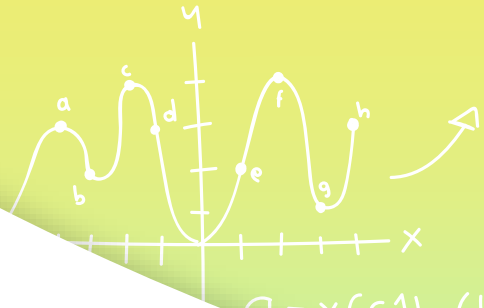
1.3

Combinations



1.3. Combinations

Activity 6

How many different groups of 3 letters can we form from the letters $ABCDEFG$?

1.3. Combinations

Rule 4

The number of different groups of r objects chosen from n objects is:

$$\binom{n}{r} = \frac{n!}{(n-r)!\,r!}$$

1.3. Combinations

Example 6

A committee of 3 people is to be formed from a group of 20 people. How many different committees can be formed?

1.3. Combinations

Example 7

From a group of 5 women and 7 men, how many different committees consisting of 2 women and 3 men can be formed if:

i. There are no restrictions?

ii. Two of the men refuse to serve together on the committee?

1.3. Combinations

Rule 5

The Binomial formula:

$$(x+y)^n = \sum_{k=0}^{n} \binom{n}{k} x^k y^{n-k}$$

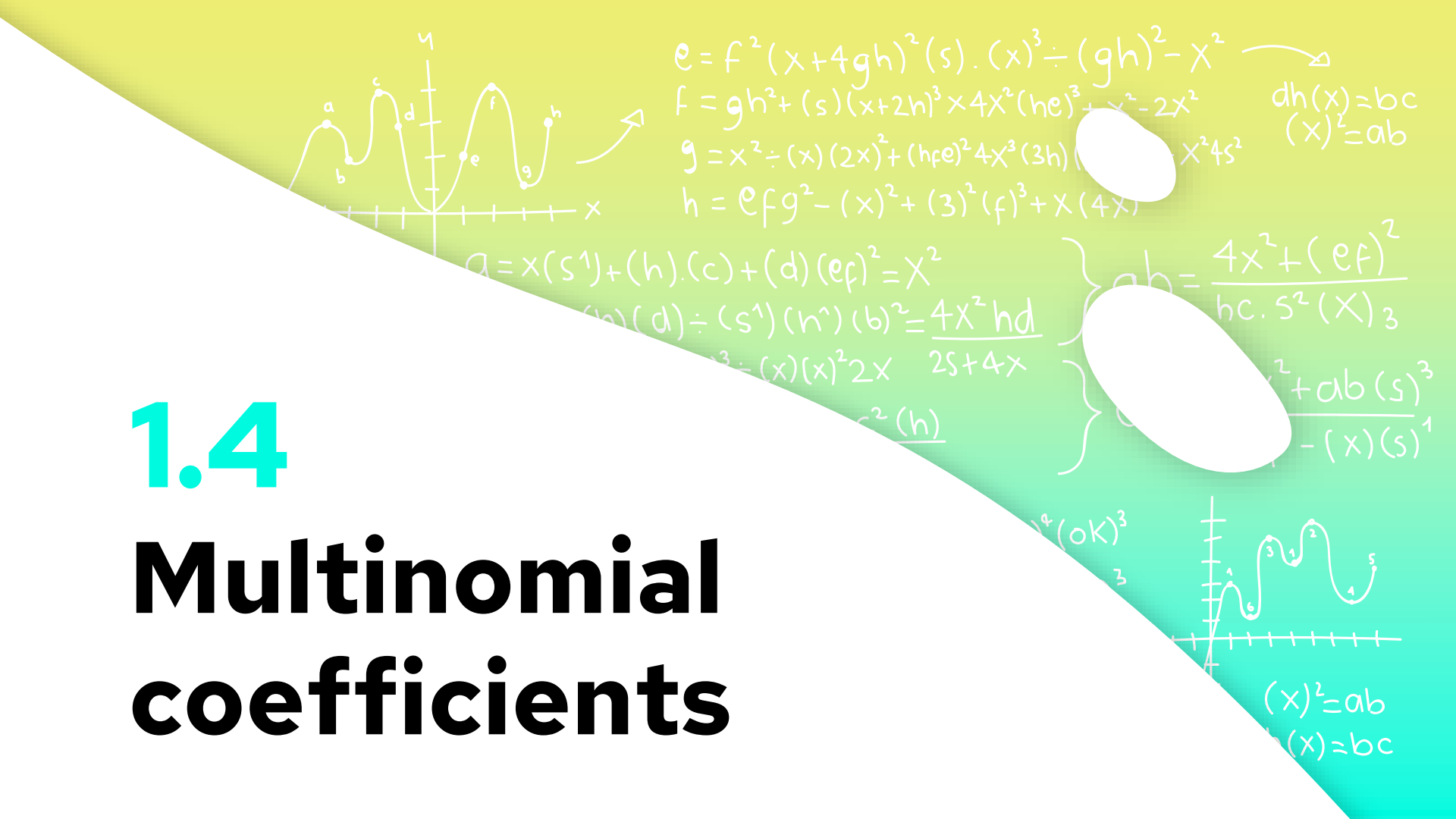
1.3. Combinations

Example 8

How many subsets are there of a set of n elements?

1.4

Multinomial coefficients



1.4. Multinomial coefficients

Activity 7

Ten children are to be divided into two teams A and B of five each. Each team will play in different leagues. How many different divisions are possible?

1.4. Multinomial coefficients

Rule 6

The number of possible divisions of n objects into r distinct groups of respective sizes $n_1, n_2, \ldots, n_r$ is:

$$\binom{n}{n_1, n_2, \ldots, n_r} = \frac{n!}{n_1!\, n_2! \ldots n_r!}$$

1.4. Multinomial coefficients

Example 9

A police department of a small city consist of 10 officers. If the department policy is to have 5 of the officers patrolling the streets, 2 of the officers working full time at the station, and 3 of the officers on reserve at the station. How many different divisions of the 10 officers into the 3 groups are possible?

1.4. Multinomial coefficients

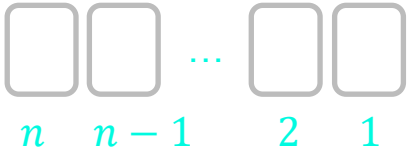
Example 10

Ten children are to be divided into two teams to play against each other a match basketball match. How many different divisions are possible?

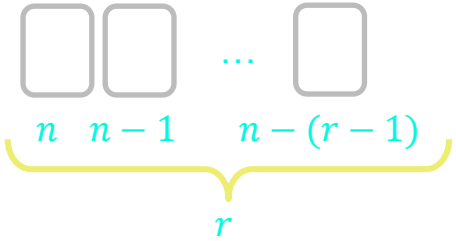
Summary

Counting

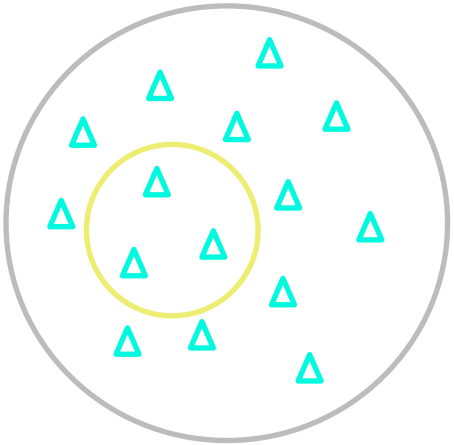
Permutation



Arrangement

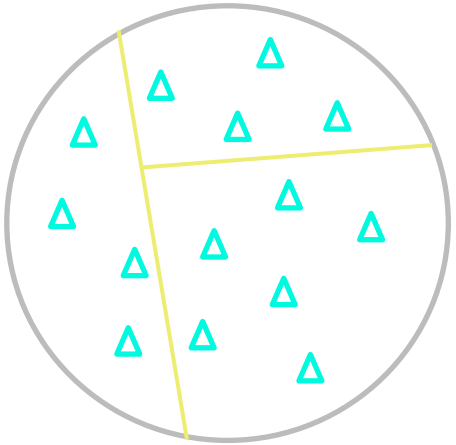


Combination



$$\binom{n}{r} = \frac{n!}{(n-r)!\,r!}$$

Multinomial coefficients



$$\frac{n!}{n_1!\,n_2!\,\dots n_r!}$$