NAME _____ DATE _____ PERIOD _____

3-9 Weighted Averages *(Pages 171–177)*

Sometimes the numbers that go into an average do not all have the same weight or importance. In such cases, you may want to use a **weighted average**. Two applications of weighted averages are mixture problems and problems involving **uniform motion**, or motion at a constant rate or speed. The formula $distance = rate \cdot time$, or $d = rt$ is used to solve uniform motion problems.

Example

How much pure juice and 20% juice should you mix to make 4 quarts of 50% juice?

Let p = the amount of pure juice to be added. Then, make a table of the information.

	Quarts	*Amount of Juice*
Pure juice (100%)	p	100% of $p = 1 \cdot p$ or p
20% juice	$4 - p$	20% of $4 - p = 0.2(4 - p)$
50% juice	4	50% of $4 = 0.5 \cdot 4$ or 2

Next, write an equation with the expression for each amount of juice.

$$\begin{aligned} \text{pure juice} + 20\%\text{ juice} &= 50\%\text{ juice} \\ p + 0.2(4 - p) &= 2 \\ p + 0.8 - 0.2p &= 2 \\ (1 - 0.2)p + 0.8 &= 2 \\ 0.8p + 0.8 &= 2 \\ 0.8p &= 1.2 \\ p &= 1.5 \end{aligned}$$

You should mix 1.5 quarts of pure juice with $4 - 1.5$ or 2.5 quarts of 20% juice to obtain a 4 quart mixture that is 50% juice.

Practice

1. **Entertainment** Symphony tickets cost \$16 for adults and \$8 for students. A total of 634 tickets worth \$8432 were sold. Use the table to find how many adult and student tickets were sold.

	Number Sold	Price Per Ticket	Total Price
Adult Tickets	x		
Student Tickets	$634 - x$		

2. **Transportation** A truck and a jeep leave Melbourne, the truck heading east and the jeep heading west. The jeep is traveling 5 mph slower than the truck. In 3 hours, the vehicles are 465 miles apart. Draw a diagram of the situation and then use the table to find the speed of each vehicle. (*Hint:* eastbound distance + westbound distance = total distance apart.)

	Rate (mph)	Time (hours)	Distance (miles)
Truck	x	3	
Jeep		3	

3. **Standardized Test Practice** A group of twenty people bought popcorn at a movie. A regular popcorn cost \$2 and a large popcorn cost \$3. If the total bill for popcorn was \$49, how many bags of each size did they buy?

A 5 regular, 15 large
B 12 regular, 8 large
C 11 regular, 9 large
D 7 regular, 13 large

Answers: **1.** 420 adult; 214 student **2.** See Answer Key for diagram; truck: 80 mph, jeep: 75 mph **3.** C