

LessonTitle: Using Proportions		Alg 3.7
Utah State Core Standard and Indicators		
Summary		
In this lesson, students use ratio and proportion to solve problems in several contexts; percentages, rates, scale drawings, size, statistics, probability, similar figures and other mathematical relationships.		
Enduring Understanding	Essential Questions	
Proportion equations are helpful in solving problems in many settings.	How can we use equivalent relationship or proportion equations to help us solve problems?	
Skill Focus	Vocabulary Focus	
<ul style="list-style-type: none"> • Using similar figures and proportion to find missing measurements. • Using proportion equations to find missing information related to rates. • Using proportion equations to understand and solve percentage problems 		
Assessment		
Materials: Calculators, Measuring tools		
Launch		
Explore		
Summarize		
Apply		

Directions: Allow students to work in groups to try to apply ratio and proportion to solve the problems in different contexts. You may wish to establish a proportional format and help them understand that this format can be used in so many different kinds of problems.

Alg 3.7

Using Ratio and Proportion

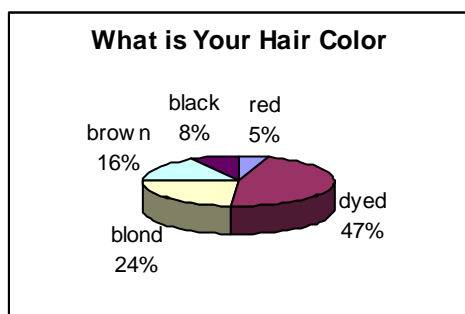
Name _____

Of all the concepts in mathematics, the idea of ratio and proportion is one of the most important and useful. The problems below are examples of contexts in which ratio and proportion might be used. Show all proportions!

Percentages

- 1) What percent of the 33 students in the class have brown hair if 13 have brown hair? Show the ratio and then change it to %.
- 2) If 15% of the 345 M&M's in the bag are blue, how many blues are there?
- 3) If 65% of the 665 students in the school have pets, how many have pets?
- 4) 35% of the paper used in the school is yellow. The school used 500 packages of yellow paper. How many packages did they use?

- 1) There are 398 students in the 7th grade. According to the chart, how many have dyed hair? _____ Blond hair _____ Red hair _____



Rates

- 6) Alaska has about 14 people per 20 square miles. How many square miles would 10,000 people use?
- 7) If there are 200 sheets in a ream miles. of paper and the ream is 3 inches Thick, how thick is one sheet of paper?

8) The distance on a globe from Rome to London is 2.5 inches. The circumference of this same globe is 40 inches. If the real circumference of the earth is 25,000, find the distance from Rome to present day London.

Scale Drawings

9) An architect represented a 15 foot wall with $\frac{3}{4}$ inch. What is the scale he is using to make his drawing?

10) Using this scale, find the scale drawing dimensions for a 20 ft by 35 foot swimming pool?

Size Proportions

11) A giraffe is 14 feet tall. If the giraffe shrunk to 1 foot and everyone shrunk proportionately, then how tall would a student who is 5 foot 8 inches be.

12) What would a 20 foot house shrink to?

13) The golden ratio of .618, is a relationship which the Greeks found in many things in nature. Since nature is beautiful, the Greeks built this ratio into their art and architecture. An 18 inch high Greek vase fits the golden ratio for width/height relationship. How wide would the base be?

Probability

14) Express the probability for dice rolling sums below as a ratio, decimal and percentage. P(sum of 7) means, "What is the probability the sum 2 dice will be 7?"

Dice rolling possible sums							Sum Probabilities			
+	1	2	3	4	5	6		ratio	decimal	percent
1	2	3	4	5	6	7	P(sum of 5)			
2	3	4	5	6	7	8	P(sum of 12)			
3	4	5	6	7	8	9	P(prime)			

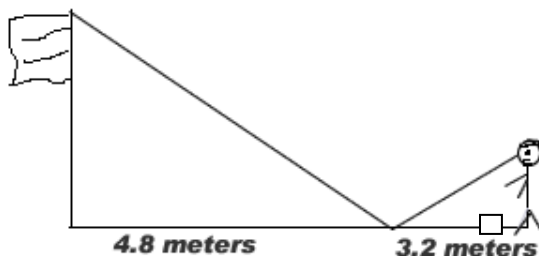
								number)			
4	5	6	7	8	9	10		P(sum of 1			
5	6	7	8	9	10	11		P(sum is odd)			
6	7	8	9	10	11	12		P(sum is even)			

Statistics

15) Dietary standards indicate that we should not take in more than 30% of our calories from fat. If your daily calorie intake is 2,120 calories and 875 of them are fat calories, then how does your fat compared to dietary standards?

Similar Figures

16) When a student stands back from a flagpole and looks into a mirror to see the top of the flagpole, his vision line creates similar triangles. Find the height of the flagpole in the following drawing intake if the person is 1.7 meters tall.



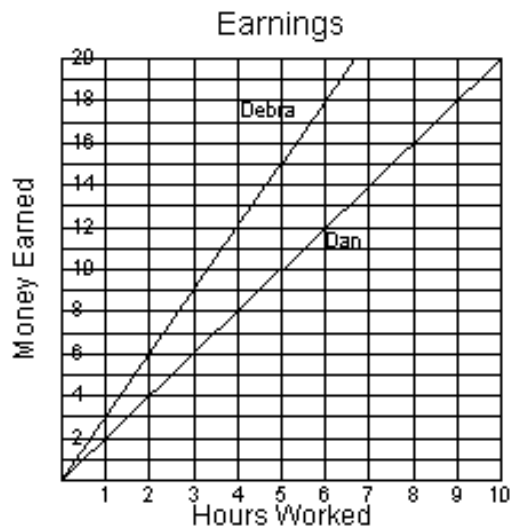
Slopes

17) Observe the graph and answer the questions.

What is Dan's rate of pay? Write as a ratio _____

What is Debra's rate of pay? Write as a ratio _____

Explain how the rates of pay affect the slopes of the lines for Debra and Dan.



Mathematical Relationships

18) The golden ratio is related to the Fibonacci sequence.

- Continue the pattern for Fibonacci numbers. 0, 1, 1, 2, 3, 5, 8, ____, ____, ____.
- Now make Fibonacci fractions. Change them to decimal values. Continue until you observe a pattern.

1/1 = 1

1/2 = _____

2/3 = _____

3/5 = _____

5/8 = _____

8/13 = _____

13/21 = _____

21/34 = _____

34/55 = _____

55/89 = _____

89/144 = _____

Describe what you see in the pattern.
