

1. Nicole throws two six-sided, distinguishable (in other words, they are different looking) dice. How many possible results can she have? Show how you use the Fundamental Counting Principle to come to your answer.

2. My favorite pizza place offers three different crusts, two different sauces, and 15 different toppings. How many different two-topping pizzas are possible? Assume this pizza has one crust, one sauce, and two different toppings.

3. Albert, Bobby, Chris, Devon, and Edward are going to try out for a play. There are three main roles for which they are auditioning. How many different ways can the roles be assigned? Use the Fundamental Counting Principle.

4. Considering the previous question, could you use permutations or combinations to solve it? Show how the appropriate formula gives the answer. The formulas are copied below.

$${}_n P_r = \frac{n!}{(n-r)!}$$

$${}_n C_r = \frac{{}_n P_r}{r!} = \frac{n!}{r!(n-r)!}$$

5. How many different-looking ways can the word BONOBO be arranged?

6. Let's investigate the different ways that the word AGOG can be rearranged. I calculated that there are  $4!$  or 24 ways that this can be done. They are listed below. Answer the questions that follow.

AGOG	AGGO	AOGG	AOGG	AGGO	AGOG
GAOG	GAGO	GOAG	GOGA	GGAO	GGOA
OAGG	OAGG	OGAG	OGGA	OGAG	OGGA
GAGO	GAOG	GGAO	GGOA	GOAG	GOGA

a.) How do you think I got  $4!$  as the number of ways to write AGOG?

b.) Use the list to explain why this number is not correct. What is the number of ways we can write this word?

7. What is the difference between permutations and combinations? Make up a problem that uses permutations and not combinations, explaining why it specifically uses permutations.

8. Margaret has ten friends, of which she can invite three to a sleepover. How many ways can she make her guest list?

9. Ted has a new set of twenty markers. His little sister, Susie, want to borrow ten markers. How many ways can this be done?

10. Susie will take her ten markers and line them up in a row. How many ways can she do this?