7th Grade Assignment – Week #2

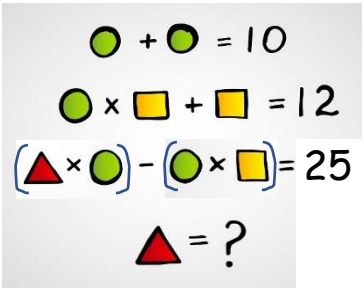
Individual Work:

- Keep working on the Arithmetic Review Sheets! This needs parental oversight! Are you sending your work to the tutor as it is completed?
- Study the **6th Grade Math Tricks**, which are found at the end of the 7th Grade Workbook, and were also included on the assignment page.
- Look over and study the list of **Divisibility Rules** (from today's lecture), which is found on the next page.

Group Assignment: For either Tuesday or Thursday

- Keep working at NIM!
  I'll repeat (more clearly) a hint that I gave (briefly) last week:
  - I will win if I can take the last gem (**which means that I have left my opponent with zero gems**).
  - I will win if I can leave my opponent with 4 gems. Why? Because if my opponent has 4 gems to work with, they can either take 1 or 2 or 3 of the gems, which will then leave me with 3 or 2 or 1, and in all of those cases, I can take the remaining gems and win! It is important to understand this!
  - Therefore, my new goal is to leave my opponent with 4 gems. But how can I make sure to leave my opponent with 4 gems?
- Once you have finish mastering NIM, you can do one of these puzzles:

1. In case you didn't do the coin puzzle from last week, here it is again:
   Coin Puzzle. Jeff has 50 coins worth $6.10 in his pocket. If he has only quarters and nickels, how many of each type of coin does he have?
2. *Age Puzzle*. Bill is two-thirds of Mark's age. If Mark is 5 years older than Bill, how old is Bill?
3. *Equation Puzzle.*



4. *Number Puzzle*. What number squared is 120 greater than twice that number?
   If you have extra time, you can make similar puzzles for one another.

Divisibility Rules

- A number is evenly divisible by 2 only if it is even. ("Evenly divisible" means it can be divided with no remainder.)
- A number is evenly divisible by 3 only if the sum of the digits is divisible by 3. The nice thing here is that we can *cast out threes* or groups of digits adding to multiples of three (3, 6, 9, 12, etc.). For example, with 65387 we can immediately cast out the 6 and 3 because they are divisible by 3, and then we can cast out the 8 and 7 because they add to 15. This leaves us with just the 5, which is not divisible by 3, so *we conclude that 65387 is not evenly divisible by 3*.
- A number is evenly divisible by 4 only if the last two digits are divisible by 4. For example, 6380716 is evenly divisible by 4, because it ends in 16, which is evenly divisible by 4.
- A number is evenly divisible by 5 only if the number ends in a 5 or a 0.
- A number is evenly divisible by 9 only if the sum of the digits is divisible by 9. Again, we can *cast out nines* in order to check divisibility for 9 quickly. If we cast out nines and are left with nothing in the end, then the number is evenly divisible by nine. For example, for 71,284 we cast out the 7 and 2 and then cast out the 8 and 1 and we are left with just a 4, so the whole number is not evenly divisible by nine.
  On the other hand, with 2,381,697 we cast out the 8 and 1, the 6 and 3, the 2 and 7, and the 9, leaving us with nothing. Therefore, we can conclude that 2,381,697 is evenly divisible by nine.
- A number is evenly divisible by 10 only if the number ends in a 0.