

These are selected questions (numbers copied from book) from Set II of the exercise set. Turn in one paper per group but be sure all members of the group have seen the final answers. Circle your name if the paper that gets turned in is your copy.

It would be somewhat surprising to toss a coin 10 times and get five heads in a row followed by five tails in a row: H H H H H T T T T T

This is due to the fact that there are so many ways in which a coin can turn up in 10 consecutive tosses. By the fundamental counting principle, the number of ways is $2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2$.

1. How many ways is that?

The number of different orders in which you could get **five** heads and **five** tails is the number of permutations of the letters in H H H H H T T T T T.

2. Write an expression with factorials for the number of permutations of these letters. [Then find this value.]

The number of different orders in which you could get **six** heads and **four** tails is the number of permutations of the letters in H H H H H H T T T T.

4. Write an expression with factorials for the number of permutations of these letters. [Then find this value.]

6. Express the number of different orders of getting **seven** heads and **three** tails in terms of factorials. [Then find this value.]

There are 10 orders of getting nine heads and one tail. [They are listed below.]

H H H H H H H H H T	H H H H T H H H H H
H H H H H H H H T H	H H H T H H H H H H
H H H H H H H T H H	H H T H H H H H H H
H H H H H H T H H H	H T H H H H H H H H
H H H H H T H H H H	T H H H H H H H H H

8. Express the number of orders of getting **nine** heads and **one** tail in terms of factorials. [Then show how this is equal to 10.]

There is only one order of getting ten heads and zero tails: H H H H H H H H H H

10. Write an expression with factorials for the number of arrangements of these letters and show that it is equal to 1.

11. [Use your calculations and a few more to complete the following table. Notice, the number of orders with seven heads and three tails would be equal to the number of orders with three heads and seven tails. Why?]

Number of heads	10	9	8	7	6	5	4	3	2	1	0
Number of tails	0	1	2	3	4	5	6	7	8	9	10
Number of orders	1	10									

12. Add the numbers of orders in your table to see if you get the number you calculated in exercise 1. [We have just explored all the possibilities for tossing 10 coins.]