

## MIXTURE TYPE I PROBLEMS

**Example 4:** A store owner sells peanuts for \$4.80/kg and raisins for \$2.40/kg. She decides to mix raisins and peanuts and sell the mixture as a snack for \$3.36/kg. She decides to make up 100 kg of the snack. How many kilograms of peanuts and raisins will she need?

Let  $p$  represent the number of kilograms of peanuts required  
 Let  $r$  represent the number of kilograms of raisins required

	number of kilograms	cost per kg (in cents)	value (in cents)
PEANUTS	$p$	480	$480p$
RAISINS	$r$	240	$240r$
MIXTURE	100	336	33,600

$$p + r = 100 \quad \textcircled{1} \rightarrow \text{total mass of mixture}$$

$$480p + 240r = 33,600 \quad \textcircled{2} \rightarrow \text{total value of mixture}$$

$$\textcircled{1} \times 240 : \quad 240p + 240r = 24,000 \quad \textcircled{1}$$

$$\quad \quad \quad 480p + 240r = 33,600 \quad \textcircled{2}$$


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$$\textcircled{1} - \textcircled{2} \quad -240p = -9600$$

$$\quad \quad \quad \boxed{p = 40}$$

substitute  $p = 40$  into  $\textcircled{1}$  :  $\therefore 40 \text{ kg of peanuts and } 60 \text{ kg of raisins need to be used.}$   
 $40 + r = 100$   
 $\boxed{r = 60}$

### PROBLEMS (answers in brackets)

- Jelly beans and mints, worth \$2.10/kg and \$2.70/kg respectively, were mixed to make 500 kg of mixture which sold for \$2.52/kg. How many kilograms of mints were used?  $(150, 350)$
- Coffee that sells for \$3.60/kg is mixed with coffee that sells for \$2.40/kg to make 1200 kg of coffee that will sell for \$2.80/kg. How many kilograms of each type of coffee were used?  $(400, 800)$
- A hardware store manager mixed nails that sell for \$1.10/kg and nails that sell for \$1.20/kg to get 100 kg of nails that he puts in 1 kg-bags. He sells each bag for \$1.14. How many kilograms of each type of nail does he use?  $(60, 40)$
- A merchant mixes tea that sells for \$2.20/kg with tea that sells for \$2.40/kg to get 200 kg of mixture that sells for \$2.28/kg. How many kilograms of each type of tea did she use?  $(120, 80)$
- A department store manager decided to mix cashews and pecans to get 400 kg of nuts that sell for \$3.36/kg. If cashews sell for \$3.20/kg and pecans for \$3.60/kg, how many kilograms of each type of nut did he use?  $(240, 160)$
- A store manager mixes tea worth \$1.50/kg and tea worth \$1.90/kg to make 200 kg of tea that sells for \$1.67/kg. How many kilograms of each type of tea does he use?  $(115, 85)$

## MIXTURE TYPE II PROBLEMS

**Example 5:** A chemistry student was asked to make 100 L of 48% alcohol solution by volume by mixing 40% alcohol solution by volume and 60% alcohol by volume. How many litres of each must the student use?

Let  $x$  be the number of litres of 40% alcohol solution needed.  
Let  $y$  be the number of litres of 60% alcohol solution needed.

Solution eq'n:  $x + y = 100$  ①

Alcohol eq'n:  $0.40x + 0.60y = (0.48)(100)$  ②

$$0.40x + 0.60y = 48 \quad \text{②}$$

$$\text{②} \times 10 : \quad 4x + 6y = 480$$

$$\text{①} \times 6 : \quad \underline{6x + 6y = 600}$$

$$\text{②} - \text{①} \quad \underline{-2x = -120}$$

$$\boxed{x = 60}$$

substitute  $x=60$  into ①:

$$60 + y = 100$$

$$\boxed{y = 40}$$

$\therefore$  40 L of the 60% solution  
and 60 L of the 40% solution  
must be used.

### PROBLEMS (answers in brackets)

1. How many kilograms of 30% salt solution by mass and 40% salt solution by mass should be mixed to form 200 kg of 37% salt solution by mass? (60, 140)
2. A lab technician wants to make 500 kg of 28% alcohol solution by mixing 40% alcohol solution and 20% alcohol solution. How many kilograms of each type should be used? (200, 300)
3. A chemist mixes hydrochloric acid solutions of 30% strength and 40% strength to get 100 kg of hydrochloric acid solution of 34% strength. How many kilograms of each should be used? (60, 40)
4. How many kilograms of 35% salt solution and 45% salt solution should be mixed to make 500 kg of 43% salt solution? (100, 400)
5. A chemistry student must combine 20% alcohol solution and 40% alcohol solution to make 100 kg of 36% alcohol solution. How many kilograms of each should be used? (20, 80)