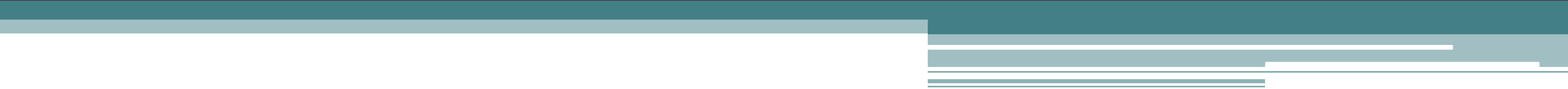


15.6

Permutations

A series of horizontal lines in teal and light blue colors, with varying lengths and offsets, creating a modern, layered effect across the width of the slide.

Permutation - an arrangement of items in a particular order

EX 1

- How many ways can you arrange 3 items in a particular order?

EX 2

- How many ways can you file 12 folders, one after another, in a drawer?

Using ALL items available

Use factorials!

- Factorial:

$$n! = n(n - 1)(n - 2)(n - 3) \cdots (3)(2)(1)$$

$$7! = 7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1$$

$$3! = 3 \cdot 2 \cdot 1$$

$$2! = 2 \cdot 1$$

$$0! = 1$$

ALL available items not being used

Use Permutation Formula!

- n: # of items available
- r: # of items chosen at a time

$${}_nP_r = \frac{n!}{(n-r)!} \quad 0 \leq r \leq n$$

EX 3

- How many 4 letter codes can be made if no letter is used twice?

EX 4

- Ten students are in a race. First, second, and third places will win medals. In how many ways can 10 runners finish first, second and third if no ties are allowed?

How many ways can the letters of the word
“SPECIAL” be arranged using

EX 5

- all the letters?

EX 6

- only four letters at a time?

What can you do when some items are alike?

Use another Permutation Formula!

- n : # of items available
- n_1 : # of items of 1 kind that are alike
- n_2 : # of items of another kind that are alike

$$P = \frac{n!}{n_1! n_2! \dots}$$

EX 7

- Find the number of ways the letters in the word “HUBBUB” can be arranged.

EX 8

- How many different signals can be made by displaying seven flags all at one time on a flagpole? The flags differ only in color: three are red, two are white and two is blue.