

Combinations, Permutations, and Probability after Spring Break

REVIEW

1. What is the difference between a combination and a permutation?
2. How many ways can you arrange all the letters in the word M-A-T-H?
3. How many ways can you arrange two of the letters drawn from the word M-A-T-H?
4. Eight different runners are running in a race. The fastest three will win gold, silver, and bronze medals, respectively. How many different outcomes are possible?
5. Twenty basketball players form teams with 5 members each. How many different teams can be formed?
6. At a party, there are 30 people. If each person shakes hands with each other person, how many handshakes will occur?

NEW IDEA: PROBABILITY

Probability problems are often just counting problems. What is the probability of rolling the number "2" on normal 6-sided dice? Well, there are six possible outcomes, and only one of them is the desired one. Thus, the probability is 1 out of 6.

MIXED PRACTICE

7. The letters A-B-C-T-U-V are placed in a bag. You randomly draw three letters. What is the probability that you will draw the letters necessary to spell the word C-A-T?
8. All of our names are in a hat, along with a bunch of other names, such that there are 100 names in total in the hat. I will draw four names at random. What is the probability that I draw the names Alex, Grayden, Fatima and Atticus?
9. There are 30 students in a class, including Ojas and Chynna. I choose two names at random to lead a discussion. What is the probability that I choose Ojas and Chynna?
10. How many distinct ways can all of the letters in the word G-E-O-M-E-T-R-Y be arranged to form new "words"?

11. How many 4-digit numbers less than 7000 are odd, not even?
12. In how many ways can 5 people stand in a line? In how many ways can 5 people stand in a circle?
13. I sent 10 candy bars by mail. Three melted. You walk over and randomly choose four candy bars. What is the probability that all of your candy bars were NOT melted? What is the probability that at least two of your candy bars were NOT melted?
14. Think about the group of numbers that are 7 digits long. For example, the number 1,215,389 is a number that is 7 digits long. Now, think of the group of numbers that are 7 digits long but have no "1" anywhere in the number. An example here would be the number 3,895,542. Does this latter group represent more than half of the former group? That, do 7-digit numbers having no "1" in their decimal representation constitute more than half of all 7-digit numbers?
15. You are making a bag consisting of 20 pieces of candy to give to your cousin for Halloween and you can choose from 8 different types of candy. Assuming that you must give your cousin at least one of each type of candy, how many different bags can you make?
16. A class is made up of 10 girls and 7 boys. In how many ways can we make a 4-person debate team that has only boys? In how many ways can we make a 4-person debate team that has 2 boys and 2 girls? In how many ways can we make a 4-person debate team that has at least 1 girl?