

Presentation Guidelines and Topics

General guidelines:

- A) All presentations must use a spreadsheet, Prezzi or PowerPoint presentation software, a poster, or typed documents on the document camera.
- B) Each group member must verbally present some of the information during the presentation and identify the role he, she, or it had in crafting the presentation.
- C) Presentations must be at least 10 minutes and at most 20 minutes long.
- D) Dr. O determines any extra credit earned by the group. (Appropriate use of visuals, music, and humor will be rewarded)

Topics:

1. **Forensics:** Determining the relationship of limb bone lengths to height. You will measure the upper arm and lower arm bones and height of team members, then find a method to calculate the height when you know the length of the arm bones.
2. **College costs:** Determine the fees and tuition for a bachelor's degree at MTSU for BOTH a 4- and a 5-year bachelor degree program for a student attending full time (minimum of 9 hours per semester), plus compare instate to out of state costs. You may use a standard 120 hour degree or a specific degree program for one of the group members. You need to decide whether you will complete your degree with or without taking summer classes.
3. **Using Roman Numerals:** Explain the what, when, and how of Roman Numerals and show at least 7 examples of modern uses, with evidence (photos from around town, or other evidence).
4. **Probability:** Define theoretical probability, then use it to calculate all of the theoretical probabilities of rolling a sum of a one through a twelve inclusive on two fair dice. Explain how each one was calculated and present your results in a Table of Probabilities, including the odds in favor and against rolling each number. Point out interesting probabilities and patterns that you find (same probability for different sums, most likely sum, and least likely sum, for examples).
5. **Sets:** Use a standard deck of 52 cards to explain the following concepts from sets: Universal set, Null set, elements of a set, Cardinal number of a set, subsets and proper subsets, union, intersection, show how to calculate and then demonstrate all possible subsets of sets with 3 and 4 elements, the Cardinal Number Formula for sets: $n(A \cup B) = n(A) + n(B) - n(A \cap B)$.
Alternative Demonstration: Use Venn diagrams to demonstrate all of the above. Include diagrams with elements inserted and the same diagrams with shading.

6. Counting: Dr. O gives a 10-item vocabulary quiz with each unit test. Explain the counting process needed and use it to determine the total number of ways that he can arrange the key for each of the following quizzes:

- 1) 10 terms and 10 definitions
- 2) 10 terms and 11 definitions
- 3) 10 terms and 9 definitions (one used twice)

Next, calculate the probability of guessing all 10 items correctly as a rational fraction and display all results in a Table of probabilities.

7. Financing a new vehicle: You need to buy a new vehicle. You have \$8000 for a down payment and can get a 1.9% loan. Using data from www.edmunds.com, compare the price, interest on the loan, total cost, and monthly payments for a 48- month loan, and total cost to purchase each of three vehicles: 1) a compact car, 2) a mid-size car, and 3) a small SUV.

An alternative: use the same data to compare two hybrid vehicles.

8. Explain how you could use **Polya's Methodical Approach to Problem Solving** to solve the following. Remember, you must show how you applied all four steps of Polya's Method (1. Understandin the problem; 2. Devise a plan; 3. Work the plan (include checking the process and results); and 4. Reflect:

Given a standard chess board, do the following:



- a. calculate the exact number of pennies on the last square under the following conditions: 1 penny is placed on the first square, then doubled for each successive square (2 on the second square, 4 on the third, 8 on the fourth, and so on).
- b. Show how to represent this number in exponential form using an Integer base and exponent.
- c. Next, a stack of 18 pennies is about an inch high, calculate the number of inches, exactly, of the height of pennies, then the number of feet, then the number of miles high the stack on the last square.
- d. Lastly, calculate, to 7 decimal places, the number of one-way trips from the Earth to the Moon using the average distance of 238,857 miles.