Answers
for Grade 8 Group Assignments - Quarter #3

<u>Notes</u>:
- Answers for group assignment problems that are out of the workbook can be found in the "G8 Workbook Answer Key".
- This answer key doesn't include all answers.

Grade 8 – Week #17
For Thursday:
    1) Cathy is 22.   2) Bill is 17.   3) 12 and 23

Grade 8 – Week #18
    No answers needed.

Grade 8 – Week #19
For Thursday:
    <u>Puzzle</u>: Because knowing her own age wasn't enough information, we know that there must be two sets of (three) numbers that both multiply to 72 and add to whatever the girl's age is. If we then list all the sets of three numbers whose product is 72 (e.g., 1, 1, 72 and 1, 2, 36, etc.) then we will find that only the following two sets have the same sum: 2, 6, 6 and 3, 3, 8. Most notably, each set shows that two of the three daughters are, in fact, twins. Therefore, when the man speaks of his "oldest daughter", the girl can then conclude that 2, 6, 6 aren't the ages because, if that were so, there wouldn't be an "oldest" daughter. So the answer must be that <u>the daughters are 3, 3 and 8</u>.

Grade 8 – Week #20
For Thursday:
    1) If the new choir is 72% women, then the ratio of men to women must be 28:72, which is 7:18. Since we know the number of men is 21, we can determine the total number of women by setting up this proportion:
        7:18 = 21:x. Solving this yields x = 54, so <u>25 new women must join</u>.
    2) 27 first class seats were sold.

Grade 8 – Week #21
For Thursday:
  1) 15 pets altogether.
  2) The product of each of the three strings of digits must be equal, so the product of their prime factorizations must also be equal. Clearly, we can't use a 0. We also can't use a 5 or a 7, because if we did, then a 5 or 7 would have to appear in the other two prime factorizations, and that's not possible. Now let's consider the factor 3. The digit 9 contains two 3's (in its prime factorization) and the digits 3 and 6 each contain one 3. Therefore, we will place the 9 at an intersect point, and the 3 and 6 on corners away from the 9. Now let's consider the factor 2. The digit 8 ($= 2 \cdot 2 \cdot 2$) contains three 2's, the digit 4 contains two 2's, and the digits 2 and 6 each contain one 2. We simply think of this as we fill in the remaining places of the puzzle. The final answer is shown here.

$$\begin{matrix} 8 & & 3 \\ 9 & 2 & 4 \\ 1 & & 6 \end{matrix}$$

Grade 8 – Week #22

For Thursday: *Grains of Rice Puzzle!*

a) The number of grains on the last square is 2^{63}. The number of grains on the whole board is $2^{64}-1 = \underline{18{,}446{,}744{,}073{,}709{,}551{,}615}$.

b) Rounding the number of grains to 18,400,000,000,000,000,000 and dividing by 400,000 gives us approximately $\underline{46{,}000{,}000{,}000{,}000}$ (46 trillion) sacks of rice. Since each sack is 20 inches long, the length of the line of sacks works out to be about 920,000,000,000,000 inches, which is 76,666,666,666,666 feet. We can round this figure and then divide by 5280 (the number of feet in a mile) to get about $\underline{14{,}500{,}000{,}000 \text{ miles}}$, which is about 156 times further than the distance to the sun!

c) The volume is calculated as follows: There are 7.48 gallons in a cubic foot, so we calculate the number of grains in a cubic foot

as: $\dfrac{400 \text{ grains}}{\text{tbsp}} \cdot \dfrac{2 \text{ tbsp}}{\text{fl.oz.}} \cdot \dfrac{128 \text{ fl.oz.}}{\text{gal}} \cdot \dfrac{7.481 \text{ gal}}{\text{ft}^3} \approx 766{,}000 \, \dfrac{\text{grains}}{\text{ft}^3}$

The total amount of rice is then approximately 24,000,000,000,000 cubic feet, and since there are about 147,000,000,000 cubic feet in a cubic mile, the volume of all the rice is approximately $\underline{163 \text{ cubic miles}}$! This is also nearly one million boxes that are 100yd x 100yd x 100yd, each box having the approximate volume of a football stadium.

Grade 8 – Week #23

For Thursday:

- *Age Puzzle.* Fred is 9 and Andy is 13.

- *Density Question.* Volume $= 36\,\pi \approx 113.1 \text{ cm}^3$. Density is 19.3 g/cm^3.
  Weight = Volume times Density $= 113.1 \text{ x } 19.3 \approx 2183\text{g} \approx \underline{\textbf{2.18 kg}}$

Grade 8 – Week #24

Missing Digit Puzzle. Possible solutions:

133 x 143

133 x 173

133 x 113

113 x 133

123 x 163