

27 pts

No calculators. **Leave answers in factorial, exponent, or “choose” form.**

1. The 8 letters of the word REMEMBER are arranged in a line.
 - a) Find the number of different arrangements if there are no restrictions. As a hint: one possible arrangement is BEEEMMRR [2 pts]
 - b) Find the number of different arrangements which start and finish with the letter M. [2 pts]
2. A committee of 6 animals is to be chosen from 8 different frogs and 5 different bunnies. In how many ways can the committee be selected if...
 - a) ...there must be more frogs than bunnies on the committee? (all frogs and no bunnies is ok) [2 pts]
 - b) ...the committee consists of 3 frogs and 3 bunnies, but two particular bunnies refuse to be on the committee together? [2 pts]
3. Find the number of positive integers greater than 6000 and less than 7000 which are divisible by 5, provided that no digit is to be repeated. [2 pts]
4. If ${}_n P_r = 840$ and ${}_n C_r = 35$, then solve for r (your answer is a single number). [3 pts]
5. My son's baseball team plays 11 games in the regular season. How many ways are there for the team to win 6 games, lose 3 and tie 2? (they only care about final standings, and not who they beat) [2pts]

6. Tomorrow, 3 fathers are taking their 3 daughters (each father has 1 daughter) to the movies.
- a) They want to sit in a row of 6 seats. If each father is sitting next to his own daughter, in how many ways can they be seated? [2pts]
 - b) They still want to sit in a row of 6 seats. How many ways can they be seated if all the daughters sit together? [2pts]
 - c) Now they want to sit in a row having 8 seats. With no other restrictions, in how many ways can they all be seated? [2pts]
7. In the expansion of $(a - 3b)^{16}$, the sum of the 9th and 10th term is zero. Find the value of $\frac{a}{b}$. (your answer should be a number) [3 pts]
8. If all permutations of the letters of the word MANGA are arranged in the order as in a dictionary. What is the 49th word? [3pts]