**What is Division and How Do We Divide?**

**Part 1**

Consider the following problem situations. Both problems can be solved using division and you will be asked why that is true. In addition, think about how division is being used in each case. Is the way of thinking about division the same? Is it different? Can you explain any differences in the meaning of division that you discover?

Situation 1:

All 5th grade students at Isaac Newton Elementary school are going on a field trip to the Calculator Hall of Fame. There are 237 students who have committed to going on the field trip. In order to be approved by the principal, the 5th grade teachers need enough parent chaperones so that a chaperone is responsible for no more than 5 students. How many parent chaperones are needed?

Situation 2:

All 5th grade students at Isaac Newton Elementary school are going on a field trip to the Calculator Hall of Fame. There are 237 students who have committed to going on the field trip. The 5th grade teachers have had 42 parent chaperones sign up to help with the trip. How many students will each parent be responsible for during the trip?

1. Explain why division can be used in each case? Based on your thinking about the answer to this question, write a sentence that describes what division means?

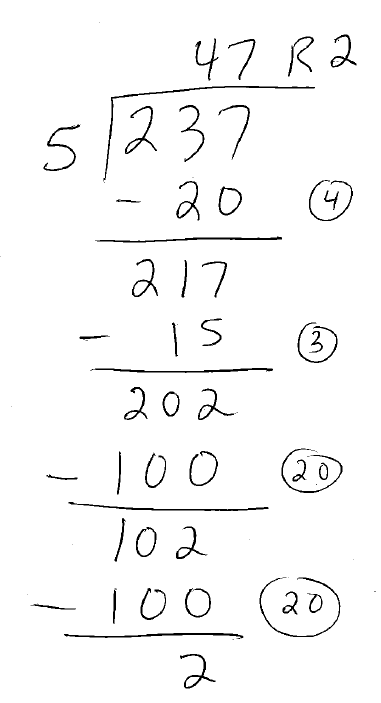
Answers will vary. Students might see division as “separating into groups of equal size” or “repeated subtraction” or “how many groups?” or “how many in each group?” Look for these ideas in their responses. All are valid.

2. Compare the two situations. How is the interpretation of division different in Situation 2 than in Situation 1?

Notice that in Situation 1, the question is, “how many groups of 5 students will we have?” In Situation 2, the question is, “how many students will be in each group if there are 42 groups?” Both questions can be answered using division.

**Part 2**

Suppose a student solves the problem given in situation 1 as follows:



Therefore, they would need 47 chaperones each with 5 students. One more chaperone would be needed and could have just 2 students.

1. Work to make sense of the work that the student performed and explain your understanding of this work to a partner.

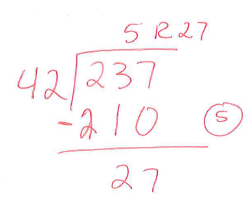
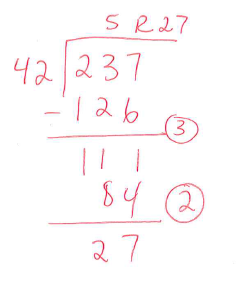
The student is thinking about repeated subtraction and is keeping track of the multiples of 5 that are being subtracted on the right side (circles numbers). In the end, 237 is reduced by 47 groups of 5 with a remainder of 2.

2. Can you think of a way that the student could have solved the problem more efficiently? Show how the computations can be done more efficiently.

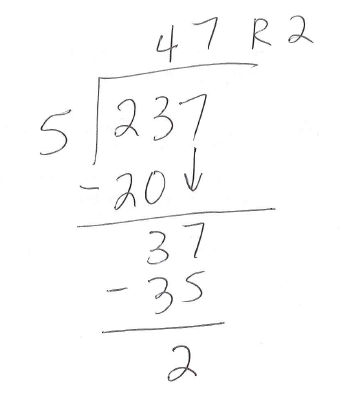
The student could have started by subtracting 40 groups of 5 (200) leaving 37. Then subtract 7 more group of 5 (35) leaving a remainder of 2. In total, 47 groups of 5 were subtracted leaving a remainder of 2.

3. Solve the problem in Situation 2 as efficiently as you are able. Be prepared to explain your thinking.

Two solutions are shown. Efficiency varies from student to student! In each case, each chaperone gets 5 kids. Then, 27 of the 42 chaperones will get an extra kid for a total of 6.



4. You may have learned to divide using a process called “long division”. Develop an explanation for how this method works and how this method is similar to the work seen previously. That is, try to explain in a meaningful way what is happening when we do long division.



Note that this is the same as the work done previously. We should say

* 5 “goes into” 237 40 times (when we put the 4 above the 10’s place thus representing 40)
* 40 groups of 5 is 200 so we subtract 200 from 237 leaving 37 (rather than 23 – 20 = 3 and “bring down” the 7)
* 5 “goes into” 35 7 times (when we put the 7 above the 1’s place thus representing 7)
* 7 groups of 5 is 35 so we subtract 35 from 37 leaving a remainder of 2

5. Solve the problem from Situation 2 with a partner using “long division”. As you do, speak out loud the steps that you are performing so that you are saying each step in a meaningful way with a focus on what it means to divide. Show all your work below.

Listen to students and look for them to pay attention to place value, “groups of”, and what it really means to “bring down” a number.

**Part 3**

For each situation, decide if the problem can be interpreted using the “How many groups?” interpretation of division or the “How many in each group” interpretation of division. Then solve each problem using any form of division that you like best. Work to be as efficient as you can be.

1. A recipe for chocolate chip cookies calls for 2 cups of flour. You have 19 cups of flour remaining. How many batches of cookies can you make (assuming you have plenty of every other ingredient)?

How many groups of 2 are in 19?

2. One yard is equivalent to 3 feet. A football field (including the end zones) is 360 feet long. How many yards long is a football field?

How many groups of 3 are in 360?

3. You have 125 inches of ribbon and want to cut it into 15 pieces of equal length. How long will each of these pieces be?

How many inches are in each of 15 groups?

4. You have a 5 gallon jug of water and will be filling red Solo cups so that each cup holds 12 ounces of water. How many cups can you fill? Note that 1 gallon is equivalent to 128 ounces.

How many groups of 12 are in 640?

5. You have a 1 gallon jug of water. You have 15 red Solo cups and you want to put the same amount of water in each cup. How much water can you put in each cup? Note that 1 gallon is equivalent to 128 ounces.

How much water can you put in each of 15 cups?

6. You have $500 saved to give as birthday money to your 3 siblings. How much money can you give to each sibling if you want to give the same amount to each?

How much money can be given to each of 3 siblings?