Tutorial Session Notes
Grade 8
Quarter #3 (Week 17-24)

About these notes:

- These notes are primarily for those who are acting as the tutor – either a parent or a class teacher.
- In the first year of JYMA, Maria (our JYMA tutor) and I met every week and talked about grades 5-8, and we made a list of suggested topics for the Friday tutorial session.
- In order to support those who are acting as the tutor for their child or a whole class, I am sharing these notes with those who are acting as the tutor.
- Of course, these tutorial sessions are also an opportunity for the students to ask their tutor questions.
- If you are acting as the tutor, it may be helpful to read the section of the JYMA Handbook titled "The Role of the Tutor".

Week #17

- Quiz them on their percent flashcard facts
- Go over and really make sure they understand group worksheet #1, especially problems #3 #4.
- Ask: What are other ways that you can reframe the question of:
    - What is 33 1/3 % of 150?
    - What is 45 increased by 20%?
    - What is 400 decreased by 30%?
- Very important: Do all kinds of things to make sure they understand the growth rate table on p. 65. Do these:
    - Look at the column for 1.07, and the row 9 → We get the value 1.83846. What does that mean?
      Answer: It means that if something grows at 7% every year, then after 9 years, its value is 1.83846 times greater than it was in the beginning.
    - Look at the column for 1.3, and the row for 20→ We get the value 190.05. What does that mean?
      Answer: It means that if something grows at 30% every year, then after 20 years, its value is about 190 times greater than it was in the beginning.
- Answer problems using the growth rate table (on p65):
    - If you put $100 in a bank account with 2% annual interest, how much money will you have after 30 years?
    - A country has a population of 1 million. Every year it increases by 3%. What is the population of the country after 10 years?
    - Give them more problems if they need more practice.
- Go over the puzzles from the group assignment.
- If there is extra time, then introduce them to the Nim game with gems. (4 versions are in the puzzle book.)

Week #18

- It's OK now to (wisely!) use a calculator.
- Go over group assignment on p. 36 especially everything from #4.
- Practice problems:
  - 17 is what percent of 23? (do 17÷23).
  - what is 29 percent of 5,000?
  - What is 63 increased by 31%?
    - Reword to "What is 131% of 63?". Then put in calculator: 1.31·63.
      Do other problems like this.
  - What is 710 decreased by 15%?
    - Reword to "What is 85% of 710? (Calculator: 0.85·710)
  - 560 is what percent greater than 350?
    - Reword to 560 is what percent of 350?
      Put into calculator: 560/350 = 1.6
      This tells that 560 is 160% 350, which also tells us that 560 is 60% greater than 350.
  - 195 is what percent greater than 120?
  - John bought a house for $150,000 and then he sold it for $190,000. What percent profit did he earn? Reframe question: 190 is <u>what percent greater</u> than 150, then 190 is <u>what percent of</u> 150?
    Calculator: 190÷150 = 1.26666, which tells us that 190 is 126⅔% of 150,
    which also means that 190 is 26⅔% greater than 150.
    Therefore, the answer to the question is 26⅔% profit.
  - Sarah bought a car for $23,000 and then sold it a year later for $16,000. What percent loss is this?
    Reword: 16 is what % less than 23 $\rightarrow$ 16 is what percent of 23
    Calculator: 16÷23 ≈ 0.696, which tells us that 16 is about 69.6% of 23,
    and also means that 16 is 30.4% less than 23.
- If more time, then practice growth problems. Solve them in ways: (1) using the growth table on p. 65, and
  (2) using the formula with a calculator.

Week #19

- **Very Important**: You need to have a discussion about Group Sheet #3. Ask these questions:
  - What is exponential growth? Answer: One way to describe it is constant percent growth – every year it increases by the same percentage.
  - What have you learned from the results of this worksheet?
  - When is an exponential growth model useful for situations in the real world?
    Answer: It may be able to fairly accurately predict results for the short term.
  - Under what circumstances does exponential growth seem to predict absurd results?
    Answer: In general, for things like population growth, the rate at which an illness is spreading, or the growth of a business, predicting results far into the future is not reliable.
  - How do you think someone might misuse exponential growth?
    Answer: Often in the media, when someone wants to make a point, they look at the current growth rate of something, and then they assume that this growth rate will continue into the distant future. The assumption that the growth rate will remain constant for such a long time is simply not valid.
- Test to make sure they understand the rule of 72/70
  - Example: If you hear that the stock of a company doubled in 12 years, what was the average annual growth? (Ans: 72÷12 = 6% per year.)
  - Example: A city's population is growing at 4% per year, how long will it take to double? (Ans: 72÷4 = 18 years)
- Test use of the table on p. 65. Ask:
  - at 6% growth, how long does it take for a population to triple?
  - at 8% growth, how long does it take for the population to increase 10-fold?
  - at 3.5% growth, how long does it take for the population to increase by 80%? (17 years)
- Practice problems - use a calculator:
  - if a town has a population of 48,000, what will the population be after 12 years if…
    - it grows at 2% per year? (Ans: $48000 \cdot 1.02^{12} \approx 60{,}900$)
    - if it grows at 4.3% per year? (Ans: $48000 \cdot 1.043^{12} \approx 79{,}600$)
  - What is 5.3% more than 370? (Ans: $370 \cdot 1.053 \approx 389.61$)
  - Jeff bought a shirt for $46.80 (before tax). If this is the price after a 35% discount, what was the price before the discount?
    Solution: Reword as "46.8 is 35% less than what number?", than as "46.8 is 65% of what number?",
    which leads to 46.8÷0.65 = 72
  - 78 is what % more than 64?
    (Ans: 78÷64 = 1.219, which means 121.9% of, or 21.9% greater than 64)
  - 593 is what percent less than 710
    (Ans: 593÷710 ≈ 0.835, which means 83.5% of, or 16.5% less than 710)
  - 158 is 63% of what number? (Ans: 158÷0.63 ≈ 250.8)
  - 158 is 63% less than what number? (Ans: 158÷0.37 ≈ 427.0)
- If time, make up word problems similar to Practice Sheets #5 and #6.

Week #20

- Test is going out next week.
- Make sure understand all the problems from sheet 5 and 6
- Review 7th grade measurement
- Go over puzzles

Week #21

- Make sure they understand the practice test.
- Go over puzzles from the group assignment. (These come from the puzzle book, #38c, #181)
    - Hint for the "Equal Products" Puzzle: think about prime factorization
- If time, give new puzzles: the next two puzzles in the puzzle book after #181 "Equal Products"

Week #22

- Answer any questions from practice sheet and group sheet 1 on p 41 and 43.
- Give other example problems similar to #6 on p42
- Map scale problems
    - If there's a map that has a fractional scale of 1:3,200
      give the verbal scale both in us system and metric.
- Use the chain method to convert 18 ft/min to km/hr
- Help them if they need with the Grains of Rice Problem (which is from the Thursday group assignment, and is last problem in puzzle book for 8th grade).
- If time, then do a few simple density problems. Examples:
    - What is the density of a rock that weighs 240g and has a volume of 100 cm^3. (Ans: 2.4 g/cm^3)

Week #23

- Ask if they have any questions from Practice Sheets #2 and #3 (p44-45)
- Practice simple Density problems:
    1. A rock has a density of 4.8grams/cm^3, and a volume of 13 cm^3. What is its weight?
    2. A piece of wood has a volume of 800cm^3 and weighs 430 grams. What is its density?
    3. What is the volume of 3kg of iron? (You need to look up the density of iron on p 66.)
- *Map Question*: A map has a fractional scale of 1:300,000.
    - What is the verbal scale both in metric and the US system?
    - A distance between 2 cities on a map measures 17cm, what is the distance between the cities in reality?
- Chain method practice:
    - 3.87 kg is how many ounces?
    - 0.63 pints is how many mℓ?
    - 35 miles/gal is how many km/ℓ?
    - 3.7g/cm^3 = how many kg/m^3? = how many ounces/in^3?

Week #24

- Ask if any questions from p. 46- 47
- Density practice:
  - Calculate the density of a piece of wood that weighs 640 grams and has a volume of 860 cm^3.
    (ans: 0.744 g/cm^3)
  - How much do 3 ft^3 of iron weigh?
    (Look for the density of iron on the conversion table in workbook) (ans: 1,329 lbs)
  - What is the volume of 3 kg of aluminum? (ans: 1,111 cm^3)
- Unit conversion practice using "chain method"
  - Pressure: Convert 80 lb/in^2 to kg/m^2 (ans: 56,236 kg/m^2)
- Average speed problem:
  - Average speed = total distance / total time
  - Maria bikes up a hill at 6mph and then comes down at 30mph. What was the average speed?
  - Note: can use whatever distance they want.
- Ask if they were able to solve missing digits puzzle. Jamie has found 5 different answers:
  - 133 x 143; 133 x 173; 133 x 113; 113 x 133; 123 x 163
- Proportion problems:
  - If a recipe calls for 3 cups of rice for 10 servings, then how many cups of rice do you need for 16 servings?
  - If a car can go 170 miles on 6 gallons of gas, how far can it go on 7.3 gallons?
    - How do we write the fuel efficiency in miles per gallon and km per liter?