Permutations

date: .... , class: .... , student: ....

1 Exercises

- **Exercise 1:** You have 10 books. In how many ways can you *arrange* 4 of these books on the shelf in your room?

- **Exercise 2:** If 10 sprinters participate in the 100 meters race, in how many ways can gold, silver, and bronze medals be *awarded*?

- **Exercise 3:** A dance class has 7 men and 5 women. How many ways can the instructor form 5 couples to dance the tango?

- **Exercise 4:** Six horses *take part* in a race. In how many different orders can the horses complete the race?

- **Exercise 5:** Lisa's dog gave birth to 4 puppies. Since she has no space for more than one dog, she will give one puppy to each of her four cousins. In how many ways can she distribute the four puppies among her cousins?

- **Exercise 6:** You have 8 balls of different colors and 8 boxes, each *labeled* with a number from 1 to 8. In how many ways can you distribute the 8 balls in the 8 boxes?

- **Exercise 7:** How many anagrams are there of the word "SCHOOL"? How many of these end with the letter L?

- **Exercise 8:** How many anagrams are there of the word "MATHE-MATICS"? How many of these start with the letter M?

- **Exercise 9:** Solve the following equation:

$$\frac{(n+1)!}{n!} + \frac{(n-1)!}{(n-2)!} = 6$$

- **Exercise 10:** Solve the following equation:

$$\frac{n!}{(n-2)!} + \frac{(n-1)!}{(n-3)!} = 8$$

2 Useful links

- Khan Academy: video about counting *outcomes* with *tree diagrams*
  `https://goo.gl/ZbhcNp`

- Khan Academy: video about counting *permutations.*
  `https://goo.gl/cnNnMr`

- Khan Academy: video about the definition of 0!
  `https://goo.gl/u3SL3j`

- Orientamat (unitn): exercises about permutations and dispositions.
  `https://goo.gl/fHzTtj`

Glossary

While reading this document you will encounter some words or expressions that you may find difficult to understand: some of them are highlighted by writing them in *italics*, and their meaning is given here below.

- outcome = risultato

- tree diagram = diagramma ad albero

- disposition = disposizione

- permutation = permutazione

- ordering = ordine/ordinamento

- arrange = sistemare

- awarded = assegnate

- take part = partecipano

- labeled = etichettata