Permutations

Problem 1 – Concert Seats

Jeremie and 3 of his cousins, Kate, Lane, and Miya, get to choose sets of concert tickets from their grandparents. The concert tickets are in different locations so the order in which they choose the tickets is very important. In this problem, you will explore the possible ways they can select the tickets.

1. If Jeremie selects a set of tickets first, what order can the other cousins select their set of tickets?

   Jeremie   _____   _____   _____

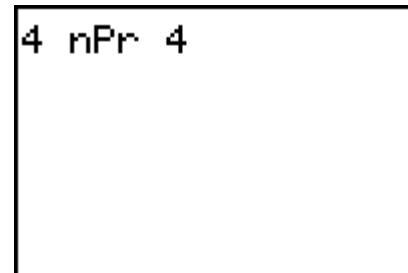   Jeremie   _____   _____   _____

   Jeremie   _____   _____   _____

   Jeremie   _____   _____   _____

   Jeremie   _____   _____   _____

   Jeremie   _____   _____   _____

2. List all the other possible orders for the 4 cousins to pick tickets.

   _____

   _____

   _____

3. How many total options did you find? (include Question 1) _____

4. Does this match the value found by using the **nPr** function on the calculator? _____

   Press ④ MATH ▶ ▶ ③ ④ ENTER to enter the command shown at the right.

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   4 nPr 4
   ```

Suppose there were only 3 sets of tickets for the 4 cousins to choose from.

6. What would you input to on the calculator to determine how many ways the cousins can select the tickets? _____

5. What answer did you get? _____

Problem 2 – Postponed Pop Quiz?

When math class started Friday, your teacher announced a pop quiz. He said that the quiz could be postponed till Monday if 4 students selected from the class answered 4 questions correctly. Each person gets to choose their question from a list of five.

7. If there are 24 students in your class, how many possible ways can students be selected to answer a question? _____

8. What is the probability that the four students with the best grades in your class will be selected in order of their grades? _____

Problem 3 – Road Trip

Trey, Sam, and Chloe are going on a road trip with their mom. So, they each can sit in three available seats – the front seat (best), the middle row (okay), or the third row (worst) of seats.

9. Draw tree diagrams to show the possible seating locations of each person.

10. How many total possibilities did you find? _____

11. Use the **nPr** function to perform the calculation of 3 objects selected 3 at a time. What result did you find? _____

Problem 4 – Using the Formula

The formula for finding the number of permutations of a group of objects is defined as $_nP_k = \dfrac{n!}{(n-k)!}$, where *n* is the number of objects and *k* represents the number being selected. Use the formula to evaluate the following problems.

12. Fourteen players can be assigned to nine batting positions on their baseball team. How many batting orders are there?

_____

13. Ten students are running the 100M dash. How many ways can the top three positions be occupied?

_____

14. Each student must have an eight character password for the computer lab. If any combination of lower case letters and numbers can be used, how many permutations exist?

_____

15. Seven students from an English class of 26 are allowed to go one at a time to the library each Friday. How many different ways can the students be selected?

_____