Name _____   Date _____

Mixture Problems

A 25% vinegar solution is combined with triple the amount of a 45% vinegar solution and a 5% vinegar solution resulting in 20 milliliters of a 30% vinegar solution.

1. Determine an equation that models this situation, and explain what each part represents in the situation.

2. Solve the equation and find the amount of each of the solutions that were combined.

1. A 5-liter cleaning solution contains 30% bleach. A 3-liter cleaning solution contains 50% bleach. What percent of bleach is obtained by putting the two mixtures together?

2. A container is filled with 100 grams of bird feed that is 80% seed. How many grams of bird feed containing 5% seed must be added to get bird feed that is 40% seed?

3. A container is filled with 100 grams of bird feed that is 80% seed. Tom and Sally want to mix the 100 grams with bird feed that is 5% seed to get a mixture that is 40% seed. Tom wants to add 114 grams of the 5% seed, and Sally wants to add 115 grams of the 5% seed mix. What will be the percent of seed if Tom adds 114 grams? What will be the percent of seed if Sally adds 115 grams? How much do you think should be added to get 40% seed?

4. Jeanie likes mixing leftover salad dressings together to make new dressings. She combined 0.55 L of a 90% vinegar salad dressing with 0.45 L of another dressing to make 1 L of salad dressing that is 60% vinegar. What percent of the second salad dressing was vinegar?

5. Anna wants to make 30 mL of a 60% salt solution by mixing together a 72% salt solution and a 54% salt solution. How much of each solution must she use?

6. A mixed bag of candy is 25% chocolate bars and 75% other filler candy. Of the chocolate bars, 50% of them contains caramel. Of the other filler candy, 10% of them contain caramel. What percent of candy contains caramel?

7. A local fish market receives the daily catch of two local fishermen. The first fisherman's catch was 84% fish while the rest was other non-fish items. The second fisherman's catch was 76% fish while the rest was other non-fish items. If the fish market receives 75% of its catch from the first fisherman and 25% from the second, what was the percent of other non-fish items the local fish market bought from the fishermen altogether?

A 25% vinegar solution is combined with triple the amount of a 45% vinegar solution and a 5% vinegar solution resulting in 20 milliliters of a 30% vinegar solution.

1. Determine an equation that models this situation, and explain what each part represents in the situation.

   Let s represent the number of milliliters of the first vinegar solution.

   $$(0.25)(s) + (0.45)(3s) + (0.05)(20 - 4s) = (0.3)(20)$$

2. Solve the equation, and find the amount of each of the solutions that were combined.

   $$0.25s + 1.35s + 1 - 0.2s = 6$$
   $$1.6s - 0.2s + 1 = 6$$
   $$1.4s + 1 - 1 = 6 - 1$$
   $$1.4s \div 1.4 = 5 \div 1.4$$
   $$s \approx 3.57$$
   $$3s \approx 3(3.57) = 10.71$$

   $$20 - 4s \approx 20 - 4(3.57) = 5.72$$

   Around 3.57 mL of the 25% vinegar solution, 10.71 mL of the 45% vinegar solution and 5.72 mL of the 5% vinegar solution were combined to make 20 mL of the 30% vinegar solution.

1. A 5-liter cleaning solution contains 30% bleach. A 3-liter cleaning solution contains 50% bleach. What percent of bleach is obtained by putting the two mixtures together?

   Let x represent the percent of bleach in the resulting mixture.

   $$0.3(5) + 0.5(3) = x(8)$$
   $$1.5 + 1.5 = 8x$$
   $$3 \div 8 = 8x \div 8$$
   $$x = 0.375$$

   The percent of bleach in the resulting cleaning solution is 37.5%.

2. A container is filled with 100 grams of bird feed that is 80% seed. How many grams of bird feed containing 5% seed must be added to get bird feed that is 40% seed?

   Let x represent the amount of bird feed, in grams, to be added.

   $$0.8(100) + 0.05x = 0.4(100 + x)$$
   $$80 + 0.05x = 40 + 0.4x$$
   $$80 - 40 + 0.05x = 40 - 40 + 0.4x$$
   $$40 + 0.05x = 0.4x$$
   $$40 + 0.05x - 0.05x = 0.4x - 0.05x$$
   $$40 \div 0.35 = 0.35x \div 0.35$$
   $$x \approx 114.3$$

   About 114.3 grams of the bird seed containing 5% seed must be added.

3. A container is filled with 100 grams of bird feed that is 80% seed. Tom and Sally want to mix the 100 grams with bird feed that is 5% seed to get a mixture that is 40% seed. Tom wants to add 114 grams of the 5% seed, and Sally wants to add 115 grams of the 5% seed mix. What will be the percent of seed if Tom adds 114 grams? What will be the percent of seed if Sally adds 115 grams? How much do you think should be added to get 40% seed?

If Tom adds 114 grams, then let x be the percent of seed in his new mixture. $214x = 0.8(100) + 0.05(114)$. Solving, we get the following:

$$x = \frac{80 + 5.7}{214} = \frac{85.7}{214} \approx 0.4005 = 40.05\%.$$

If Sally adds 115 grams, then let y be the percent of seed in her new mixture. $215y = 0.8(100) + 0.05(115)$. Solving, we get the following:

$$y = \frac{80 + 5.75}{215} = \frac{85.75}{215} \approx 0.3988 = 39.88\%.$$

The amount to be added should be between 114 and 115 grams. It should probably be closer to 114 because 40.05% is closer to 40% than 39.88%.

4. Jeanie likes mixing leftover salad dressings together to make new dressings. She combined 0.55 L of a 90% vinegar salad dressing with 0.45 L of another dressing to make 1 L of salad dressing that is 60% vinegar. What percent of the second salad dressing was vinegar?

Let c represent the percent of vinegar in the second salad dressing.

$$0.55(0.9) + (0.45)(c) = 1(0.6)$$
$$0.495 + 0.45c = 0.6$$
$$0.495 - 0.495 + 0.45c = 0.6 - 0.495$$
$$0.45c = 0.105$$
$$0.45c \div 0.45 = 0.105 \div 0.45$$
$$c \approx 0.233$$

The second salad dressing was around 23% vinegar.

5. Anna wants to make 30 mL of a 60% salt solution by mixing together a 72% salt solution and a 54% salt solution. How much of each solution must she use?

Let s represent the amount, in milliliters, of the first salt solution.

$$0.72(s) + 0.54(30 - s) = 0.60(30)$$
$$0.72s + 16.2 - 0.54s = 18$$
$$0.18s + 16.2 = 18$$
$$0.18s + 16.2 - 16.2 = 18 - 16.2$$
$$0.18s = 1.8$$
$$s = 10$$

Anna needs 10 mL of the 72% solution and 20 mL of the 54% solution.

6. A mixed bag of candy is 25% chocolate bars and 75% other filler candy. Of the chocolate bars, 50% of them contain caramel. Of the other filler candy, 10% of them contain caramel. What percent of candy contains caramel?

Let c represent the percent of candy containing caramel in the mixed bag of candy.

$$0.25(0.50) + (0.75)(0.10) = 1(c)$$
$$0.125 + 0.075 = c$$
$$0.2 = c$$

In the mixed bag of candy, 20% of the candy contains caramel.

7. A local fish market receives the daily catch of two local fishermen. The first fisherman's catch was 84% fish while the rest was other non-fish items. The second fisherman's catch was 76% fish while the rest was other non-fish items. If the fish market receives 75% of its catch from the first fisherman and 25% from the second, what was the percent of other non-fish items the local fish market bought from the fishermen altogether?

Let n represent the percent of non-fish items of the total market items.

$$0.75(0.16) + 0.25(0.24) = n$$
$$0.12 + 0.06 = n$$
$$0.18 = n$$

The percent of non-fish items in the local fish market is 18%.