \$4.00/kg and nuts sell for \$6.00/kg. How many kilograms of each should be mixed to make 40 kg of this snack worth \$4.75/kg?

Solution

Step 1 The problem asks for the number of kilograms of raisins and the number of kilograms of nuts.

Step 2 Let x = the number of kilograms of raisins.
Then $40 - x$ = the number of kilograms of nuts.

	Number of kg	× Price per kg	= Cost
Raisins	x	\$4.00	$4x$
Nuts	$40 - x$	\$6.00	$6(40 - x)$
Mixture	40	\$4.75	190

Step 3 The value of a mixture is equal to the value of the individual ingredients.

Cost of raisins + Cost of nuts = Total cost of mixture

$$4x + 6(40 - x) = 190$$

Step 4 $4x + 6(40 - x) = 190$

$$4x + 240 - 6x = 190$$

$$240 - 2x = 190$$

$$-2x = -50$$

$$x = 25$$

$$40 - x = 15$$

Step 5 $4(25) + 6(15) \stackrel{?}{=} 190$

$$100 + 90 \stackrel{?}{=} 190$$

$$190 = 190 \checkmark \quad 25 \text{ kg of raisins and } 15 \text{ kg of nuts should be mixed.}$$

Solve.

- The owner of a specialty food store wants to mix cashews selling at \$8.00/kg and pecans selling at \$6.00/kg. How many kilograms of each should be mixed to get 12 kg of nuts worth \$7.50/kg?
- A grocer mixed 12 lb of egg noodles costing 80¢/lb with 3 lb of spinach noodles costing \$1.20/lb. What will the cost per pound of the mixture be?
- A special tea blend is made from two varieties of herbal tea, one that costs \$4.00/kg and another that costs \$2.00/kg. How many kilograms of each type are needed to make 20 kg of a blend worth \$2.50/kg?
- A grocer has two kinds of nuts. One costs \$5/kg and another costs \$4.20/kg. How many kilograms of each type of nut should be mixed in order to get 60 kg of a mixture worth \$4.80/kg?

7-7 Mixture Problems (continued)

Example 2 A chemist has 60 mL of a solution that is 70% acid. How much water should be added to make a solution that is 40% acid?

Solution

Step 1 The problem asks for the number of milliliters of water to be added.

Step 2 Let x = the number of milliliters of water to be added.

	Total amount	\times % acid	= Amount of acid
Original solution	60	70%	$0.70(60)$
Water	x	0%	0
New solution	$60 + x$	40%	$0.40(60 + x)$

Step 3 Original amount of acid + Added acid = New amount of acid
 $0.70(60) + 0 = 0.40(60 + x)$

Step 4 $70(60) = 40(60 + x)$ { Multiply both sides by
 $4200 = 2400 + 40x$ { 100 to clear decimals.
 $1800 = 40x$
 $45 = x$

Step 5 The check is left to you. 45 mL of water should be added.

Solve.

- A chemist has 80 mL of a solution that is 70% salt. How much water should he add to make a solution that is 40% salt?
- If 800 mL of a juice drink is 10% grape juice, how much grape juice should be added to make a drink that is 20% grape juice?
- How many liters of water must be added to 70 L of a 40% acid solution in order to produce a 28% acid solution?
- How many mL of pure water must be added to 60 mL of a 20% salt solution to make a 12% salt solution?
- A nurse has 100 mL of a solution that is 10% salt. How much sterile water must be added to make an 8% salt solution?

Mixed Review Exercises**Evaluate.**

- 8% of 50 + 0.2% of 120
- What percent of 60 is 18?
- What percent of 120 is 30?
- 12 is 25% of what number?

Evaluate if $a = 1$, $b = 2$, $x = 3$, and $y = 6$.

- $|-3| + y$
- $\frac{5 - 2a}{x - b}$
- $\frac{1}{8}(6x + y)$
- x^2y
- $2a + 3b$
- $(x - a)^2$