Fundamental Counting Principle, Permutations, Combinations Name _____

1. When buying a "value meal" at Wendy's, there are 9 different sandwiches and 7 different sides. How many different meals consisting of one sandwich and one side could someone buy?

2. Fred wants to buy either a Toyota Camry or a Honda Accord. Both cars come in three different interior colors and four different exterior colors. How many different options can Fred choose from?

3. Mr. Dalmati has 26 dress shirts, 43 ties, 7 pairs of pants, and 2 pairs of dress shoes. How many different outfits consisting of a shirt, tie, pair of pants, and pair of shoes does he have?

Fundamental Counting Principle –

4. How many different 7-digit phone numbers begin with 893?

5. Three students are going to present a speech. How many different orders can they present?

6. A license plate in a certain state consists of three digits followed by three letters. How many different license plates…

(a) … are possible if there can be repeats?

(b) … are possible if letters cannot be repeated?

(c) … are possible if digits cannot be repeated and the letters C and F cannot be used?

(d) … are possible if letters are not repeated and only even numbers that are not repeated are used?

7. How many ways can four students line up in front of their class? 5 students? 10 students?

8. How many ways can 8 cans of soup be displayed in a row on a shelf?

9. Given the word "FRIEND", how many different ways can the letters of the word be arranged if…..

(a) The first letter must be an "N"?

(b) The first letter must be a vowel?

(c) The word begins with "R" and end with "E"?

Permutation –

10. Of 6 friends on the track team, how many ways can 4 of them be used to run the 400 meter relay?

11. Six swimmers are competing in a race. How many different ways can three of them finish in 1^{st}, 2^{nd}, and 3^{rd} place.

Permutations with Repetition –

12. How many ways can the letters in the word "SEE" be arranged?

13. How many ways can the letters in the word "APARTMENT" be arranged?

14. How many ways can the letters in the word "ARKANSAS" be arranged?

Circular Permutations –

15. How many different ways can four friends stand in a circle at the front of their class?

16. A large family is eating at a Chinese restaurant and sitting at a circular table. Six different entrees are ordered and placed on a "spinning wheel" in the center of the table. How many different ways can the six entrees be placed on the wheel?

Combinations –

17. From a list of 10 different books, how many groups of 5 books can be selected?

18. A pizza delivery shop has 12 different toppings from which to choose. This week, if you buy a 2-topping pizza, you get 2 more toppings free. How many different ways can the special 4-topping pizza be made?

19. From a group of 4 men and 5 women, how many committees of 3 men and 2 women can be formed?

20. A bag consists of 3 red, 5 white, & 8 blue marbles. How many ways can 2 red, 1 white, & 2 blue marbles be chosen?

CLASSWORK / HOMEWORK

1. How many way can 7 different books be stacked on a shelf?

2. There are 4 roads from Eric to Mead, 3 from Mead to Titus, and 4 from Titus to Corry. How many different routes are there from Erie to Corry?

3. Regular license plates in Ohio have 3 letters followed by 3 digits. How many plates are possible?

4. There are 10 students in a class that meets in a room that has 12 chairs arranges in a row. How many different ways is it possible for the students to be seated?

5. Using the letters from the word "EQUATION", how many different 5-letter patterns can be formed in which "q" is followed immediately by "u"?

6. How many different ways can the letters of the word "PAIRS" be arranged if the…

(a) first letter must be p.

(b) the first letter must be a vowel.

(c) the first letter cannot be a vowel.

(d) The letter r must be in the middle place.

7. Using the letters from the word "EQUATION", how many different 5-letter patterns can be formed in which "q" is followed immediately by "u"?

8. Truck license plates numbers in a certain state consist of 5 digits followed by 2 letters. How many plates are possible if

(a) the letters O and I cannot be used.

(b) The letters must be different.

(d) The letter O cannot be used.

(d) Odd numbers that are not repeated are used.

9. There are 8 finalists in an Olympic swimming race. How many ways can gold, silver, and bronze be awarded?

10. How many different ways can the letters of each word be arranged…..

(a) ALGEBRA (b) CANDIDATE (c) QUADRATIC (d) BASKETBALL

11. How many ways can 7 people be seated around a campfire?

12. How many different arrangements can be made with 10 pieces of silverware laid in a row if 3 are identical spoons, 4 are identical forks, and 3 are identical knives?

13. How many different 6-digit license plates of the same state can have the digits 3, 5, 5, 6, 2, and 6?

14. Five algebra and 4 geometry books are to be placed on a shelf. How many different ways can they be arranged if all of the algebra books must be together?

15. Three men and three women are to be seated in a row containing 6 chairs. Find the number of arrangements if…

(a) the men and women are to sit in alternating chairs.

(b) the men are to sit in three adjoining chairs and the women are to sit in three adjoining chairs.

(c) the men are to sit in three adjoining chairs.

16. A Sony CD-changer holds 5 CDs on a circular platter. How many different ways can 5 CDs be arranged?

17. Morse code is a system of dots, dashes, and spaces that telegraphers in the US and Canada once used to send messages by wire. How many different arrangements are there of 4 dots and 2 dashes?

18. From a list of 10 books, how many groups of 4 books can be selected?

19. How many baseball teams of 9 players can be formed from 14 players?

20. There are 130 telephones in CB East. How many 2-way connections can be made using the phones?

21. The cast of a school play needs 4 girls and 3 boys. There are 7 eligible girls and 9 eligible boys. How many ways can the cast be selected?

22. How many different baseball teams of 9 players can be formed at CB East if there are 2 players who can only play catcher, 6 players that can only play pitcher, and 17 that can play any of the other 7 positions?

23. From a group of 8 juniors and 10 seniors, a committee of 5 is to be formed to discuss plans for the prom. How many committees can be formed if we want to select 3 juniors and 2 seniors?

24. At Mike's Burgers, you can order your hamburger with or without cheese, with or without onions or pickles, and either medium, medium-well, or well-done. How many different hamburgers are possible?

25. How many 7-letter patters can be formed from the letters of BENZENE?

26. How many ways can 5 people be seated at a round table relative to each other?

27. How many ways can a club of 13 members choose 4 different officers?

28. How many ways can a club of 13 members choose a 4-person committee?