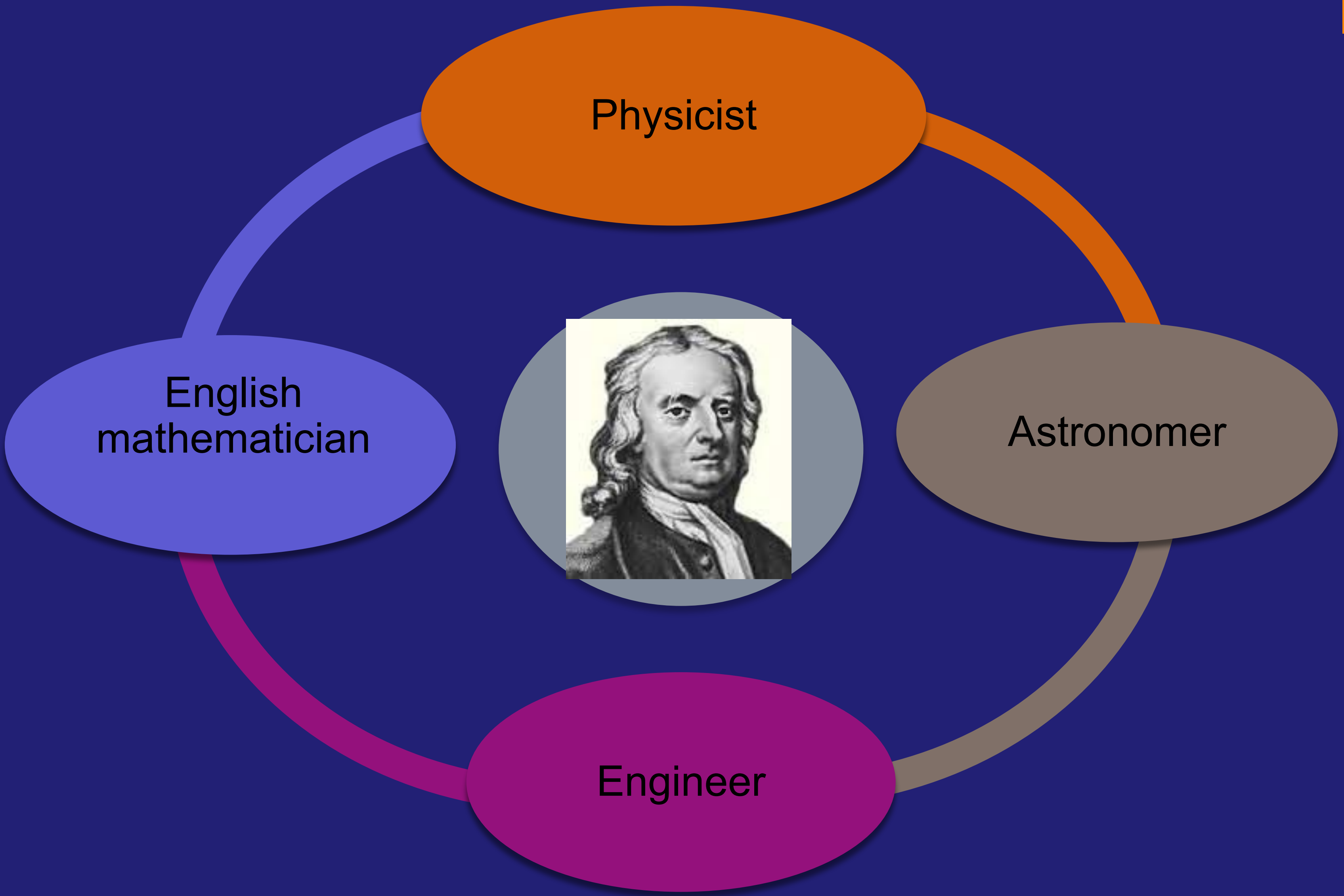
NEWTON BINOMIAL FORMULA


Physicist
English mathematician
Astronomer
Engineer

Developed:

- Differential and integral calculus

Opened:

- light dispersion

He built:

- reflecting telescope

Formuleted

- the basic laws of classical mechanics.

Combinatorics

Permutations

Example 1.

Arrangements

Example 2.

Combinaitions

Example 3.

Permutation

Permutations - compounds that can be composed of n items, changing in every way possible their order; **their number**

$$P_n = n!$$

The number n is called the order permutations.

n - faktorial-

it is the product of all natural numbers from unity and n, denoted by the symbol !

Using factorial sign, you can, for example, write:

$$1! = 1,$$

$$2! = 2*1=2,$$

$$3! = 3*2*1=6,$$

$$4! = 4*3*2*1=24,$$

$$5! = 5*4*3*2*1 = 120.$$

- You must know that 0! = 1

A task

How many ways can sit four musicians?

Solution

$$P_n = n!$$

<u>**P = 4! = 1 * 2 * 3 * 4 = 24**</u>

Arrangements

Arrangements - compounds containing m items out of n data, different subjects or the order or the objects themselves?; their number

$$A_n^m = \frac{n!}{(n-m)!}$$

A task

The M11 group enrolled 24 students.

How many ways can a timetable duty if the duty team consists of three students?

Solution

$$A_{24}^{3} = \frac{24!}{(24-3)!} = \frac{24!}{21!} = \frac{21!*22*23*24}{21!} = 22*23*24 = 12144$$

Answer: The number of ways is equal to the number of placements of 24 to 3, that is, 12144 method.

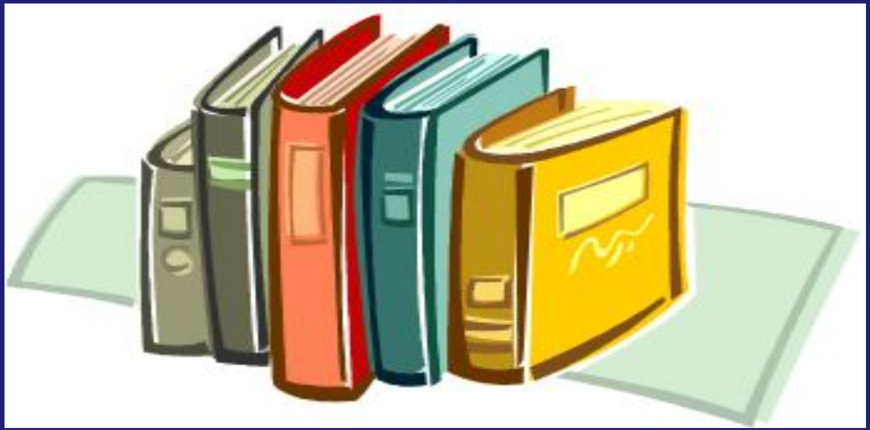
Combinations

Combinations - compounds containing items of m n, differing from each other, at least one subject; their number

$$C_n^m = \frac{n!}{m!(n-m)!}$$

A task

The students were given a list of 10 books, that are recommended to be used to prepare for the exam.



In how many ways a student can choose from these 3 books?

Solution

$$C_{10}^{3} = \frac{10!}{3!*(10-3)!} = \frac{7!*8*9*10}{3!*7!} = \frac{8*9*10}{3!} =$$

$$= \frac{8*9*10}{1*2*3} = \frac{720}{6} = 120$$

- Answer: The number of ways is the number of combinations of 10 to 3, . 120 methods.

Newton binomial formula

- THE BINOMIAL THEOREM shows how to calculate a power of a binomial -- $(a + b)^n$ -- without actually multiplying out.

$$(a+b)^n = \sum_{k=0}^{n} \binom{n}{k} a^{n-k} b^k$$

For example, if we actually multiplied out the 4th power of $(a + b)$ --

$(a + b)^4 = (a + b)(a + b)(a + b)(a + b)$

-- then on collecting like terms we would find:

$(a + b)^4 = a^4 + 4a^3b + 6a^2b^2 + 4ab^3 + b^4$ . . . . . (1)