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Grade Level: High School Algebra 2

Topic of the lesson: Ratio and Proportion word problems using ratio box

Topic of the day: Comprehension of word problems

This is a lesson on solving proportion word problems involving totals or missing parts in the ratio by setting up a ratio box. Many times students have trouble setting up a proportion, and to set them up using a ratio box as this lesson suggests will help them to visualize the problem in order to answer the question.

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 Topic: Ratio and Proportion word problems using ratio box

A. Objectives: PASS 2.11 Solve multistep word problems involving...ratio and proportion.

B. Instruction:

a. Introduction:

Review with students what the terms ratio and proportion mean. Have them add these definitions to the vocabulary sheets that they are filling out.

Ratio: An expression of the relationship between 2 numbers.

Proportion: An equation or statement that indicates two ratios are equal.

b. Instruction:

Example 1

I will give them a simple example of a ratio.

"The ratio of red shirts to green shirts was 3 to 2" Explain that that means for every three red shirts, there are two green shirts.

I will then give an example turning this simple ratio into a proportion.

"The ratio of red shirts to green shirts in the room was 3 to 2. There were 24 red shirts in the room, how many green shirts were there?"

We could set up a ratio box to solve this problem. Like the following:

	Ratio Numbers	Actual Numbers
Red Shirts		
Green Shirts		

	Ratio Numbers	Actual Numbers
Red Shirts	3	24
Green Shirts	2	g

From the table it would follow that we could set up a proportion to solve this as shown

$$\frac{3}{2} = \frac{24}{g}$$

We would cross multiply to solve.

Example 2: (with totals)

"The ratio of Shetlands to Clydesdales in the herd was 2 to 17. If there were 380 horses in the herd, how many were Shetlands?"

We would set up another ratio box, this time with totals. Explain to the students how to arrive at the total on the ratio side and how to put a variable in for the section we don't know.

	Ratio Numbers	Actual Numbers
Shetlands	2	s
Clydesdales	17	
Total	19	380

To set up this proportion, we would use the rows that had entries (Shetland and Total). Emphasize that we are putting the same kind in corresponding positions. "Shetland over total equals Shetland over total"

$$\frac{2}{19} = \frac{s}{380}$$

Example 3:

"It took 600 kilograms of sulfur to make 3000 kg of the new compound. How many kg of other materials would be required to make 4000 kg of the new compound?"

	Ratio Numbers	Actual Numbers
Sulfur	600	
Other materials		n
Total	3000	4000

This problem is a little different because it asks for how much other and we were given sulfur and total. We must first find the "other" in the ratio part by subtracting 3000-600

	Ratio Numbers	Actual Numbers
Sulfur	600	
Other materials	2400	n
Total	3000	4000

Now we can set up the proportion $\frac{2400}{3000} = \frac{n}{4000}$

Thinking "other over total equals other over total".

c. Closure:

Remind the students that a ratio box can help them visualize how to set up the proportions. It also helps to keep in mind that corresponding parts go in corresponding positions.

C. Assessment:

Name: _____

Algebra 2 Ratio/Proportion Practice

Directions: Complete the ratio box for each of the following problems. Set up a proportion and solve the proportion. Be sure you label your answer.

1. The ratio of white hats to black hats was 3 to 11. If there were a total of 350 cowboys, how many wore white hats?

	Ratio Numbers	Actual Numbers
White Hats		
Black Hats		
Total		

2. The chemistry experiment called for 800 mg of sulfur to make 4000 mg of the new compound. How many mg of other materials would be required to make 5000 mg of the new compound.

	Ratio Numbers	Actual Numbers
Sulfur		
Other materials		
Total		

3. The ratio of Alpine Goats to Boer Goats was 2 to 19. If there were 420 goats in the herd, how many were Alpine?

	Ratio Numbers	Actual Numbers
Alpine		
Boer		
Total		

4. It took 500 kg of sulfur to make 3000 kg of the new compound. How many kg of other materials would it take to make 6000 kg of the new compound.

	Ratio Numbers	Actual Numbers
Sulfur		
Other materials		
Total		

5. The ratio of masters to servants was 2 to 120. If there were 228,000 servants, how many people were there in all?

	Ratio Numbers	Actual Numbers
Masters		
Servants		
Total		

6. The ratio of those who stayed awake to those who dozed was $2\frac{1}{2}$ to 7. If 1400 stayed awake, how many dozed? (draw your own ratio box)
7. The ratio of nuts and bolts was 11 to 2. If there were 260 nuts and bolts in the pile, how many were bolts?
8. The ratio of big pancakes to small pancakes was 2 to 9. If there were 242 pancakes, how many were big?
9. The ratio of green cats to red cats was 3 to 17. If there were 400 cats, how many were green?

D. Modifications/Accommodations

The problems could be read out loud to a student who needed that assistance, or extra help given. None of the students in my class needed modifications

E. Reflection

This lesson was taught on October 3rd, 2006 to a class of Algebra 2 students. The ratio boxes helped them to get the problem in order to see how they needed to set up the proportion. Due to time constraints, I only put nine questions on the worksheet practice. In the future, I would add a few more problems to provide more practice.