

Section 6.2: Combinations and Permutations

Exercises

Calculate the following quantities. (This is just to ensure that you know how to use the functions on your calculator correctly.)

1. $7!$
2. $8!$
3. $\frac{11!}{4!}$
4. $\frac{10!}{8!}$
5. $\frac{12!}{8!4!}$
6. $\frac{20!}{5!15!}$
7. ${}_{25}P_4$
8. ${}_4P_3$ and ${}_4P_1$
9. ${}_{25}C_4$
10. ${}_5C_3$ and ${}_5C_2$

Calculate the requested permutations.

11. In how many different ways can five boxes be stacked?
12. How many ways are there to seat eight people in a row?
13. A “combination” lock is unlocked by first rotating the dial clockwise to the first number, then rotating the dial counterclockwise to the second number, then clockwise to the third. If there are 50 numbers on the dial and you’re not allowed to repeat a number, how many possible sequences can be formed to open the lock? (Bonus question: is it really a “combination” lock or is it a “permutation” lock?)
14. How many 4-digit PIN numbers are possible if
 - a) digits cannot be repeated?

b) digits can be repeated?

Calculate the requested combinations.

15. For a poker game, each player is dealt five cards from the standard deck of 52 cards. How many different poker hands are possible?
16. For the Lotto 6/49, a player chooses 6 numbers from 1 through 49 (without repetition) and circles them on the card. The winning ticket will then have the same six numbers as the numbers drawn randomly from a barrel at Lotto 6/49 headquarters. How many different possible number selections could the player make?
17. There are twenty-five members of the Math Department at Camosun, and nine members of the Physics Department. If a committee is to be formed from three math faculty and two physics faculty, how many possible committees are there?

Calculate the following quantities.

18. How many different ways are there to rearrange the four letters in the word “math” (the arrangements don’t have to form an actual word)?
19. In how many different ways can 3 people each have a different birthday, assuming that a year has exactly 365 days?
20. There are 24 seats on a particular bus. When 28 grumpy and tired people board the bus, four will be left standing. How many different groups of people left standing could there be?
21. Six horses run a race. Prizes are then awarded for first, second, and third place. How many winning arrangements are possible?
22. In a psychology experiment, a person claiming to have ESP draws 3 cards from a set of 6 cards. If the person is asked what are the three symbols on the cards he’s drawn, how many possible answers could he give if a) the order of the symbols matters or b) the order doesn’t matter.
23. A Math 161 class consists of twenty men and five women. How many ways can a committee be formed if
 - a) the committee has four members?
 - b) the committee has four members – three men and one woman?
 - c) the committee has four members – president, vice-president, secretary, and treasurer?
24. A student committee is formed with two second-year students and two first-year students. If there are 25 second-year students and 52 first year students, how many different committees could there be?