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Big Ideas Math Grade 7 Chapter 5 Ratios and Proportions Answer Sheet is presented here for the best practice of maths. All solutions along with the detailed explanations prepared by the math experts are included in the below sections. Students can quickly open Big Ideas Math Book Grade 7 Answer Key Chapter 5 Ratios and Proportions on our website and start preparation. You can also get a free pdf for Big Ideas Math Answers Grade 7 Chapter 5 Ratios and Proportions that helps you to prepare offline also. Big Ideas Math Book 7th Grade Answer Key Chapter 5 Ratios and Proportions It is very difficult to get the best answer key for the math problems. A trustable guide will clear explanation and short answers are provided that help you to learn perfectly and to improve your math skills. Get a clear idea of ratios and ratio tables, rates and unit rates, identifying proportional relationships, writing and solving proportions, graphs of proportional relationships, and scale drawings by practicing this chapter. Performance Task Lesson: 1 Ratios and Ratio Tables Lesson: 2 Rates and Unit Rates Lesson: 3 Identifying Proportional Relationships Lesson: 4 Writing and Solving Proportions Lesson: 5 Graphs of Proportional Relationships Lesson: 6 Scale Drawings Lesson 5.6 Scale Drawings Scale Drawings Homework & Practice 5.6 Chapter: 5 – Ratios and Proportions Ratios and Proportions STEAM Video/ Performance Task STEAM Video Painting a Large Room Shades of paint can be made by mixing other paints. What colors of paints can you mix to make green paint? Watch the STEAM Video "Painting a Large Room." Then answer the following questions. 1. Enid estimates that they need 2 gallons of paint to apply two coats to the wall shown. How many square feet does she expect \(\frac{1}{2}\) gallon of paint will cover? Answer: 1/2 gallon of paint will cover 60 sq feet. Explanation: Enid estimates that they need 2 gallons of paint to apply two coats to the wall of 240 sq ft The area of the shown figure = 24 x 10 = 240 square feet To know how many sq feet does 1/2 gallon of paint will cover (240 . 1/2) . 1/2 = 240 . 1/4 = 60 So, 1/2 gallon of paint will cover 60 sq feet. 2. Describe a room that requires 5\(\frac{1}{2}\) gallons of paint to apply one coat of paint to each of the four walls. Answer: The room has 4 walls each wall is 330 sq feet. Explanation: A room requires 5(1/2) gallons of paint to apply one coat of paint to each of the four walls. Enid estimates that they need 2 gallons of paint to apply two coats to the wall of 240 sq ft If they coat only once, she would require 1 gallon of paint for a wall of 240 sq feet. If she wants to use 5(1/2) = 11/2 gallons of paint, then the area of walls will be = 240 . (11/2) = 120 . 11 = 1320 Square feet Each wall = 1320/4 =330 sq feet The room has 4 walls each wall is 330 sq feet. Performance Task Mixing Paint After completing this chapter, you will be able to use the concepts you learned to answer the questions in the STEAM Video Performance Task. You will be given the amounts of each tint used to make different colors of paint. For example: You will be asked to solve various ratio problems about mixing paint. Given any color of paint, how can you make the paint slightly lighter in color? Ratios and Proportions Getting Ready for Chapter 5 Chapter Exploration The Meaning of a Word Rate When you rent snorkel gear at the beach, rate you should pay attention to the rental. The rental rate is in dollars per hour. 1. Work with a partner. Complete each step. • Match each description with a rate. • Match each rate with a fraction. • Give a reasonable value for each fraction. Then give an unreasonable value. 2. Work with a partner Describe a situation to which the given fraction can apply. Show how to rewrite each expression as a division problem. Then simplify and interpret your result. Vocabulary The following vocabulary terms are defined in this chapter. Think about what each term might mean and record your thoughts. proportional constant of proportionality scale drawing Lesson 5.1 Ratios and Ratio Tables EXPLORATION 1 Describing Ratio Relationships Work with a partner. Use the recipe shown. a. Identify several ratios in the recipe. b. You halve the recipe. Describe your ratio relationships in part (a) using the new quantities. Is the relationship between the ingredients the same as in part(a)? Explain. Answer: a. Stewed tomatoes : chicken broth = 9 ounces : 15 ounces Stewed tomatoes : Chopped Spinach = 9 ounces : 9 ounces = 1 : 1 Chopped Spinach : chicken broth = 9 ounces : 15 ounces Chopped Chicken : grated parmesan = 1 cup : 5 tablespoons Chicken broth : Chopped Chicken = 15 ounces : 1 cup Stewed tomatoes : chopped chicken = 9 ounces : 1 cup = Chopped Spinach : chopped chicken Stewed tomatoes : grated parmesan = 9 ounces : 5 tablespoons = Chopped Spinach : grated parmesan chicken broth : grated parmesan = 15 ounces : 5 tablespoons = 5 ounces : 1 tablespoon b. The relationship between the ingredients the same as in part(a). Explanation: a. The several ratios of the recipe are Stewed tomatoes : chicken broth = 9 ounces : 15 ounces Stewed tomatoes : Chopped Spinach = 9 ounces : 9 ounces = 1 : 1 Chopped Spinach : chicken broth = 9 ounces : 15 ounces Chopped Chicken : grated parmesan = 1 cup : 5 tablespoons Chicken broth : Chopped Chicken = 15 ounces : 1 cup Stewed tomatoes : chopped chicken = 9 ounces : 1 cup = Chopped Spinach : chopped chicken Stewed tomatoes : grated parmesan = 9 ounces : 5 tablespoons = Chopped Spinach : grated parmesan chicken broth : grated parmesan = 15 ounces : 5 tablespoons = 5 ounces : 1 tablespoon b. The relationship between the ingredients the same as in part(a). EXPLORATION 2 Completing Ratio Tables Work with a partner. Use the ratio tables shown. a. Complete the first ratio table using multiple operations. Use the same operations to complete the second ratio table. b. Are the ratios in the first table equivalent? the second table? Explain. c. Do the strategies for completing ratio tables of whole numbers work for completing ratio tables of fractions? Explain your reasoning. Answer: a. b. Yes Explanation: a. 5 x 2 = 10, 1 x 2 = 2, 1/4 x 2 = 1/2, 1/2 x 2 = 1 5 x 1.5 = 7.5, 1 x 1.5 = 1.5, 1/4 x 3/2 = 3/8, 1/2 x 3/2 = 3/4 5 x 4 = 20, 1 x 4 = 4, 1/4 x 4 = 1, 1/2 x 4= 2 b. Yes the ratios in the first table are equivalent to the second table. Try It Question 1. You mix \(\frac{2}{3}\) teaspoon of baking soda with 3 teaspoons of salt. Find and interpret the value of the ratio of baking soda to salt. Answer: The ratio of baking soda to salt is 2 : 1. Explanation: Given that, You mix \(\frac{2}{3}\) teaspoon of baking soda with 3 teaspoons of salt. The ratio of baking soda to salt = 2/3 to 3 = 2/3 : 3 = 2/3 / 3 = 2/3 . 3/1 = 2/1 = 2 : 1 The ratio of baking soda to salt is 2 : 1. Find the missing values in the ratio table. Then write the equivalent ratios. Question 2. Answer: Explanation: The missing values in the ratio table are 4 x 4 = 16. So, 5/2 x 4 = 10 5/2 . x = 5 x = 2 So, 4 . 2 = 8 The equivalent ratios are 5/2 : 4, 10 : 16, 5 : 8. Question 3. Answer: Explanation: 0.4 . x = 1.2 x = 1.2/0.4 = 3 So, 0.75 . 3 = 2.25 0.4 . y = 1.6 y = 1.6/0.4 = 4 So, 0.75 . 4 = 3 The equivalent ratios are 0.4 : 0.75, 1.2 : 2.25, 1.6 : 3 Self-Assessment for Concepts & Skills Solve each exercise. Then rate your understanding of the success criteria in your journal. Question 4. WRITING AND INTERPRETING RATIOS You include \(\frac{1}{2}\) tablespoon of essential oils in a solution for every 12 tablespoons of jojoba oil. Find and interpret the value of the ratio of jojoba oil to essential oils. Answer: The amount of jojoba oil in the solution is the 24th amount of essential oil. Explanation: You include \(\frac{1}{2}\) tablespoon of essential oils in a solution for every 12 tablespoons of jojoba oil The ratio of jojoba oil to essential oil = 12 : 1/2 = 12 ÷ 1/2 = 12 . 2/1 = 24 The amount of jojoba oil in the solution is the 24th amount of essential oil. Question 5. NUMBER SENSE Find the missing values in the ratio table. Then write the equivalent ratios. Answer: Explanation: 1/12 . x = 2/3 x = 2/3 . 12 x = 8 So, Pounds = 3/2 . 8 = 12 3/2 . 7 = 21/2 1/12 . 7 = 7/12 The equivalent ratios are 3/2 : 1/12, 12 : 2/3, 21/2 : 7/12 Self-Assessment for Problem Solving Solve each exercise. Then rate your understanding of the success criteria in your journal. Question 6. DIG DEEPER! A satellite orbiting Earth travels 14\(\frac{1}{2}\) miles every 3 seconds. How far does the satellite travel in \(\frac{3}{4}\) minute? Answer: The satellite travels 217(1/2) miles in 3/4 minutes. Explanation: A satellite orbiting Earth travels 14\(\frac{1}{2}\) miles every 3 seconds. So, it travels 14.5/3 miles = 29/6 miles in every 1 second 3/4 minutes = 3/4 . 60 = 45 seconds Therefore, it travels 45 . 29/6 miles in 3/4 minutes = 217(1/2) miles in 3/4 minutes. Hence, the satellite travels 217(1/2) miles in 3/4 minutes. Question 7. An engine runs on a mixture of 0.1 quart of oil for every 3.5 quarts of gasoline. You make 3 quarts of the mixture. How much oil and how much gasoline do you use? Answer: We use 0.083 quarts of oil and 2.917 quarts of gasoline. Explanation: The ratio of oil to gasoline = 0.1 : 3.5 = 1 : 35 use the ratio table to find an equivalent ratio in which the total mixture is 3 quarts. For 3 quarts mixture Oil required is 1/36 * 3 = 3/36 = 1/12 = 0.083 quarts Gasoline required is 35/36 * 3 = 35/12 = 2.917 quarts We use 0.083 quarts of oil and 2.917 quarts of gasoline. Ratios and Ratio Tables Homework & Practice 5.1 Review & Refresh Solve the inequality. Graph the solution. Question 1. 4p + 7 ≥ 19 Answer: p ≥ 3 Explanation: Given that, 4p + 7 ≥ 19 Subtract 7 from both sides 4p + 7 – 7 ≥ 19 – 7 4p ≥ 12 Divide both sides by 4 4p/4 ≥ 12/4 p ≥ 3 Question 2. 14 < – 6n – 10 Answer: -4 > n Explanation: Given that, 14 < – 6n – 10 Add 10 to both sides 14 + 10 < -6n – 10 + 10 24 < -6n Divide both sides by -6 24/-6 > -6n/-6 -4 > n Question 3. – 3(2 + d) ≤ 15 Answer: d ≥ -7 Explanation: Given that, – 3(2 + d) ≤ 15 Divide both sides by -3 – 3(2 + d)/-3 ≥ 15/-3 2 + d ≥ -5 d ≥ -5 – 2 d ≥ -7 Find the quotient. Write fractions in simplest form. Question 4. \(\frac{2}{9}\) ÷ \(\frac{4}{3}\) Answer: \(\frac{2}{9}\) ÷ \(\frac{4}{3}\) = 1/6 = 0.166 Explanation: \(\frac{2}{9}\) ÷ \(\frac{4}{3}\) = 2/9 . 3/4 = (2 . 3) / (9 . 4) = 1/6 Question 5. 10.08 ÷ 12 Answer: 10.08 ÷ 12 = 3024/25 = 120.96 Explanation: 10.08 ÷ 12 = 1008/100 ÷ 12 = 1008/100 . 12/1 = (1008 . 12)/100 = (100.8 . 3)/25 = 3024/25 = 120.96 Question 6. – \(\frac{5}{6}\) ÷ \(\frac{3}{10}\) = -25/9 = -2.7777 Answer: – \(\frac{5}{6}\) ÷ \(\frac{3}{10}\) Explanation: – \(\frac{5}{6}\) ÷ \(\frac{3}{10}\) = -5/6 . 10/3 = (-5 . 10)/(3 . 6) = -25/9 = -2.7777 Question 7. Which ratio can be represented by the tape diagram? A. 3 : 4 B. 4 : 5 C. 4 : 9 D. 8 : 12 Answer: D. 8 : 12 Explanation: Quantity 1 has 2 boxes, quantity 2 has 3 boxes. Out of all given ratios, 8 : 12 satisfy the condition The ratio of given quantity = 2 : 3 2 * 4 : 3 * 4 = 8 : 12 Concepts, Skills, & Problem Solving OPEN-ENDED Complete the ratio table using multiple operations. Are the ratios in the table equivalent? Explain. (See Exploration 2, p. 183.) Question 8. Answer: Explanation: 4 x 2 = 8, 10 2 = 20 8 x 2 = 16, 20 x 2 = 40 16/8 = 2, 40/8 = 5 The equivalent ratios are 4:10, 8:20, 16:40, 2:5. Question 9. Answer: Explanation: 4/5 x 10 = 8, 1/2 x 10 = 5 4/5 x 5 = 4, 1/2 x 5 = 5/2 4 x 1/25 = 4/25, 5/2 x 1/25 = 1/10 WRITING AND INTERPRETING RATIOS Find the ratio. Then find and interpret the value of the ratio. Question 10. club soda : white grape juice Answer: club soda : white grape juice = 2 : 1 Explanation: Club soda = 4 cups white grape juice = 2 cups club soda : white grape juice = 4 : 2 = 2 : 1 Question 11. mint leaves : chopped watermelon Answer: mint leaves : chopped watermelon = 1 : 6 Explanation: mint leaves = 1/2 cup chopped watermelon = 3 cups mint leaves : chopped watermelon = 1/2 : 3 = 1 : 3 x 2 = 1 : 6 Question 12. white grape juice to sugar Answer: white grape juice : sugar = 8 : 3 Explanation: white grape juice = 2 cups sugar=3/4 cup white grape juice : sugar = 2 : 3/4 = 2 x 4: 3 = 8 : 3 Question 13. lime juice to mint leaves Answer: lime juice to mint leaves is 3 : 2 Explanation: lime juice = 3/4 cup mint leaves = 1/2 cup lime juice to mint leaves = 3/4 : 1/2 = 3/2 : 1 = 3 : 2 Question 14. You have blue ribbon and red ribbon in the ratio \(\frac{1}{2}\) : \(\frac{1}{5}\) . Your friend finds the value of the ratio. Is your friend correct? Explain your reasoning. Answer: Wrong. Explanation: 1/2 : 1/5 = 1/2 ÷ 1/5 = 1/2 . 5/1 = 5/2 COMPLETING A RATIO TABLE Find the missing values in the ratio table. Then write the equivalent ratios. Question 15. Answer: Explanation: To find the missing values, 1/6 . x = 2/3 x = 2/3 . 6 x = 4 So, calories = 20 . 4 = 80 20 . y = 10 y = 10/20 = 1/2 Miles = 1/6 . 1/2 = 1/12 10 . z = 90 z = 90/10 z = 9 Miles = 1/12 . 9 = 3/4 The equivalent ratios are 20 : 1/6, 80 : 2/3, 10 : 1/12, 90 : 3/4 Question 16. Answer: Explanation: To find the missing values, 8/2 = 4 Minutes = 1/3/2 = 1/3 . 2 = 1/6 1/3 . x = 1/4 x = 1/4 . 3 = 3/4 Meters = 8 . 3/4 = 6 1/3 . y = 5/12 y = 5/12 . 3 = 5/4 Meters = 8 . 5/4 = 10 The equivalent ratios are 8 : 1/3, 4 : 2/3, 6 : 1/4, 10 : 5/12 Question 17. Answer: Explanation: To find the missing values, 1/2 . x = 1 x = 2 1/24 . 2 = 1/12 = Feet 1/24 . y = 1/8 y = 1/8 . 24 = 3 Inches = 1/2 . 3 = 3/2 1/2 . z = 1/4 z = 1/4 . 2 = 1/2 Feet = 1/24 . 1/2 = 1/48 The equivalent ratios are 1/24 : 1/2, 1/12 : 1, 1/8 : 3, 1/48 : 1/4 Question 18. Answer: Explanation: To find missing values, 1.5 . x = 1 x = 1/1.5 = 2/3 Tea = 3.75 . 2/3 = 2.5 1.5 . y = 3.5 y = 35/15 = 7/3 Tea = 3.75 . 7/3 = 8.75 1.5 . z = 2.5 z = 5/3 3.75 . 5/3 = 6.25 Question 19. CRITICAL THINKING Are the two statements equivalent? Explain your reasoning. The ratio of boys to girls is 2 to 3. The ratio of girls to boys is 3 to 2. Answer: Yes, both the statements are equivalent. Explanation: The ratio of boys to girls is 2 to 3. boys : girls = 2 : 3 The ratio of girls to boys is 3 to 2. girls : boys = 3 : 2 Question 20. MODELING REAL LIFE A city dumps plastic shade balls into a reservoir to prevent water from evaporating during a drought. It costs $5760 for 16,000 shade balls. How much does it cost for 12,000 shade balls? Answer: The cost for 12,000 shade balls is $4320 Explanation: It costs $5760 for 16,000 shade balls. The cost for 12,000 shade balls = (5760 x 12,000)/16000 = 69120/16 = 4320 So, the The cost for 12,000 shade balls is $4320 Question 21. MODELING REAL LIFE An oil spill spreads 25 square meters every \(\frac{1}{6}\) hour. What is the area of the oil spill after 2 hours? Answer: The area that the oil spill covers after 2 hours is 300 sq meters. Explanation: An oil spill spreads 25 square meters every 1/6 hour The unit rate = 25 ÷ 1/6 = 25 x 6 = 150 square meters per hour Every 1 hour spreads 150 square meters The area that the oil spill covers after 2 hours = 2 x 150 = 300 sq meters Question 22. MODELING REAL LIFE You mix 0.25 cup of juice concentrate for every 2 cups of water to make 18 cups of juice. How much juice concentrate do you use? How much water do you use? Answer: To make 18 cups of juice we use 16 cups of water and 2 cups of juice concentrate Explanation: The ratio between cups of water and cups of juice concentration is 2 to 1/4 The unit rate = 2 / 1/4 = 2 x 4 = 8 cups of water per cup of juice concentrate So, to make 9 cups of juice we use 8 cups of water and 1 cup of juice concentrate To make 18 cups of juice we use 16 cups of water and 2 cups of juice concentrate Question 23. A store sells 2\(\frac{1}{4}\) pounds of mulch for every 1\(\frac{1}{2}\) pounds of gravel sold. The store sells 180 pounds of mulch and gravel combined. How many pounds of each item does the store sell? Answer: Mulch = 108 pounds, gravel = 72 pounds Explanation: Let 2(1/4)x = 9/4 x be the amount of mulch so that 1(1/2)x = 3x/2 is the amount of gravel the store sell, both in pounds. Given that thestore sells a total of 180 pounds of mulch and gravel, we can write 9x/4 + 3x/2 = 180 9x + 6x = 180 x 4 15x = 720 x = 720/15 x = 48 So, the store sells 9/4(48) = 108 pounds of mulch and 3/2(48) = 72 pounds of gravel. Question 24. DIG DEEPER! You mix \(\frac{1}{4}\) cup of red paint for every \(\frac{1}{2}\) cup of blue paint to make 3 gallons of purple paint. a. How much red paint do you use? How much blue paint do you use? b. You decide that you want to make a lighter purple paint. You make the new mixture by adding \(\frac{1}{4}\) cup of white paint for every \(\frac{1}{4}\) cup of red paint and \(\frac{1}{2}\) cup of blue paint. How much red paint, blue paint, and white paint do you use to make 1\(\frac{1}{2}\) gallons of the lighter purple paint? Answer: a. We use 12 cups of red paint, 24 cups of blue paint b. white paint = 6 cups, red paint = 6 cups, blue paint = 12 cups. Explanation: You mix \(\frac{1}{4}\) cup of red paint for every \(\frac{1}{2}\) cup of blue paint to make 3 gallons of purple paint. a. The ratio of red paint to blue paint = 1/4 : 1/2 1/4x + 1/2x = (x + 2x)/4 = 3x/4 3x/4 = 3 x = 3 . 4/3 x = 4 cups 1 cup = 1/16 gallons So, 4 cups = 4/16 = 1/4 gallons 12 . 4 = 48 cups = 1/4 . 12 = 3 gallons So, 1/4(48) = 12 cups of red paint and 1/2(48) = 24 cups of blue paint is required to make 3 gallons b. You make the new mixture by adding \(\frac{1}{4}\) cup of white paint for every \(\frac{1}{4}\) cup of red paint and \(\frac{1}{2}\) cup of blue paint. (1/4 + 1/4 +1/2) = 1 1 cup = 1/16 gallons The total lighter purple paint = 1(1/2) = 3/2 gallons Total number of cups = (3/2) 16 = 24 white paint = 1/4 (24) = 6 cups red paint = 1/4 (24) = 6 cups blue paint = 1/2 (24) = 12 cups Lesson 5.2 Rates and Unit Rates EXPLORATION 1 Writing Rates Work with a partner. a. How many degrees does the minute hand on a clock move every 15 minutes? Write a rate that compares the number of degrees moved by the minute hand to the number of hours elapsed. b. Can you use the rate in part(a) to determine how many degrees the minute hand moves in \(\frac{1}{2}\) hour? Explain your reasoning. c. Write a rate that represents the number of degrees moved by the minute hand every hour. How can you use this rate to find the number of degrees moved by the minute hand in 2\(\frac{1}{2}\) hours? d. Draw a clock with hour and minute hands. Draw another clock that shows the time after the minute hand moves 900°. How many degrees does the hour hand move in this time? in one hour? Explain your reasoning. Try It Question 1. There is \(\frac{1}{4}\) gram of fat for every \(\frac{1}{3}\) tablespoon of powdered peanut butter. How many grams of fat are there for every tablespoon of the powder? Answer: We have 3/4 grams of fat for every tablespoon of the powder. Explanation: There is \(\frac{1}{4}\) gram of fat for every \(\frac{1}{3}\) tablespoon of powdered peanut butter. There are 1/4 / 1/3 = 1/4. 3 = 3/4 grams of fat for every tablespoon of the powder. Question 2. WHAT IF? The scientist later states that the iron travels 3 feet every 10 minutes. Does this change your answer in Example 2? Explain. Answer: The liquid iron travels about 432 feet in 1 day. Explanation: The iron travels 3 feet for every 10 minutes The ratio of feet to minutes is 3 : 10 Divide the quantity by 10 to get the unit rate per minute. Then multiply each quantity by 1440 to find the distance traveled in 24 hours. So, the liquid iron travels about 432 feet in 1 day. Self-Assessment for Concepts & Skills Solve each exercise. Then rate your understanding of the success criteria in your journal. Question 3. VOCABULARY How can you tell when a rate is a unit rate? Answer: A unit rate is described as hoe many units of the first type of quantity corresponds to one unit of the second type of quantity. When the denominator is 1, then you can say that that rate is a unit rate. Few examples of unit rate are m/sec, feet/hour. Question 4. WRITING Explain why rates are usually written as unit rates. Answer: Generally, a rate is a ratio of two quantities. Rates are usually written as unit rates because they are easier to read, easier to understand and easier to compare. Find the unit rate. Question 5. $1.32 for 12 ounces Answer: $0.11 for 1 ounce Explanation: $1.32 for 12 ounces = 1.32 : 12 = 1.32/12 : 12/12 = 0.11 : 1 Question 6. \(\frac{1}{4}\) gallon for every \(\frac{3}{10}\) mile Answer: 5/6 gallon for every 1 mile Explanation: \(\frac{1}{4}\) gallon for every \(\frac{3}{10}\) mile = 1/4 : 3/10 = 1/4 x 10/3 : 3/10 x 10/3 = 5/6 : 1 Question 7. USING TOOLS Find the missing values in the ratio table. Then write the unit rate of grams per cup and the unit rate of cups per gram. Answer: The unit rate of grams per cup = 15/4 : 1 The unit rate of cups per gram = 1 : 4/15 Explanation: 2/3 . x = 1/6 x = 1/6 . 3/2 = 1/4 1/4 . 5/2 = 5/8 = grams 5/2 . y = 1 y = 1 . 2/5 = 2/5 2/3 . 2/5 = 4/15 = cups 5/2 . 3/2 = 15/4 So, 2/3 . 3/2 = 1 = cups 2/3 . z = 4 z = 4 . 3/2 = 6 So, 5/2 . 6 = 15 grams: cups = 5/2 : 2/3 The unit rate of grams per cup = 5/2 . 3/2 : 1 = 15/4 : 1 cups : grams = 4/15 : 1 Self-Assessment for Problem Solving Solve each exercise. Then rate your understanding of the success criteria in your journal. Question 8. Two people compete in a five-mile go-kart race. Person A travels \(\frac{1}{10}\) mile every 15 seconds. Person B travels \(\frac{3}{8}\) mile every 48 seconds. Who wins the race? What is the difference of the finish times of the competitors? Answer: Person B wins the race. The difference of the finish times of the competitors = 1.833 minutes Explanation: Two people compete in a five-mile go-kart race. Person A travels 1/10 miles for 15 seconds = 1/10 : 15 Person A unit rate = 1/150 : 1 It means, A travels 1/150 miles per1 second So, person A completes the race in 5 x 150 = 750 seconds = 750/60 = 12.5 minutes Person B travels 3/8 mile for 48 seconds = 3/8 : 48 Person B unit rate = 3/384 : 1 It means B travels 3/384 miles in 1 second. So, person B completes the race in 5 . (384/3) = 1920/3 = 640 = 640/60 = 10.666 minutes Hence, person B wins the race. The difference of the finish times of the competitors = 12.5 – 10.66 = 1.8333 minutes Question 9. DIG DEEPER! A bus travels 0.8 mile east every 45 seconds. A second bus travels 0.55 mile west every 30 seconds. The buses start at the same location. Use two methods to determine how far apart the buses are after 15 minutes. Explain your reasoning. Answer: Two buses are 1/2 mile apart after 15 minutes. Explanation: A bus travels 0.8 mile east every 45 seconds = 0.8 : 45 The unit rate = 0.8/45 : 1 A second bus travels 0.55 mile west every 30 seconds = 0.55 : 30 The unit rate = 0.55/30 : 1 Find how much distance, busses travelled after 15 minutes = 15 x 60 = 900 seconds First bus travels (0.8/45) x 900 = 16 miles Second bus travels (0.55/30) x 900 = 16.5 miles The difference in their distances = 16.5 – 16 = 1/2 mile Rates and Unit Rates Homework & Practice 5.2 Review & Refresh Find the missing values in the ratio table. Then write the equivalent ratios. Question 1. Answer: The equivalent ratios are 3/4 : 1/3, 3/2 : 2/3, 3 : 3/4, 1 : 4/9 Explanation: To find the missing values, 1/3 . x = 2/3 x = 2 3/4 . 2 = 3/2 = flour 3/4 . y = 3 y = 4 1/3 . 4 = 4/3 = oats1 3/4 . z = 1 z = 4/3 4/3 . 1/3 = 4/9 = oats2 The equivalent ratios are 3/4 : 1/3, 3/2 : 2/3, 3 : 3/4, 1 : 4/9 Question 2. Answer: The equivalent ratios are 1/4 : 1/2, 3/4 : 3/2, 3/2 : 3, 5 : 10 Explanation: To find the missing values, 1/4 . x = 3/4 x = 3 1/2 . 3 = 3/2 = minutes1 1/2 . y = 3 y = 6 1/4 . 6 = 3/2 = pages 1/4 . z = 5 z = 20 1/2 . 20 = 10 = minutes 2 The equivalent ratios are 1/4 : 1/2, 3/4 : 3/2, 3/2 : 3, 5 : 10 Copy and complete the statement using , or =. Question 3. Answer: 9/2 > 8/3 Explanation: 9/2 = 4.5 8/3 = 2.6666 So, 9/2 > 8/3 Question 4. Answer: -8/15 < 10/18 Explanation: -8/15 = -0.5333 10/18 = 0.555 So, -8/15 < 10/18 Question 5. Answer: -6/24 = -2/8 Explanation: -6/24 = -0.25 -2/8 = -0.25 So, -6/24 = -2/8 Concepts, Skills, & Problem Solving WRITING RATES Find the number of degrees moved by the minute hand of a clock in the given amount of time. Explain your reasoning. (See Exploration 1, p. 189.) Question 6. \(\frac{2}{3}\) hour Answer: 240 degrees. Explanation: The minute hand passes through 60 minutes (= 360 degrees) in 1 hour. In 2/3 hours it passes through 2/3 * 360 = 240 degrees. Question 7. \(\frac{7}{12}\) hour Answer: 210 degrees Explanation: The minute hand passes through 60 minutes (= 360 degrees) in 1 hour. In 7/12 hours it passes through 7/12 * 360 = 210 degrees Question 8. 1\(\frac{1}{4}\) hours Answer: 450 degrees = (360 + 90) degrees Explanation: The minute hand passes through 60 minutes (= 360 degrees) in 1 hour. In 1(1/4) = 5/4 hours it passes through 5/4 * 360 = 450 degrees FINDING UNIT RATES Find the unit rate. Question 9. 180 miles in 3 hours Answer: 6 miles per 1 hour Explanation: 180 miles in 3 hours = 18 : 3 The unit rate is 18/3 : 1 = 6 : 1 Question 10. 256 miles per 8 gallons Answer: 32 miles per 1 gallon Explanation: 256 miles per 8 gallons = 256 : 8 The unit rate is 256/8 : 1 = 32 : 1 Question 11. \(\frac{1}{2}\) pound : 5 days Answer: 1/10 pounds for 1 day Explanation: \(\frac{1}{2}\) pound : 5 days = 1/2 : 5 The unit rate is 1/2/5 : 1 = 1/10 : 1 Question 12. 4 grams for every \(\frac{3}{4}\) serving Answer: 16/3 grams per serving Explanation: 4 grams for every \(\frac{3}{4}\) serving = 4 : 3/4 The unit rate is = 4 x (4/3) : 1 = 16/3 : 1 Question 13. $9.60 for 4 pounds Answer: $2.4 per 1 pound Explanation: $9.60 for 4 pounds = 9.60 : 4 The unit rate is 9.60/4 : 1 = 2.4 : 1 Question 14. $4.80 for 6 cans Answer: $0.8 per 1 can Explanation: $4.80 for 6 cans = 4.80 : 6 The unit rate is 4.80/6 : 1 = 0.8 : 1 Question 15. 297 words in 5.5 minutes Answer: 54 words in 1 minute Explanation: 297 words in 5.5 minutes = 297 : 5.5 The unit rate is 297/5.5 : 1 = 54 : 1 Question 16. \(\frac{1}{3}\) kilogram: \(\frac{2}{3}\) foot Answer: 1/2 kilogram per 1 foot Explanation: \(\frac{1}{3}\) kilogram: \(\frac{2}{3}\) foot = 1/3 : 2/3 The unit rate is 1/3 x (3/2) : 1 = 1/2 : 1 Question 17. \(\frac{5}{8}\) ounce per \(\frac{1}{4}\) pint Answer: 5/2 ounce per 1 pint Explanation: \(\frac{5}{8}\) ounce per \(\frac{1}{4}\) pint = 5/8 : 1/4 The unit rate is 5/8 x 4 : 1 = 5/2 : 1 Question 18. 21\(\frac{3}{4}\) meters in 2\(\frac{1}{2}\) hours Answer: 87 meters in 1 hour Explanation: 21\(\frac{3}{4}\) meters in 2\(\frac{1}{2}\) hours = 21(3/4) : 2(1/2) = 87/4 : 5/2 The unit rate is 87/4 x (2/5) : 1 = 87/10 : 1 USING TOOLS Find the missing values in the ratio table. Then write the equivalent ratios. Question 19. Answer: The equivalent ratios are 25 : 1/3, 50 : 2/3, 75 : 1, 100 : 4/3 Explanation: To find the missing values, 25 . x = 50 x = 50/25 = 2 1/3 . 2 = 2/3 = servings 1/3 . y = 1 y = 3 25 . 3 = 75 = calories1 1/3 . z = 4/3 z = 4 25 . 4 = 100 = calories2 The equivalent ratios are 25 : 1/3, 50 : 2/3, 75 : 1, 100 : 4/3 Question 20. Answer: The equivalent ratios are 4 : 3/4, 4/3 : 1/4, 16/3 : 1, 16 : 3 Explanation: To find the missing values, 4x = 4/3 x = 1/3 3/4 . 1/3 = 1/4 = time1 3/4 y = 1 y = 4/3 4 . 4/3 = 16/3 = oxygen 4z = 16 z = 16/4 = 4 3/4 . 4 = 3 = time2 The equivalent ratios are 4 : 3/4, 4/3 : 1/4, 16/3 : 1, 16 : 3 Question 21. PROBLEM SOLVING In January 2012, the U.S.population was about 313 million people. In January 2017, it was about 324 million. What was the average rate of population change per year? Answer: The average rate of population change per year = 2.2 million Explanation: In January 2012, the U.S.population was about 313 million people In January 2017, it was about 324 million After 5 years, the population change = 324 – 313 = 11 million The average rate of population change per year = 11/5 = 2.2 million Question 22. MODELING REAL LIFE You can sand \(\frac{4}{9}\) square yard of wood in \(\frac{1}{2}\) hour. How many square yards can you sand in 3.2 hours? Justify your answer. Answer: 128/45 square yards can you sand in 3.2 hours. Explanation: You can sand \(\frac{4}{9}\) square yard of wood in \(\frac{1}{2}\) hour In 3.2 hours, you can sand 4/9 x 3.2 x 2 sq yads = 25.6/9 = 128/45 So, 128/45 square yards can you sand in 3.2 hours. Question 23. REASONING Tell whether the rates are equivalent. Justify your answer. Question 23. 75 pounds per 1.5 years 38.4 ounces per 0.75 year Answer: Rates are not equivalent. Explanation: 75 pounds per 1.5 years = 75 : 1.5 = 750/15 = 50 38.4 ounces per 0.75 year = 38.4 : 0.75 = 384 : 7.5 = 51.2 So, rates are not equivalent Question 24. 7\(\frac{1}{2}\) miles for every \(\frac{3}{4}\) hour \(\frac{1}{2}\) mile for every 3 minutes Answer: Rates are not equivalent. Explanation: 7\(\frac{1}{2}\) miles for every \(\frac{3}{4}\) hour = 7(1/2) : 3/4 = 15/2 : 3/4 = 15/2 . 4/3 = 10 \(\frac{1}{2}\) mile for every 3 minutes = 1/2 : 3 = 1 : 6 So, rates are not equivalent Question 25. PROBLEM SOLVING The table shows nutritional information for three beverages. a. Which has the most calories per fluid ounce? b. Which has the least sodium per fluid ounce? Answer: a. whole milk has the most calories per fluid ounce b. Oange juice has the least sodium per fluid ounce. Explanation: a. Convert serving size to fluid ounce Whole Milk = 1 c = 8 fl oz Orange juice = 1 pt = 16 fl oz Whole milk = 146 : 8 = 146/8 : 1 = 18.25 There are 18.25 calories in 1 fluid ounce of Whole Milk. Orange juice = 210 : 16 = 210/16 : 1 = 13.125 There are 13.125 calories in 1 fluid ounce of Orange Juice. Apple juice = 351 : 24 = 351/24 : 1 There are 14.625 calories in 1 fluid ounce of Apple Juice. So, whole milk has the most calories per fluid ounce b. Whole milk = 98 : 8 = 98/8 : 1 = 12.25 Orange juice = 10 : 16 = 10/16 : 1 = 0.625 Apple juice = 21 : 24 = 21/24 : 1 = 0.875 So, orange juice has the least sodium per fluid ounce. Question 26. MODELING REAL LIFE A shuttle leaving Earth's atmosphere travels 15 miles every 2 seconds. When entering the Earth's atmosphere, the shuttle travels 2\(\frac{3}{8}\) miles per \(\frac{1}{2}\) second. Find the difference in the distances traveled after 15 seconds when leaving and entering the atmosphere. Answer: The difference in the distances traveled is 2503 miles. Explanation: A shuttle leaving Earth's atmosphere travels 15 miles every 2 seconds. = 15 : 2 = 15/2 : 1 = 7.5 miles for every second When entering the Earth's atmosphere, the shuttle travels 2\(\frac{3}{8}\) miles per \(\frac{1}{2}\) second = 2(3/8) : /2 = 19/8 : 1/2 = 19/8 . 2 = 19/4 = 4.75 miles per second After 15 minutes = 15 x 60 = 900 seconds, A shuttle leaving Earth's atmosphere travels = 7.5 x 900 = 6750 miles When entering the Earth's atmosphere, the shuttle travels = 4.75 x 900 = 4247 miles The difference in the distances traveled = 6750 – 4247 = 2503 miles Question 27. RESEARCH Fire hydrants are one of four different colors to indicate the rate at which water comes from the hydrant. a. Use the Internet to find the ranges of rates indicated by each color. b. Research why a fire fighter needs to know the rate at which water comes out of a hydrant. Answer: a. Blue – 1500 or more gallons per minute Green – 1000 to 1499 gallons per minute Red – Less than 500 gallons per minute Orange – 500 to 999 gallons per minute b. Fire hydrants are flow-tested at a residual pressure of 20 psi. Therefore, firefighters should understand the typical flow rates of fire hydrants at a pressure. They should not expect that the fire hydrant will be supplied at an increased pressure, resulting in a greater flow rate. Explanation: a. Blue – 1500 or more gallons per minute Green – 1000 to 1499 gallons per minute Red – Less than 500 gallons per minute Orange – 500 to 999 gallons per minute Question 28. DIG DEEPER! You and a friend start riding bikes toward each other from opposite ends of a 24-mile biking route. You ride 2\(\frac{1}{6}\) miles every \(\frac{1}{4}\) hour. Your friend rides 7\(\frac{1}{3}\) miles per hour. a. After how many hours do you meet? b. When you meet, who has traveled farther? How much farther? Answer: a. They meet after 1(1/2) hour. b. You have traveled farther 2 miles. Explanation: You ride 2\(\frac{1}{6}\) miles every \(\frac{1}{4}\) hour. = 2(1/6) : 1/4 = 13/6 : 1/4 = 13/6 . 4 = (13 . 2)/3 = 26/3 : 1 Your friend rides 7\(\frac{1}{3}\) miles per hour. = 7(1/3) : 1 = 22/3 : 1 After 1 hour, you traveled = 26/3 miles, your friend traveled 22/3 miles = 26/

6x = 9 . 5 6x = 45 x = 45/6 x = 15/2 Question 17. DIFFERENT WORDS, SAME QUESTION Which is different? Find “both” answers. Answer: Solve 12/x = 3/8 is different, x = 32 For remaining x = 2 Explanation: 3/x = 12/8 3 • 8 = 12x 24 = 12x x = 2 3 : x and 12 : 8 are equivalent 3/x = 12/8 So, x = 2 3 : 12 and x : 8 are equivalent 3/12 = x/8 3 • 8 = 12x x = 2 12/x = 3/8 12 • 8 = 3x 3x= 96 x = 96/3 = 32 Self-Assessment for Problem Solving Solve each exercise. Then rate your understanding of the success criteria in your journal. Question 18. You burn 35 calories every 3 minutes running on a treadmill. You want to run for at least 15 minutes, but no more than 30 minutes. What are the possible numbers of calories that you will burn? Justify your answer. Answer: The possible number of calories burned in between 560/3 and 350. Explanation: You burn 35 calories every 3 minutes running on a treadmill. 35 : 3 = 35/3 : 1 You want to run for at least 15 minutes, but no more than 30 minutes means you want to run in between 16 and 30 minutes If you run for 16 minutes then, the number of calories burn = (35/3) x 16 = 560/3 If you run for 30 minutes, then the number of calories burn = (35/3) x 30 = 1050/3 = 350 So, the possible number of calories burned in between 560/3 and 350. Question 19. DIG DEEPER! Two boats travel at the same speed to different destinations. Boat A reaches its destination in 12 minutes. Boat B reaches its destination in 18 minutes. Boat B travels 3 miles farther than Boat A. How fast do the boats travel? Justify your answer. Answer: The boat travels with 1/2 mile/hr. Explanation: Boat A reaches its destination in 12 minutes Boat B reaches its destination in 18 minutes Let us take the speed as x miles/minute So, Boat A travels 12x miles Boat B travels 18x miles Boat B travels 3 miles farther than Boat A 18x + 3 = 12x 18x – 12x = -3 6x = -3 x = 3/6 x = 1/2 mile/hr So, the boat travels with 1/2 mile/hr Writing and Solving Proportions Homework & Practice 5.4 Review & Refresh Tell whether and are proportional. Question 1. Answer: x and y are not proportional. Explanation: Compare the values of the ratios x to y 4/6 = 2/3 6/8 = 3/4 8/10 = 4/5 The values of the ratios are not equivalent So, x and y are not proportional. Question 2. Answer: x and y are proportional. Explanation: Compare the values of the ratios x to y 2/5/3 = 2/15 4/5/6 = 2/15 4/30 = 2/15 The values of the ratios are equivalent So, x and y are proportional. Plot the ordered pair in a coordinate plane. Question 3. A (- 5, – 2) Answer: Explanation: In point A (- 5, – 2) The x coordinate and y coordinate values are negative. so, the point lies in 3rd quadrant. Take 5 units on the x-axis, 2 units on the y-axis, and locate the point. Question 4. B (- 3, 0) Answer: Explanation: In the point B (- 3, 0) The x coordinate, y coordinates are negative and zero. So, the point lies in the x-axis. Question 5. C (- 1, 2) Answer: Explanation: In point C (- 1, 2) has x coordinate negative value and y coordinate positive value. so, the point lies in the 2nd quadrant. Take -1 units on the x-axis, 2 units on the y-axis, and mark the point. Question 6. D (1, 4) Answer: Explanation: In point D (1, 4) the x, y coordinates are positive. So, the point lies in quadrant 1. Take 1 unit on the x-axis, 4 units on the y-axis, and mark the point. Question 7. Which expression is equivalent to (3w – 8) – 4(2w + 3)? A. 11w + 4 B. – 5w – 5 C. – 5w + 4 D. – 5w – 20 Answer: D. – 5w – 20 Explanation: (3w – 8) – 4(2w + 3) = 3w – 8 – 8w – 12 = -5w -20 Concepts, Skills, & Problem Solving SOLVING A RATIO PROBLEM Determine how far the vehicle travels in 3 hours. (See Exploration 1, p. 203.) Question 8. A helicopter travels 240 miles every 2 hours. Answer: The helicopter travels 360 miles in 3 hours. Explanation: A helicopter travels 240 miles every 2 hours = 240 : 2 = 240/2 : 1 = 120 : 1 The helicopter travels 120 miles in 1 hour The distance traveled by the vehicle in 3 hours = 120 * 3 = 360 miles Question 9. A motorcycle travels 25 miles every 0.5 hour. Answer: A motorcycle travels 150 miles in 3 hours. Explanation: A motorcycle travels 25 miles every 0.5 hour = 25 : 0.5 = 25/0.5 : 1 = 50 : 1 The motorcycle travels 50 miles in 1 hour So, the distance traveled by the vehicle in 3 hours = 50 * 3 = 150 miles Question 10. A train travels 10 miles every \(\frac{1}{4}\) hour. Answer: A train travels 120 miles in 3 hours. Explanation: A train travels 10 miles every \(\frac{1}{4}\) hour = 10 : 1/4 = 4 * 10 : 1 = 40 : 1 A train travels 40 miles in 1 hour So, the distance traveled by the vehicle in 3 hours = 40 * 3 = 120 miles Question 11. A ferry travels 45 miles every 1\(\frac{1}{2}\) hours. Answer: A ferry travels 90 miles in 3 hours Explanation: A ferry travels 45 miles every 1\(\frac{1}{2}\) hours = 45 : 1(1/2) = 45 : 3/2 = 45 * 2 : 3 = 90 : 3 = 30 : 1 A ferry travels 30 miles in 1 hour So, the distance traveled by the vehicle in 3 hours = 30 * 3 = 90 SOLVING A PROPORTION Solve the proportion. Explain your choice of method. Question 12. \(\frac{1}{4}=\frac{z}{20}\) Answer: z = 5 Explanation: \(\frac{1}{4}=\frac{z}{20}\) Cross multiply the fractions 20 = 4z z = 20/4 z = 5 Question 13. \(\frac{3}{4}=\frac{12}{y}\) Answer: y = 16 Explanation: \(\frac{3}{4}=\frac{12}{y}\) The product of 3 and 4 is 12, multiply the denominator by 4 to find y 4 * 4 = 16 So, y = 16 Question 14. \(\frac{35}{k}=\frac{7}{3}\) Answer: k = 15 Explanation: \(\frac{35}{k}=\frac{7}{3}\) Divide both sides by 35 (35/k)/35 = (7/3)/35 1/k = 1/15 k = 15 Question 15. \(\frac{b}{36}=\frac{5}{9}\) Answer: b = 20 Explanation: \(\frac{b}{36}=\frac{5}{9}\) Cross multiply the proportions 9b = 5 * 36 9b = 180 b = 180/9 b = 20 Question 16. \(\frac{x}{8}=\frac{3}{12}\) Answer: x = 2 Explanation: \(\frac{x}{8}=\frac{3}{12}\) Cross multiply the fractions 12x = 3 * 8 12x = 24 x = 24/12 x = 2 Question 17. \(\frac{3}{4}=\frac{v}{14}\) Answer: v = 21/2 Explanation: \(\frac{3}{4}=\frac{v}{14}\) Cross multiply the fractions 3 * 14 = 4v 42 = 4v v = 42/4 v = 21/2 Question 18. \(\frac{15}{8}=\frac{45}{c}\) Answer: c = 24 Explanation: \(\frac{15}{8}=\frac{45}{c}\) Cross multiply the fractions 15c = 45 * 8 15c = 360 c = 360/15 c = 24 Question 19. \(\frac{35}{28}=\frac{n}{12}\) Answer: n = 15 Explanation: \(\frac{35}{28}=\frac{n}{12}\) Cross multiply the fractions 35 * 12 = 28n 420 = 28n n = 420/28 n = 15 Question 20. \(\frac{a}{6}=\frac{15}{2}\) Answer: a = 45 Explanation: \(\frac{a}{6}=\frac{15}{2}\) Cross multiply the fractions 2a = 15 * 6 2a = 90 a = 90/2 a = 45 Question 21. \(\frac{y}{9}=\frac{44}{54}\) Answer: y = 22/3 Explanation: \(\frac{y}{9}=\frac{44}{54}\) Cross multiply the fractions 54y = 44 * 9 54y = 396 y = 396/54 y = 22/3 Question 22. \(\frac{4}{24}=\frac{c}{36}\) Answer: c = 6 Explanation: \(\frac{4}{24}=\frac{c}{36}\) Cross multiply the fractions 4 * 36 = 24c 144 = 24c c = 144/24 c = 6 Question 23. \(\frac{20}{16}=\frac{d}{12}\) Answer: d = 15 Explanation: \(\frac{20}{16}=\frac{d}{12}\) Cross multiply the fractions 20 * 12 = 16d 240 = 16d d = 240/16 d = 15 Question 24. \(\frac{10}{7}=\frac{8}{k}\) Answer: k = 5.6 Explanation: Cross multiply the fractions 10k = 8 * 7 10k = 56 k = 56/10 k = 5.6 Question 25. \(\frac{5}{n}=\frac{16}{32}\) Answer: n = 10 Explanation: \(\frac{5}{n}=\frac{16}{32}\) Cross multiply the fractions 5 * 32 = 16n 160 = 16n n = 160/16 n = 10 Question 26. \(\frac{9}{10}=\frac{d}{6.4}\) Answer: d = 5.76 Explanation: \(\frac{9}{10}=\frac{d}{6.4}\) Cross multiply the fractions 10d = 6.4 * 9 10d = 57.6 d = 57.6/10 d = 5.76 Question 27. \(\frac{2.4}{1.8}=\frac{7.2}{k}\) Answer: k = 5.4 Explanation: \(\frac{2.4}{1.8}=\frac{7.2}{k}\) Cross multiply the fractions 2.4k = 7.2 * 1.8 2.4k = 12.96 k = 12.96/2.4 k = 5.4 Question 28. YOU BE THE TEACHER Your friend solves the proportion \(\frac{m}{8}=\frac{15}{24}\). Is your friend correct? Explain your reasoning. Answer: Correct Explanation: m/8 = 15/24 Cross multiply the fractions 24m = 15 * 8 24m = 120 m = 120/24 m = 5 Question 29. NUMBER SENSE Without solving, determine whether \(\frac{x}{4}=\frac{15}{3}\) and \(\frac{x}{15}=\frac{4}{3}\) have the same solution. Explain your reasoning. Answer: Both have same solution. Explanation: \(\frac{x}{4}=\frac{15}{3}[/latex Cross multiply the fractions 3x = 15 * 4 [latex]\frac{x}{15}=\frac{4}{3}\) Cross multiply the fractions 3x = 4 * 15 We got same equation So, both have same solution. WRITING A PROPORTION Use the table to write a proportion. Question 30. Answer: 6/7 = 18/w, w = 6 Explanation: 12/14 = 18/w Cross multiply the fractions 12w = 18 * 4 w = 72/12 w = 6 12/14 = 18/w 6/7 = 18/w Question 31. Answer: n/85 = 1/5, n = 17 Explanation: n/85 = 34/170 n/85 = 1/5 Cross multiply the fractions 5n = 85 n = 85/5 n = 17 Question 32. Answer: 15/2.5 = m/4, m = 24 Explanation: 15/2.5 = m/4 Cross multiply the fractions 15 * 4 = 2.5m 60 = 2.5m m = 60/2.5 m = 24 Question 33. Answer: x = 11.2 Explanation: 100/x = 200/22.4 Cross multiply the fractions 100 * 22.4 = 200x 2240 = 200x x = 2240/200 x = 11.2 WRITING AND SOLVING A PROPORTION Find the value of x so that the ratios are equivalent. Question 34. 1 : 8 and 4 : x Answer: x = 32 Explanation: 1/8 = 4/x Cross multiply the fractions x = 8 * 4 x = 32 Question 35. 4 to 5 and x to 20 Answer: x = 16 Explanation: 4/5 = x/20 Cross multiply the fractions 20 * 4 = 5x 80 = 5x x = 80/5 x = 16 Question 36. 3 : x and 12 : 40 Answer: x = 10 Explanation: 3/x = 12/40 Cross multiply the fractions 3 * 40 = 12x 120 = 12x x = 120/12 x = 10 Question 37. x to 0.25 and 6 to 1.5 Answer: x = 1 Explanation: x/0.25 = 6/1.5 Cross multiply the fractions 1.5x = 6 * 0.25 1.5x = 1.5 x = 1.5/1.5 x = 1 Question 38. x : \(\frac{5}{2}\) and 8 : 10 Answer: x = 2 Explanation: x : 5/2 = 8 : 10 Cross multiply the fractions 10x = 8 * 5/2 10x = 20 x = 20/10 x = 2 Question 39. \(\frac{7}{4}\) to 14 and x to 32 Answer: x = 4 Explanation: 7/4 : 14 = x : 32 Cross multiply the fractions 14x = 32 * (7/4) 14x = 56 x = 56/14 x = 4 Question 40. WRITING A PROPORTION Your science teacher has a photograph of the space shuttle Atlantis. Every 1 centimeter in the photograph represents 200 centimeters on the actual shuttle. Which of the proportions can you use to find the actual length x of Atlantis? Explain. Answer: 1/200 = x/19.5 Explanation: Every 1 centimeter in the photograph represents 200 centimeters on the actual shuttle = 1 : 200 Length of atlantis on model = 19.5 The actual length on Atlantis = x Scale 1:200 When length on model = 1 Actual length = 200 When actual length = x Length on model = 19.5 Scale = x : 19.5 Equating both scales 1/200 = x/19.5 Question 41. MODELING REAL LIFE In an orchestra, the ratio of trombones to violas is 1 to 3. There are 9 violas. How many trombones are in the orchestra? Answer: There are 3 trombones in the orchestra. Explanation: t/9 = 1/3 3t = 9 t = 9/3 t = 3 There are 3 trombones in the orchestra. Question 42. MODELING REAL LIFE A dance team has 80 dancers. The ratio of seventh-grade dancers to all dancers is 5:16. Find the number of seventh-grade dancers on the team. Answer: The number of seventh-grade dancers on the team is 25. Explanation: A dance team has 80 dancers Let us take the seventh-grade dancers as x The ratio of seventh-grade dancers to all dancers is 5:16 x : 80 = 5 : 16 x/80 = 5/16 Cross multiply the fractions 16x = 5 *80 16x = 400 x = 400/16 x = 25 The number of seventh-grade dancers on the team is 25. Question 43. MODELING REAL LIFE There are 144 people in an audience. The ratio of adults to children is 5 to 3. How many are adults? Answer: The number of adults in the audience are 18. Explanation: The ratio of adults to children is 5 to 3 adults : children = 5 : 3 There are 144 people in an audience. 5x + 3x = 144 8x = 144 x = 144/8 x = 18 So, the number of adults in the audience are 18. Question 44. PROBLEM SOLVING You have $50 to buy T-shirts. You can buy 3 T-shirts for $24. Do you have enough money to buy 7 T-shirts? Justify your answer. Answer: No. Explanation: You can buy 3 T-shirts for $24 = 24 : 3 = 24/3 : 1 = 8 : 1 So, you can buy 1 T-shirt per $8. The money required to buy 7 T-shirts = 7 * 8 = $56 The remaining money after buying 3 T-shirts is 50 – 24 = $26 $26 is not enough to buy 7 T-shirts. Question 45. PROBLEM SOLVING You buy 10 vegetarian pizzas and pay with $100. How much change do you receive? Answer: The change you receive = $15 Explanation: 3 vegetarian pizzas for $25.50 = 25.50 : 3 = 25.50/3 : 1 = 8.5 : 1 So, you have to pay $8.5 for 1 vegetarian pizza If you buy 10 vegetarian pizzas, then amount is 10 * 8.5 = $85 The change you receive = 100 – 85 = 15 Question 46. MODELING REAL LIFE A person who weighs 120 pounds on Earth weighs 20 pounds on the Moon. How much does a 93-pound person weigh on the Moon? Answer: The weight of a 93-pound person weigh on the Moon is 15.5 pounds Explanation: The ratio of a person weight on earth to moon = 120 : 20 = 120/20 : 1 = 6 : 1 The weight of a 93-pound person weigh on the Moon is 93/6 = 31/2 = 15.5 pounds. Question 47. PROBLEM SOLVING Three pounds of lawn seed covers 1800 square feet. How many bags are needed to cover 8400 square feet? Answer: The number of bags required to cover 8400 sq ft is 14. Explanation: Three pounds of lawn seed covers 1800 square feet. The ratio of lawn to seed cover = 1800 : 3 = 1800/3 : 1 = 600 : 1 So, 1 seed bag covers 600 sq ft The number of bags required to cover 8400 sq ft is 8400/600 = 14 bags Question 48. MODELING REAL LIFE There are 180 white lockers in a school. There are 3 white lockers for every 5 blue lockers. How many lockers are in the school? Answer: There are 480 lockers in the school. Explanation: There are 3 white lockers for every 5 blue lockers = 3 : 5 Let b be the number of blue lockers 3/5 = 180/b 3b = 180 * 5 3b = 900 b = 900/3 b = 300 300 + 180 = 400 So, there are 480 lockers in the school. CONVERTING MEASURES Use a proportion to complete the statement. Round to the nearest hundredth if necessary. Question 49. Answer: 3.73 miles Explanation: 1 km = 0.621371 6 km = 6 * 0.621371 = 3.72823 miles = 3.73 miles Question 50. Answer: 0.66 gal Explanation: 1 L = 0.264172 gal 2.5 L = 0.264172 * 2.5 = 0.66043 2.5 L = 0.66 gal Question 51. Answer: 40.82 kg Explanation: 1 lb = 0.453592 kgs 90 lb = 0.453592 * 90 = 40.8233 90 lb = 40.82 kg SOLVING A PROPORTION Solve the proportion. Question 52. Answer: x = 3/2 Explanation: 2x/5 = 9/15 Cross-multiply the fractions 15 * 2x = 9 * 5 30x = 45 x = 45/30 x = 3/2 Question 53. Answer: d = 12 Explanation: 5/2 = (d – 2)/4 Cross-multiply the fractions 20 = 2(d – 2) 20 = 2d – 4 20 + 4 = 2d 24 = 2d d = 24/2 d = 12 Question 54. Answer: k = 4 Explanation: 4/(k + 3) = 8/14 Cross-multiply the fractions 14 * 4 = 8(k + 3) 56 = 8k + 24 56 – 24 = 8k 32 = 8k k = 32/8 k = 4 Question 55. LOGIC It takes 6 hours for 2 people to build a swing set. Can you use the proportion \(\frac{2}{6}=\frac{5}{h}\) to determine the number of hours h it will take 5 people h6to build the swing set? Explain. Answer: It will take 15 hours for 5 people to build the swing set. Explanation: It takes 6 hours for 2 people to build a swing set 2 people – 6 hours 5 people – ? We have a proportion, 2/6 = 5/h 2h = 6 * 5 2h = 30 h = 30/2 h = 15 It will take 15 hours for 5 people to build the swing set. Question 56. STRUCTURE The ratios a : b and c : d are equivalent. Which of the following equations are proportions? Explain your reasoning. Answer: a/d = c/b is not equivalent proportion. Explanation: a/b = c/d ad = bc b/a = d/c bc = ad a/c = b/d ad = bc a/d = c/b ab = cd c/a = d/b bc = ad So, a/d = c/b is not equivalent proportion. Question 57. CRITICAL THINKING Consider the proportions \(\frac{m}{n}=\frac{1}{2}\) and \(\frac{n}{k}=\frac{2}{5}\). What is \(\frac{m}{k}\) ? Explain your reasoning. Answer: m/k = 1/5 Explanation: m/n = 1/2 So m = x, n = 2x n/k = 2/5 n = 2x, k = 5x So, m/k = x/5x = 1/5 Lesson 5.5 Graphs of Proportional Relationships EXPLORATION 1 Representing Relationships Graphically Work with a partner. The tables represent two different ways that red and blue food coloring are mixed. a. Represent each table in the same coordinate plane. Which graph represents a proportional relationship? How do you know? b. Find the unit rate of the proportional relationship. How is the unit rate shown on the graph? c. What is the multiplicative relationship between x and y for the proportional relationship? How can you use this value to write an equation that relates y and x? Answer: Mixture 1 a. Mixture 2 b. If the line passes through the origin, then x and y are proportional. Explanation: a.The points in mixture 1 are A (1, 2), B (2, 4), C (3, 6), D (4, 8) The points in mixture 2 are E (0, 2), F (2, 4), G (4, 6), H (6, 8) b. If the line passes through the origin, then x and y are proportional. Try It Tell whether x and y are proportional. Explain your reasoning. Question 1. Answer: The line does not pass through the origin. So, x and y are not proportional. Explanation: The line does not pass through the origin. So, x and y are not proportional. Question 2. Answer: x and y are not proportional. Explanation: The line pass through the origin. So, x and y are not proportional. Question 3. Answer: x and y are not proportional. Explanation: The line pass through the origin. So, x and y are not proportional. Question 4. WHAT IF Does your answer change when you use the point (\(\frac{1}{2}\), \(\frac{1}{4}\))to find the speed of the subway car? Explain your reasoning. Answer: No. Explanation: The point (1/2, 1/4) indicates that the subway car travels 1/4 mile every 1/2 minutes. 1/4 : 1/2 = 2/4 : 1 = 1/2 : 1 So, the unit rate is 1/2 mile per minute The speed of the subway car is 1/2 mile per minute. Self-Assessment for Concepts & Skills Solve each exercise. Then rate your understanding of the success criteria in your journal. Question 5. IDENTIFYING A PROPORTIONAL RELATIONSHIP Use the graph shown to tell whether x and y are proportional. Explain your reasoning. Answer: x and y are proportional. Explanation: x/y = 0/0 1.5/1 = 15/10 = 3/2 4.5/3 = 45/30 = 3/2 As the line pass through the origin, so, x and y are proportional. Question 6. FINDING A UNIT RATE Interpret each plotted point in the graph. Then identify the unit rate, if possible. Answer: The unit rate is 1.5 Explanation: time : distance = 1.5/1 = 15/10 = 3/2 The unit rate is 1.5 Self-Assessment for Problem Solving Solve each exercise. Then rate your understanding of the success criteria in your journal. Question 7. The table shows the temperature (in degrees Fahrenheit), hours after midnight. a. Describe a proportional relationship between time and temperature shown by the table. Explain your reasoning. b. Find the temperature 3.5 hours after midnight. Answer: b. 161 degrees Fahrenheit Explanation: a. The table shows the proportional relationship between hours and temperature. 0.5/44 = 1/88 1/46 1.5/48 = 1/32 The temperature after 3.5 hours, is 3.5 * 46 = 161 degrees Fahrenheit Question 8. DIG DEEPER! Show how you can use a proportional relationship to plan the heights of the vertical supports of a waterskiing ramp. Then explain how increasing the steepness of the ramp affects the proportional relationship. Answer: The vertical supports tell the height of the ramp. As the height of the ramp increases the distance from the ramp is increases. Graphs of Proportional Relationships Homework & Practice 5.5 Review & Refresh Find the value of x so that the ratios are equivalent. Question 1. 2 : 7 and 8 : x Answer: x = 28 Explanation: 2/7 = 8/x Cross multiply the fractions 2x = 8 * 7 2x = 56 x = 56/2 x = 28 Question 2. 3 to 2 and x to 18 Answer: x = 27 Explanation: 3/2 = x/18 Cross multiply the fractions 3 * 18 = 2x 54 = 2x x = 54/2 x = 27 Question 3. 9 : x and 54 : 8 Answer: x = 4/3 Explanation: 9/x = 54/8 Cross multiply the fractions 54x = 9 * 8 54x = 72 x = 72/54 x = 4/3 Find the quotient, if possible. Question 4. 36 ÷ 4 Answer: 36 ÷ 4 = 9 Explanation: The quotient of two integers of the same sign is positive. 36 ÷ 4 = 9 Question 5. 42 ÷ (- 6) Answer: 42 ÷ (- 6) = -7 Explanation: The quotient of two integers of the different signs is negative. 42 ÷ (- 6) = -7 Question 6. – 39 ÷ 3 Answer: – 39 ÷ 3 = -13 Explanation: The quotient of two integers of the different signs is negative. – 39 ÷ 3 = -13 Question 7. – 44 ÷ (- 4) Answer: – 44 ÷ (- 4) = 11 Explanation: The quotient of two integers of the same sign is positive. – 44 ÷ (- 4) = 11 Solve the inequality. Graph the solution. Question 8. – \(\frac{x}{3}\) < 2 Answer: x > -6 Explanation: – \(\frac{x}{3}\) < 2 Multiply each side by 3 -x/3 . 3 < 2 . 3 -x < 6 x > -6 Question 9. \(\frac{1}{3}\)p ≥ 4 Answer: p ≥ 12 Explanation: \(\frac{1}{3}\)p ≥ 4 Multiply each side by 3 \(\frac{1}{3}\)3p ≥ 4 . 3 p ≥ 12 Question 10. – 8 < \(\frac{2}{3}\)n Answer: -24 < n Explanation: – 8 < \(\frac{2}{3}\)n Multiply each side by 3/2 -8 x (3/2) < 2n/3 x (3/2) -24 < n Question 11. – 2w ≤ 10 Answer: w ≥ 5 Explanation: – 2w ≤ 10 Divide each side by 2 – 2w/2 ≤ 10/2 -w ≤ 5 w ≥ 5 Concepts, Skills, & Problem Solving REPRESENTING RELATIONSHIPS GRAPHICALLY Represent the table graphically. Does the graph represent a proportional relationship? How do you know? (See Exploration 1, p. 211.) Question 12. Answer: x and y are not proportional. Explanation: The line does not pass through the origin. So, x and y are not proportional. Question 13. Answer: x and y are proportional. Explanation: The line pass through the origin. So, x and y are proportional. IDENTIFYING A PROPORTIONAL RELATIONSHIP Tell whether x and y are proportional. Explain your reasoning. Question 14. Answer: x and y are proportional. Explanation: Compare the values of ratios x to y x/y = 1/2 2/4 = 1/2 3/6 = 1/2 4/8 = 1/2 The ratios are equivalent. So, x and y are proportional. Question 15. Answer: x and y are not proportional. Explanation: Compare the values of ratios x to y x/y = -2/0 = 0 -1/2 0/4 = 0 1/6 The ratios are not equivalent So, x and y are not proportional. Question 16. Answer: x and y are not proportional. Explanation: Compare the values of ratios x to y x/y = -1/-2 = 1/2 0/-1 = 0 1/0 = 0 2/1 All the ratios are not equivalent So, x and y are not proportional. Question 17. Answer: x and y are proportional. Explanation: Compare the values of ratios x to y x/y = 3/2 6/4 = 3/2 9/6 = 3/2 12/8 = 3/2 All the ratios are equivalent So, x and y are proportional. Question 18. Answer: x and y are not proportional. Explanation: Compare the values of ratios x to y x/y = 1/3 2/4 = 1/2 3/5 4/6 = 2/3 All the ratios are not equivalent So, x and y are not proportional. Question 19. Answer: x and y are proportional. Explanation: Compare the values of ratios x to y x/y = 1/0.5 = 2 3/1.5 = 2 5/2.5 = 2 7/3.5 = 2 The ratios are equivalent So, x and y are proportional. Question 20. YOU BE THE TEACHER Your friend uses the graph to determine whether x and y are proportional. Is your friend correct? Explain your reasoning. Answer: The line does not pass through the origin. so, x and y are not proportional. FINDING A UNIT RATE Interpret each plotted point in the graph. Then identify the unit rate. Question 21. Answer: Tnit rate is 1/15 Explanation: The points are (1, 15), (4, 60) x/y = 1/15 4/60 = (4 ÷ 4)/(60 ÷ 4) = 1/15 So, unit rate is 1/15 Question 22. Answer: The unit rate is 0.2 seconds per feet. Explanation: The points are (1, 5), (6, 30) x/y = 1/5 6/30 = 1/5 The unit rate is 0.2 seconds per feet. IDENTIFYING A PROPORTIONAL RELATIONSHIP Tell whether x and y are proportional. If so, identify the constant of proportionality. Explain your reasoning. Question 23. x – y = 0 Answer: x and y are proportional. Explanation: x – y = 0 x = 0 + y x = y So, x and y are proportional. Question 24. \(\frac{x}{y}\) = 2 Answer: x and y are proportional. Explanation: \(\frac{x}{y}\) = 2 x = 2y If y = 0, then x = 2(0) = 0 If y = 1, then x = 2(1) = 2 If y = 2, then x = 2(2) = 4 So, x and y are proportional. Question 25. 8 = xy Answer: x and y are proportional. Explanation: 8 = xy y = 8/x If x = 0, then y = 8/0 = 0 If x = 1, then y = 8/1 = 8 If x = 2, then y = 8/2 = 4 So, x and y are proportional. Question 26. x2 = y Answer: x and y are proportional. Explanation: x2 = y If x = 0, then y = 0 If x = 1, then y = 1 If x = 2, then y = 4 So, x and y are proportional. WRITING AN EQUATION The variables and are proportional. Use the values to find the constant of proportionality. Then write an equation that relates x and y. Question 27. When y = 72, x = 3. Answer: y = 24x Explanation: y/x = 72/3 y/x = 24 y = 24x Question 28. When y = 20, x = 12. Answer: 5x = 3y Explanation: y/x = 20/12 y/x = 5/3 Cross multiply the fractions 3y = 5x Question 29. When y = 45, x = 40. Answer: 9x = 8y Explanation: y/x = 45/40 y/x = 9/8 Cross multiply the fractions 8y = 9x Question 30. MODELING REAL LIFE The table shows the profit y for recycling x pounds of aluminum. Find the profit for recycling 75 pounds of aluminum. Answer: The profit for recycling 75 pounds of aluminum is $33.75 Explanation: The profit is $4.50 for recycling 10 pounds of aluminum = 4.50 : 10 = 4.50/10 : 1 = 0.45 : 1 The profit is 40.45 for recycling 1 pound of aluminum. The profit for recycling 75 pounds of aluminum is $135/4 Question 31. MODELING REAL LIFE The graph shows the cost of buying concert tickets. Tell whether x and y are proportional. If so, find and interpret the constant of proportionality. Then find the cost of 14 tickets. Answer: x and y are proportional. The cost for buying 14 tickets is $182 13x = y Explanation: The line in the graph passes through the origin. so, x and y are proportional. The cost for buying 2 tickets is 26 = 26 : 2 =13 : 1 The cost for buying 1 ticket is $13. So, the cost for buying 14 tickets is 14 * 13 = $182 x/y = 2/26 x/y = 1/13 Cross multiply the fractions 13x = y Question 32. REASONING The graph of a proportional relationship passes through (12, 16) and (1, y) Find y. Answer: y = 4/3 Explanation: 12/16 = 1/y 3/4 = 1/y Cross multiply the fractions 3y = 4 y = 4/3 Question 33. PROBLEM SOLVING The amount of chlorine in a swimming pool is proportional to the volume of water. The pool has 2.5 milligrams of chlorine per liter of water. How much chlorine is in the pool? Answer: The amount of chlorine in the pool is 75708.225 milligrams. Explanation: The amount of chlorine in a swimming pool varies directly with the volume of water. The pool has 2.5 milligrams of chlorine per liter of water. 1 gallon = 3.78541 litre 8000 gallons = 8000 * 3.78541 = 30283.29 litres The amount of chlorine in the pool = 30283.29 * 2.5 = 75708.225 milligrams. Question 34. DIG DEEPER! A vehicle travels 250 feet every 3 seconds. Find the value of the ratio, the unit rate, and the constant of proportionality. How are they related? Answer: The ratio is 250 : 3 The unit rate is 250/3 : 1 3x = 250y Explanation: A vehicle travels 250 feet every 3 seconds = 250 : 3 = 250/3 : 1 The unit rate is 250/3 : 1 x/y = 250/3 Cross multiply the proportions 3x = 250y Lesson 5.6 Scale Drawings EXPLORATION 1 Creating a Scale Drawing Work with a partner. Several sections in a zoo are drawn on 1-centimeter grid paper as shown. Each centimeter in the drawing represents 4 meters. a. Describe the relationship between the lengths of the fences in the drawing and the actual side lengths of the fences. b. Describe the relationship between the areas of the sections in the drawing and the actual areas of the sections. c. Are the relationships in parts (a) and (b) the same? Explain your reasoning. d. Choose a different distance to represent each centimeter on a piece of 1-centimeter grid paper. Then create a new drawing of the sections in the zoo using the distance you chose. Describe any similarities or differences in the drawings. Try It Question 1. What is the actual distance between Traverse City and Marquette? Answer: The distance between Traverse City and Marquette is 150 miles Explanation: Use the centimeter ruler to find the distance on the map between traverse city and Marquette. the map distance is about 3 centimeters Use the scale 1 cm : 50 mi and the ratio 3 cm : d mi to write and solve a proportion 1/50 = 3/d d = 50 * 3 d = 150 So, the distance between Traverse City and Marquette is 150 miles Question 2. A drawing has a scale of 1 mm : 20 cm. What is the scale factor of the drawing? Answer: The scale factor is 1/200 Explanation: Write the scale with the same units. Use the factor 1 cm = 10 mm 1 mm : 20 cm = 1 mm : (20 • 10) mm = 1 : 200 So, the scale factor is 1/200 Self-Assessment for Concepts & Skills Solve each exercise. Then rate your understanding of the success criteria in your journal. Question 3. VOCABULARY In your own words, explain the meaning of the scale and scale factor of a drawing or model. Answer: A scale factor is a number that multiplies times a given quantity to produce a smaller or longer version of the original number. It is also defined as the ratio of a drawing or blueprint to the actual object or distance. The measurements in scale drawings are proportional to the measurements of the actual object. The scale is the ratio that compares the measurements of the drawings with the actual measurements. Question 4. FINDING AN ACTUAL DISTANCE Consider the scale drawing of Balanced Rock in Arches National Park. What is the actual height of the structure? Answer: h = 1/975.36 Explanation: scale drawing is 1 cm : 32 ft 1 foot = 30.48 cm So, 32 ft = 975.36 cm 1 cm : 32 ft = 1 : 975.36 h = 1/975.36 Question 5. FINDING A SCALE FACTOR A drawing has a scale of 3 in. : 2 ft. What is the scale factor of the drawing? Answer: The scale factor is 1/8 Explanation: 3 in. : 2 ft 1 foot = 12 inches 2 ft = 24 inches The scale is 3 : 24 inches = 1/8 Question 6. REASONING Describe the scale factor of a model that is (a) larger than the actual object and (b) smaller than the actual object. Answer: If the scale of the factor is larger than the actual object, then every point is considered larger in the image. It means we represent a lion in a smaller box. If the scale of the factor is less than the actual object, it means we represent the pen as a larger box. Self-Assessment for Problem Solving Solve each exercise. Then rate your understanding of the success criteria in your journal. Question 7. A scale drawing of the Parthenon is shown. Find the actual perimeter and area of the rectangular face of the Parthenon. Then recreate the scale drawing with a scale factor of 0.2. Find the perimeter and area of the rectangular face in your drawing. Answer: The actual perimeter of the rectangular face of the Parthenon is 26 ft The actual area of the rectangular face of the Parthenon is 36 sq ft the perimeter of the rectangular face in your drawing is 5.2 ft area of the rectangular face in your drawing is 1.44 sq ft. Explanation: Perimeter of the rectangular face of the Parthenon = 2(l + b) = 2(4 + 9) = 13 * 2 = 26 ft Area of the rectangular face of the Parthenon = l * b = 4 * 9 = 36 sq ft Scale factor = 0.2 The length of the rectangular face in your drawing = 0.2 * 9 = 1.8 The breadth of the rectangular face in your drawing = 4 * 0.2 = 0.8 Perimeter is 2(1.8 + 0.8) = 5.2 Area is 0.8 * 1.8 = 1.44 Question 8. DIG DEEPER! You are in charge of creating a billboard advertisement that is 16 feet long and 8 feet tall. Choose a product. Create a scale drawing of the billboard using words and a picture. What is the scale factor of your design? Answer: The scale factor is 2 Explanation: The details of the billboard advertisement is 16 : 8 = 2 : 1 1 unit is 4 units on the scale So, the billboard advertisement is 16 * 4 : 8 * 4 = 64 : 32 = 2 : 1 So, the scale factor is 2 Scale Drawings Homework & Practice 5.6 Review & Refresh Tell whether x and y are proportional. Explain your reasoning. Question 1. Answer: x and y are not proportional Explanation: Compare the values of ratios x to y 10/5 = 2 9/4 = 2.25 8/3 = 2.6666 7/2 = 3.5 The ratios are not equivalent So, x and y are not proportional Question 2. Answer: x and y are proportional Explanation: Compare the values of ratios x to y 6/7 12/14 = 6/7 18/21 = 6/7 24/28 = 6/7 The ratios are equivalent So, x and y are proportional Simplify the expression. Question 3. 7p + 6p Answer: 7p + 6p = 13p Explanation: The given expression is 7p + 6p = 13p Question 4. 8 + 3d – 17 Answer: 8 + 3d – 17 = 3d – 9 Explanation: The given expression is 8 + 3d – 17 = 3d – 9 Question 5. – 2 + \(\frac{2}{5}\)b – \(\frac{1}{4}\)b + 6 Answer: – 2 + \(\frac{2}{5}\)b – \(\frac{1}{4}\)b + 6 = 4 + 3b/20 Explanation: The given expression is – 2 + \(\frac{2}{5}\)b – \(\frac{1}{4}\)b + 6 = 4 + (8b – 5b)/20 = 4 + 3b/20 Write the word sentence as an inequality. Question 6. A number is less than – 3. Answer: n < -3 Explanation: Let us the number as n n < -3 Question 7. 7 plus a number z is more than 5. Answer: 7 + z > 5, z > -2 Explanation: more than means > symbol 7 + z > 5 z > 5 – 7 z > -2 Question 8. The product of a number m and 6 is no less than 30. Answer: 6m > 30 Explanation: No less than means > m . 6 > 30 6m > 30 Divide both sides by 6 6m/6 > 30/6 m > 30/6 Concepts, Skills, & Problem Solving CREATING A SCALE DRAWING Each centimeter on the 1-centimeter grid paper represents 8 inches. Create a proportional drawing of the figure that is larger or smaller than the figure shown. (See Exploration 1, p. 217.) Question 9. Answer: The base of the traingle is 16 inches Explanation: 1 cm = 8 inches The base of triangle = 2 cm = 2 * 8 = 16 inches Actually, 1 cm = 0.393701 inches The size of drawing/real size = 1/8 2/real size = 1/8 16 = real size Question 10. Answer: The bottom surface is 24 inches, the height is 24 inches, the top surface is 8 inches. Explanation: 1 cm = 8 inches Bottom surface is 3 cm = 3