

Ratio, Proportion, & Mathematical Representations

Mathematics Teaching Institute, July 27-31, 2015



The ratio of boys to girls in a class is 5 to 3. After six girls join the class, the number of boys and girls in the class is the same. How many students are in the class now?

Post solutions on chart paper.

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Consider Student Work Samples

- What mathematics does each student know?
- What do we learn about each child based on their responses?
- What are the advantages and disadvantages of each representation?

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Student Work Sample #1

multiplied bu then I added me 10 to (the number of new t girls) to it gives me number of in the class 15 32 16 boys

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# in class	в	6	Student Work Sample #2
8	S	3	
16	10	6	
24	15	9	
32	20	12	
40	25	15	
48	30	18	
# of girls plus 6 which will equal the # of bays	5 10 5	$\neq 3+6$ $\neq 6+6$ = 9+6	Sponsored by Ohio Pepartment 5

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Student Work Sample #3



Student Work Sample #4

20 15 10 6 G ۷ Sille +6=15 6=12 6=1 NO Yes NO NO 8 16 +o+3/ 4



Student Work Sample #5



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Student Work Sample #6

9999999 6666b + 990 66666 999999 999 + 999 6666 399 ga bbbb 999 999999 999 9 99 9999 The third one works 3 because when we give two girls to each Phir of gitgits then rows of boys and girls are protected. 999 60 6



If instruction emphasizes only one model or one representational type, then the mathematical tools that children acquire is limited.

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Proportional Situations & Graphs

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- When we talk about graphing ratios, would the graph be continuous or discrete, and why?
- Is graphing a relationship defined by a ratio different from graphing a proportional relationship?



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Ratios

- Discrete
- Uses additive and multiplicative reasoning patterns!





Ratios vs. Proportions

- Discrete vs. continuous
- Additive
 vs. multiplicative
 reasoning (a.k.a.
 constant of
 proportionality)



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Discussions

- 1. Can all ratios be represented by tables and graphs?
- 2. Is the graph of a ratio always linear?
- 3. How is the slope of a line related to the ratio between the vertical and horizontal distance between two points on the line?



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16

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- 1. A Metric Conversion: If 6 inches is 15.24 cm, 9 inches is how many centimeters?
- 2. A Candy company is developing packaging for their Chocolates. If they place 60 candies in a long box, there can be 6 rows of 10 candies. If the company decides to use a different box with 4 rows, how many candies would there be in each of 4 rows?
- 3. Sal is hosting a party for 50 people. He will have people sit at a long line of tables. Each table can seat 4 people, plus one person can sit at each end of the line of tables, as shown. Find the number of tables he will need to seat 50 people. (OAA, 2005)





Solve the above problems. Record your solution strategy and discuss the following:

- Of the above problems, which are proportion problems and which are not? Briefly justify your answers.
- How do you graph each situation?



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19

Consider Student Work Samples

- What mathematics does each student know?
- What are the themes emerged from the samples below?
- What do we learn about each child based on their responses?

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need 10 tables to have 500 you would table do 50 at because if you each you get to so then this is like: mat it itooks F 0 国 20 田 20 TR a a a 20 CF 50 0 S च्च 0 0 तन tables

Student Work Sample #1





Student Work Sample #2

6 P=1+table Sal Will need 9 tables to seat 50 People. There would be 4 seats left over. 12P=2 tables 18 9 = 3. tables 240 4 tables 30 = 5 tables 36P= 6tables 7 tables 428-8 tables 9 tables 501



Student Work Sample #3





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Student Work Sample #4



Student Work Sample #5







Student Work Sample #6

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Student Work Sample #7

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26



- In the discussion above, what mathematical points are important to be made explicitly in class?
- What other problems might be used to help children acquire these different representational schemes?
- How might we make the different types of representations accessible to children?

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