

Permutations

Key Words: How many Ways...

Permutation - the number of ways objects in a group can be arranged without repeats.

How many ways can 4 people stand in a line?

$$\underline{4} \times \underline{3} \times \underline{2} \times \underline{1} = 24 \text{ Ways}$$

How many ways can 18 students finish a race in first, second or third place?

3 places

$$\underline{18} \times \underline{17} \times \underline{16} = 4,896 \text{ Ways}$$

How many different ways can you create a 4-digit pin number if no number is repeated?

$$\underline{10} \times \underline{9} \times \underline{8} \times \underline{7} = 5040 \text{ Ways}$$

digits 0-9
(10)

An ice cream parlor has 31 flavors. How many different 3-scoop cones can be created if no flavor is repeated?

$$\underline{31} \times \underline{30} \times \underline{29} = 26,970 \text{ Cones}$$

Permutation Notation

$P(\underline{8}, \underline{4}) \rightarrow$ 8 items & choosing 4 of them

$$\underline{8} \times \underline{7} \times \underline{6} \times \underline{5} = 1680$$

$P(5, \underline{5})$

$$\underline{5} \times \underline{4} \times \underline{3} \times \underline{2} \times \underline{1} = 120$$

Permutations Quick Notes:

Ask:

1. How many total objects/items do I have?
2. How many of those items do I want/need?
 - a. All of them
 - b. A certain amount (*i.e.* 1st, 2nd, 3rd place, would mean I want three positions filled, so I would need to multiply 3 numbers together)
3. Using your response from step 2, set up the number of spaces you need for the amount of numbers you're going to be multiplying together.

****YOUR FIRST NUMBER WILL ALWAYS BE YOUR TOTAL AMOUNT YOU STARTED WITH****

4. Multiply