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This service is down for maintenance If the book you are trying to access can be found in the B.C. Open Collection, contact open@bccampus.ca for a PDF copy. Or, try entering the URL of your desired book into the Internet Archive at web.archive.org to look for an archived version. We're getting everything ready for you. The page is loading, and you'll be on your way in just a few moments. Thanks for your patience! Mixture problems are word problems where items or quantities of different values are mixed together. Sometimes different liquids are mixed together changing the concentration of the mixture as shown in example 1, example 2 and example 3. At other times, quantities of different costs are mixed together as shown in [example 4](#mix We recommend using a table to organize your information for mixture problems. Using a table allows you to think of one piece of information at a time instead of trying to handle the whole mixture problem at once. We will show you how it is done by the following examples of mixture problems: How To Solve Mixture Problems When We Are Adding To The Solution? Mixture Problems: Example 1: John has 20 ounces of a 20% of salt solution. How much salt should he add to make it a 25% solution? Solution: Set up a table for salt using the information from the question. Algebra Worksheets Practice your Algebra skills with the following worksheets: Printable & Online Algebra Worksheets Mixture Problems: Example 2: John has 20 ounces of a 20% of salt solution. How much water should he evaporate to make it a 3 0% solution? Solution: Set up a table for water. The water is removed from the original solution. Mixture Problems: Example 3: A tank has a capacity of 10 gallons. When it is full, it contains 15% alcohol. How many gallons must be replaced by an 80% alcohol solution to give 10 gallons of 70% solution? Solution: Set up a table for alcohol. The alcohol is replaced: an amount of 15% alcohol is removed and the same amount of 80% alcohol is added. Mixture Problems: Example 4: How many pounds of chocolate worth $1.20 a pound must be mixed with 10 pounds of chocolate worth 90 cents a pound to produce a mixture worth $1.00 a pound? Solution: Set up a table for the chocolates with different costs. Some word problems using systems of equations involve mixing two quantities with different prices. To solve mixture problems, knowledge of solving systems of equations. is necessary. Most often, these problems will have two variables, but more advanced problems have systems of equations with three variables. Other types of word problems using systems of equations include rate word problems and work word problems. How To Solve Acid Solution Problems? Example: The mad scientist has one solution that is 30% acid and another solution that is 18% acid. How much of each should he use to get 300 L of a solution that is 21% acid? Show Video Lesson Example: How much pure acid must be mixed with 200 mL of 5% acid to get a 25% acid? Show Video Lesson Try out our new and fun Fraction Concoction Game. Add and subtract fractions to make exciting fraction concoctions following a recipe. There are four levels of difficulty: Easy, medium, hard and insane. Practice the basics of fraction addition and subtraction or challenge yourself with the insane level. We welcome your feedback, comments and questions about this site or page. Please submit your feedback or enquiries via our Feedback page. Mixture problems and their solutions are presented along with their solutions. Percentages are also used to solve these types of problems. How many liters of \(20\% \) alcohol solution should be added to 40 liters of a \(50\% \) alcohol solution to make a \(30\% \) solution? Let \(x \) be the number of liters of the 20% alcohol solution to be added. Let \(y \) be the total quantity of the resulting 30% solution. Since we're adding \(x \) liters to 40 liters, we have: \[x + 40 = y \] Express the total amount of alcohol before and after mixing. The alcohol in the 20% solution is \(0.20x \), and in the 50% solution, it's \(0.50 \times 40 \). The total alcohol in the final mixture is \(0.30y \). So: \[0.20x + 0.50 \times 40 = 0.30y \] Substitute \(y = x + 40 \) into the equation: \[0.20x + 0.50 \times 40 = 0.30(x + 40) \] Simplify: \[0.20x + 20 = 0.30x + 12 \] Bring all terms to one side: \[0.20x - 0.30x + 20 - 12 = 0 \] \[-0.10x + 8 = 0 \] \[x = 80 \] 80 liters of 20% alcohol solution should be added to 40 liters of a 50% alcohol solution to make a 30% alcohol solution. John wants to make 100 ml of a 5% alcohol solution by mixing a quantity of a 2% alcohol solution with a 7% alcohol solution. What are the quantities of each of the two solutions (2% and 7%) he has to use? Let \(x \) and \(y \) be the quantities (in ml) of the 2% and 7% alcohol solutions, respectively. Then: \[x + y = 100 \tag{1} \] The amount of alcohol in \(x \) ml of 2% solution is \(0.02x \), and the amount in \(y \) ml of 7% solution is \(0.07y \). The total amount of alcohol in the final mixture is: \[0.02x + 0.07y = 0.05 \times 100 = 5 \tag{2} \] From equation (1), solve for \(y \): \[y = 100 - x \] Substitute into equation (2): \[0.02x + 0.07(100 - x) = 5 \] \[0.02x + 7 - 0.07x = 5 \] \[-0.05x + 7 = 5 \] \[-0.05x = -2 \] \[x = 40 \] Now substitute \(x = 40 \) into equation (1) to find \(y \): \[y = 100 - 40 = 60 \] John should mix 40 ml of the 2% solution with 60 ml of the 7% solution to obtain 100 ml of a 5% alcohol solution. Sterling Silver is 92.5% pure silver. How many grams of Sterling Silver must be mixed with a 90% Silver alloy to obtain 500 g of a 91% Silver alloy? Let \(x \) be the weight (in grams) of Sterling Silver (92.5%), and \(y \) be the weight (in grams) of the 90% silver alloy. We want to mix these to get 500 grams of a 91% silver alloy. So, the total mass equation is: \[x + y = 500 \] The pure silver content equation is: \[0.925x + 0.90y = 0.91 \times 500 \] Substitute \(y = 500 - x \) into the equation: \[0.925x + 0.90(500 - x) = 455 \] Now simplify: \[0.925x + 450 - 0.90x = 455 \] \[(0.925 - 0.90)x + 450 = 455 \] \[0.025x = 5 \] \[x = 200 \] \(200 \) grams of Sterling Silver is needed to make the 91% silver alloy. How many kilograms of pure water must be added to 100 kilograms of a 30% saline solution to obtain a 10% saline solution? Let \(x \) be the amount of pure water (in kilograms) to be added. Let \(y \) be the final weight of the 10% saline solution. So, \[x + 100 = y \] The salt content in the pure water is 0. The salt content in the original 30% solution is: \[0.30 \times 100 = 30 \text{ kg of salt} \] The final solution is a 10% saline solution, so the total amount of salt is also: \[0.10 \times y \] Equating the amount of salt: \[30 = 0.10 \times y \] Substitute \(y = x + 100 \) into the equation: \[30 = 0.10(x + 100) \] Multiply both sides by 10 to eliminate the decimal: \[300 = x + 100 \] Solve for \(x \): \[x = 200 \] \(200 \text{ kilograms} \) of pure water must be added. A 50 ml after-shave lotion at 30% alcohol is mixed with 30 ml of pure water. What is the percentage of alcohol in the new solution? The total volume of the final mixture is: \[50\ \text{ml} + 30\ \text{ml} = 80\ \text{ml} \] The amount of alcohol in pure water is 0 ml. The amount of alcohol in the after-shave lotion is: \[30\% \text{ of } 50\ \text{ml} = 0.30 \times 50 = 15\ \text{ml} \] Let \(x \) be the percentage of alcohol in the final solution. Then: \[x \times 80 = 15 \] Solving for \(x \): \[x = \frac{15}{80} = 0.1875 = 18.75\% \] The percentage of alcohol in the new solution is 18.75%. You add \(x \) ml of a 25% alcohol solution to 200 ml of a 10% alcohol solution to obtain another solution. a) Find the amount of alcohol in the final solution in terms of \(x \). b) Find the ratio, in terms of \(x \), of the alcohol in the final solution to the total amount of the solution. c) What do you think will happen if \(x \) is very large? d) Find \(x \) so that the final solution has a percentage of 15%. a) The amount of alcohol in the 200 ml of 10% solution is: \[200 \times 0.10 = 20 \text{ ml} \] The amount of alcohol in \(x \) ml of 25% solution is: \[0.25x \text{ ml} \] The total amount of alcohol in the final solution is: \[20 + 0.25x \] b) The total volume of the solution is: \[x + 200 \] - The ratio of alcohol in the final solution to the total amount of the solution is: \[r = \frac{20 + 0.25x}{x + 200} \] c) - As \(x \) becomes very large, the expression \[r = \frac{20 + 0.25x}{x + 200} \] \(r \) approaches 0.25 or 25%. This is because the 25% solution dominates, and the solution behaves like a 25% alcohol solution. (The horizontal asymptote of the rational function is 0.25.) d) To find \(x \) such that the final solution has 15% alcohol, set: \[\frac{20 + 0.25x}{x + 200} = 0.15 \] Solve the equation: \[20 + 0.25x = 0.15(x + 200) \] \[20 + 0.25x = 0.15x + 30 \] \[0.25x - 0.15x = 30 - 20 \] \[0.10x = 10 \] \[x = 100 \] \(x = 100 \) ml so that the final solution has a percentage of 15%. Mixture word problems involve combining two or more substances with different properties (such as concentration, price, or volume) to create a new mixture. These problems often require setting up and solving equations based on the given information. We recommend using a table to organize your information for mixture problems. Using a table allows you to think of one piece of information at a time instead of trying to handle the whole mixture problem at once. Removing From The Solution Example: John has 20 ounces of a 20% of salt solution. How much water should he evaporate to make it a 30% solution? Solution: Set up a table for water. The water is removed from the original. Algebra Worksheets Practice your Algebra skills with the following worksheets: Printable & Online Algebra Worksheets Mixture Problems Some word problems using systems of equations involve mixing two quantities with different prices. To solve mixture problems, knowledge of solving systems of equations. is necessary. Most often, these problems will have two variables, but more advanced problems have systems of equations with three variables. Other types of word problems using systems of equations include rate word problems and work word problems. Percent Mixture Problem #1 This video, explains using picture, how to solve this percent mixture problem using one variable: Example: How many pounds of dogfood that is 50% rice must be mixed with 400 pounds of dogfood that is 80% rice to make a dogfood that is 75% rice? Percent Mixture Problem #2 Example: Ten quarts of pure apple juice are added to 90 quarts of a fruit juice that is 10% pure apple juice. What is the percent concentration of pure apple juice in the resulting mixture? Show Step-by-step Solutions Percent Mixture Problem #3 How to solve percent mixture problem using one variable? Example: Five pounds of candy that is 20% chocolate is combined with a candy that is 40% chocolate. How many pounds of the candy that is 40% chocolate should be used to get a candy that is 25% chocolate? Show Step-by-step Solutions Percent Mixture Problem #4 Example: How much water should be added to 30 cups of juice that is 70% juice to get a diluted mixture that is only 60% juice? Show Step-by-step Solutions Try out our new and fun Fraction Concoction Game. Add and subtract fractions to make exciting fraction concoctions following a recipe. There are four levels of difficulty: Easy, medium, hard and insane. Practice the basics of fraction addition and subtraction or challenge yourself with the insane level. We welcome your feedback, comments and questions about this site or page. Please submit your feedback or enquiries via our Feedback page.