

Name:

Date:

WORKSHEET :



**Word Problems
Mixture Problems**

Round all answers to 1 decimal place

1. 548 tickets were sold to the fair for \$2,460. The price of a child's ticket was \$2.50 and that of an adult was \$5.00. How many children attended the fair?
2. You mix a 10% acid solution with a 30% acid solution to get 10 liters of 15% acid solution. How many liters of 10% and 30% solution do you need to use?
3. How many liters of a 70% alcohol solution must be added to 50 liters of a 40% alcohol solution to produce a 50% alcohol solution?
4. How many ounces of pure water must be added to 50 ounces of a 15% saline solution to make a saline solution that is 10% salt?
5. Find the selling price per pound of a coffee mixture made from 8 pounds of coffee that sells for \$9.20 per pound and 12 pounds of coffee that costs \$5.50 per pound.
6. How many pounds of lima beans that cost \$0.90 per pound must be mixed with 16 pounds of corn that costs \$0.50 per pound to make a mixture of vegetables that costs \$0.65 per pound?
7. Two hundred liters of a punch that contains 35% fruit juice is mixed with 300 liters (L) of another punch. The resulting fruit punch is 20% fruit juice. Find the percent of fruit juice in the 300 liters of punch.
8. Ten grams of sugar are added to a 40-g serving of a breakfast cereal that is 30% sugar. What is the percent concentration of sugar in the resulting mixture?

ANSWERS :



Word Problems
Mixture Problems

1. 548 tickets were sold to the fair for \$2,460. The price of a child's ticket was \$2.50 and that of an adult was \$5.00. How many children attended the fair?

	Total \$	Ticket Price	Tickets Sold
Children	$2.50C$	\$2.50	C
Adults	$2,460 - 2.5C$	\$5.00	$548 - C$
Total	2,460	$=2,460/548 = \$4.49$	548

Equation 1:

$$2460 - 2.5C = 5(548 - C)$$

$$2460 - 2.5C = 2740 - 5C$$

$$5C - 2.5C = 2740 - 2460 = 280$$

$$2.5C = 280$$

$$C = 280/2.5 = 280 \times (2/5) = 56 \times 2 = 112 \text{ children}$$

2. You mix a 10% acid solution with a 30% acid solution to get 10 liters of 15% acid solution. How many liters of 10% and 30% solution do you need to use?

	Amount	Volume	Concentration
10% acid	0.1L	L	10%
30% acid	$1.5 - 0.1L$	$10 - L$	30%
Total	$=15\% \times 10 = 1.5$	10	15%

Equation 1:

$$1.5 - 0.1L = 0.3(10 - L)$$

$$1.5 - 0.1L = 3.0 - 0.3L$$

$$0.2L = 3.0 - 1.5 = 1.5$$

$$L = 1.5/0.2 = 7.5 \text{ liters of 10\% solution}$$

$$\text{The 30\% solution used will be } 10 \text{ liters} - 7.5 \text{ liters} = 2.5 \text{ liters}$$

3. How many liters of a 70% alcohol solution must be added to 50 liters of a 40% alcohol solution to produce a 50% alcohol solution?

	Amount	Volume	Concentration
70% alcohol	0.7X	X	70%
40% alcohol	$=50 \times 0.4 = 20 \text{ L}$	<u>50 L</u>	40%
Total	$20 + 0.7X$	$50 + X$	50%

Equation 1:

$$20 + 0.7X = 0.5(50 + X)$$

$$20 + 0.7X = 25 + 0.5X$$

$$0.7X - 0.5X = 25 - 20$$

$$0.2X = 5$$

$$X = 5/0.2 = \mathbf{25 \text{ liters}}$$
 of 70% solution added

4. How many ounces of pure water must be added to 50 ounces of a 15% saline solution to make a saline solution that is 10% salt?

	Amount	Volume	Concentration
Water(0% Solution)	0.0	X	0%
15% Solution	$=50 \times 0.15 = 7.5 \text{ oz.}$	<u>50 oz.</u>	15%
Total	7.5	$50 + X$	10%

Equation 1:

$$7.5 = 0.1(50 + X)$$

$$7.5 = 5.0 + 0.1X$$

$$0.1X = 7.5 - 5.0 = 2.5$$

$$X = 2.5/0.1 = \mathbf{25 \text{ oz. water}}$$

5. Find the selling price per pound of a coffee mixture made from 8 pounds of coffee that sells for \$9.20 per pound and 12 pounds of coffee that costs \$5.50 per pound.

	Total \$	Price	Amount
Coffee 1	\$73.60	\$9.20/lb.	8 lb.
Coffee 2	\$66.00	\$5.50/lb.	12 lb.
Total	\$139.60	P	20 lb.

Equation 1:

$$139.60 = 20P$$

$$P = 139.60/20 = \text{\$6.98 per lb.}$$

6. How many pounds of lima beans that cost \$0.90 per pound must be mixed with 16 pounds of corn that costs \$0.50 per pound to make a mixture of vegetables that costs \$0.65 per pound?

	Total \$	Price	Amount
Lima Beans	0.9X	\$0.90/lb.	X lb.
Corn	\$8.00	\$0.50/lb.	16 lb.
Total	8 + 0.9X	\$0.65	16 + X

Equation 1:

$$8 + 0.9X = 0.65(16 + X)$$

$$8 + 0.9X = 10.4 + 0.65X$$

$$0.9X - 0.65X = 10.4 - 8.0$$

$$0.25X = 2.4$$

$$X = 2.4/0.25 = \text{9.6 lb. of lima beans}$$

7. Two hundred liters of a punch that contains 35% fruit juice is mixed with 300 liters (L) of another punch. The resulting fruit punch is 20% fruit juice. Find the percent of fruit juice in the 300 liters of punch.

	Amount	Volume	Concentration
35% fruit juice	$= 200(0.35) = 70 \text{ L}$	200 L	35%
X% fruit juice	$= 300X \text{ L}$	300 L	X%
Total	$300X + 70$	500	20%

Equation 1:

$$300X + 70 = 0.2(500)$$

$$300X + 70 = 100$$

$$300X = 30$$

$$X = 30/300 = 0.1 = 10\% \text{ fruit juice}$$

8. Ten grams of sugar are added to a 40-g serving of a breakfast cereal that is 30% sugar. What is the percent concentration of sugar in the resulting mixture?

	Amount	Volume	Concentration
100% sugar	$= 10 \times 100\% = 10 \text{ g}$	10 g	100%
30% sugar	$= 40 \times 0.3 = 12 \text{ g}$	40 g	30%
Total	22g	50 g	X%

Equation 1:

$$22 = 50X$$

$$X = 22/50 = 44/100 = 44\% \text{ sugar}$$

KEY CONCEPTS:

Learn to setup and solve mixture problems ($\text{Amount} = \text{Volume} \times \text{Concentration}$ OR $\text{Total } \$ = \text{Price} \times \text{Amount}$). The approach is similar to $\text{Distance} = \text{Rate} \times \text{Time}$ in the format $A = B \times C$, but in this case the rows represent the different elements being mixed not the different vehicles or legs of the journey.

1. Identify the key equations to solve given the word problem.
2. It is often easiest to start by recording the information provided in a table where the columns reflect the underlying equation (varies depending on the question e.g. $\text{Amount} = \text{Volume} \times \text{Concentration}$) and the rows reflect the different elements being mixed. Typically there are two elements mixed and a "total" of 3 rows in each table.
3. Make sure all the units have been converted to a consistent set of units.
4. Solve for the desired variable.
5. ** Check your results by plugging back into the original equations to make sure they make sense. Calculations on mixture and similar problems are especially prone to errors.**