WEEK 1: NUMBER - INTEGERS

How Old are Three Daughters?
A census taker walks up to a house and asks the man answering the door to state the number of people in his household. "Five," he says. "There's me, my wife, and my three daughters." "How old are your daughters?" the census taker asks. "The product of their ages is 72, and the sum of their ages is the number on my house." The census taker leaves, but soon he comes back and replies, "That's not enough information." "Oh, I forgot, the youngest one likes chocolate pudding." How old are the three daughters? Explain how you found the result.

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| **M6N1.** Students will understand the meaning of the four arithmetic operations as related to positive rational numbers and percents using these concepts to solve problems.  
  a. Use factors and multiples  
  b. Decompose numbers into their prime factorization (Fundamental Theorem of Arithmetic.) | a. Students have to find the factorizations of 72 to solve this problem.  
  b. Students can decompose 72 into its prime factorization (2*2*2*3*3). By finding the various combinations of the factors will help the students find the ages of the three daughters. |
| **M6D1.** Students will represent and analyze data.  
  a. Construct frequency distributions, tables, and graphs using data. | Students can use an Excel spreadsheet to create a table of possible combinations of three numbers, whose product is 72. |
| **M7A1.** Students will represent and evaluate quantities using algebraic expressions.  
  a. Translate verbal phrases to algebraic expressions.  
  b. Use and evaluate algebraic expressions. | Let a,b,c be the daughters’ ages. Let n= house number. a*b*c=72, a+b+c=n. We know that there is a youngest, so a does not equal b. We know that we didn’t have enough information so a+b+c=n has multiple solutions. |
| **M8A1.** Students will represent, solve, and analyze mathematical situations algebraically.  
  a. Simplify and evaluate algebraic expressions.  
  b. Translate word phrases to algebraic expressions and equations.  
  c. Solve algebraic equations. | Let a,b,c be the daughters’ ages. Let n= house number. a*b*c=72, a+b+c=n. We know that there is a youngest, so a does not equal b. We know that we didn’t have enough information so a+b+c=n has multiple solutions.  
  *same unpacking as M7A1* |
McNugget Numbers

McDonald's sells Chicken McNuggets in boxes of 6, 9, or 20. Obviously one could purchase exactly 15 McNuggets by buying a box of 6 and a box of 9. Using only combinations of boxes of 6, 9, and/or 20 McNuggets,

a. Could you purchase exactly 17 McNuggets?
b. How would you purchase exactly 53 McNuggets?
c. What is the largest number for which it is impossible to purchase exactly that number of McNuggets?
d. Let's say you could only buy the McNuggets in boxes of 7, 11, and 17. What is the largest number for which it is impossible to purchase exactly that number of McNuggets?

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| M6N1: Students will understand the meaning of the four arithmetic operations as related to positive rational numbers and percents using these concepts to solve problems.  
  a. Use factors and multiples.  
  b. Decompose numbers into their prime factorization (Fundamental Theorem of Arithmetic).  
  c. Determine the greatest common factor and the least common multiple for a set of numbers. | a. You can look at multiples of each box #, i.e. 6, 12,18…, 9, 18, 27,…, 20, 40, 60,…  
  b. Talk about this – 6 and 9 have a least common multiple of 18. 6 and 20 have a least common multiple of 60. This could lead to a discussion of the common factors as well as 6 and 9 have a common factor of 3 because 6 = 3*2 and 9 = 3*3. To find the least common multiple of 6 and 9, 18 is the third multiple of 6 and 18 is the second multiple of 9. The 3 for the third multiple of 6 is what is left from the nine when the common factor of 3 is taken out and the two for the second multiple of 9 is left from the six when the common factor of 3 is taken out. |
| M6A2. Students will consider relations between varying quantities.  
  a. Analyze and describe patterns arising from function rules, tables, and graphs. | By setting up the investigation in a spreadsheet, students can analyze the patterns that exist by adding boxes of 6, 9 or 20 McNuggets. |
| M6D1. Students will represent and analyze data.  
  a. Construct frequency distributions, tables, and graphs using data.  
  b. Choose appropriate tables and graphs to be consistent with the nature of the data. | b. Students must pay attention on how they set up the table in Excel to represent the patterns and the McNugget combinations. |