Name: _____ Date: _____ Per: _____

Notes – Permutations

1. List all possible ways to rearrange the letters CAT

A permutation is an **ordered** arrangement of things.
The question you should be asking yourself is, "Will the outcome be different if I move things around?" In #1 we rearranged the letters, so each "word" is different from the others. The order of the letters in each word is important!

2. How many ways can we rearrange the letters in NUMBER, if we only use 3 letters at a time for each new "word"?

Use the counting principle - make a "slot" for the number of items you are choosing.

_____	•	_____	•	_____	=	_____
1st letter choices		2nd letter choices		3rd letter choices		Total Outcomes

OR

Permutation Formula: ${}_nP_k = P(n, k) = \frac{n!}{(n - k)!} =$

n = # Items choosing from and k = # items you are using

3. How many ways can 10 people finish a race?

4. How many ways can 10 people place either 1st, 2nd, 3rd, or 4th in a race?

5. How many ways can you rearrange the letters in BOOK?

6. How many ways can you rearrange the letters in TALLAHASSEE?

7. 20 people are trying out for the school play, but there are only 2 male roles and 4 female roles. If there are 8 boys and 12 girls trying out, how many possible ways could the roles be assigned?

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Permutations

Show all work in completing each question. (Show formulas/what is being multiplied)

1. In how many ways can Natalie, Amber, Brittany, John, Isaac, and Michael stand in line?	2. Austin, Jonathan, and Brittany ran in a race. In how many different orders can they place 1^{st}, 2^{nd}, or 3^{rd}?
3. How many permutations can you make from the letters A through E?	4. How many ways can a president and vice-president be selected in a pool of twelve candidates?
5. Christina, Makayla, Daniel, and Matthew ran in a race. In how many different orders can they finish the race?	6. How many permutations can you make from the letters W, Q, G, O, and F?
7. How many permutations can you make from the letters in ARRANGEMENT?	8. How many permutations can you make from the letters COMBINE?
9. You have 10 textbooks in your locker, but you only have space for 4 on the top shelf. How many ways can you arrange your books, if you only use any 4 at a time?	10. How many ways can a president, vice-president, and secretary be selected from a group of ten students who are running?
11. How many ways can we make a seating chart for the 5 desks in the front row if there are 35 students in the class?	12. We have 11 trees to plant along a fence. How many ways can we plant any 6 of the trees?
13. How many different signals can be sent by displaying three flags on a mast if there are six different flags available?	14. A co-ed team is composed of 4 women and 10 men. The team must play 2 women at all times. How many batting orders of 9 players are possible?

15. Create your own question to show an example of ${}_7P_3$.