Group 1:

1) A license plate has **four letters** followed by **two numbers**. How many different license plates can be made?

2) How many different outfits can be made from **3** pairs of shoes, **4** shirts, and **2** pairs of jeans?

3) Two **6**-sided die are rolled. How many possible outcomes are there?

Group 2:

1) A license plate has **three letters** followed by **three numbers**. How many different license plates can be made?

2) How many different meals can be made from **2** appetizers, **5** entrees, and **3** desserts?

3) A **4**-sided die, and a **6** sided die are rolled. How many possible outcomes are there?

#learning

Today we will determine how many outcomes are possible when considering order and position.

Keys:

-I can determine if a situation is an arrangement, permutation or combination.

-I can calculate the number of possible outcomes

World 9-2

ARRANGEMENTS, COMBINATIONS, AND PERMUTATIONS

Arrangements

- Definition: An arrangement is the act of ordering SOME of the items in a set.
- 6 swimmers are competing for the gold, silver, and bronze medals. How many possible ways are there to give out the medals?

Total # of ways = # of people to get Gold x # of people to get Silver x # of people to get Bronze

= 6 x 5 x 4 = 120 possibilities!

- Can I have 3 volunteers?
- How many ways can we organize this four fine folks in a line?
- Answer….
- 6 ways! (3 x 2 x 1)

PERMUTATIONS





How many ways can we arrange x number of cars in their parking spots.

x=3 cars (R,Y,B)

RYB
RBY
YBR = 6 different options
YRB
BYR
BRY

Or,
3 x 2 x 1 = 6

x=4 cars (R,Y,B,W)

4 x 3 x 2 x 1 = 24

X=5 cars (R,Y,B,W)

= 120 ways

More specifically a Permutation is an ordered arrangement of ALL items in a set.

To Remember: Permutation think Position

eg. 1 Organizing 3 students in a row

3 2 1 3x2x1=3! or 6 permutations

eg. 2 Organizing 6 books on a shelf.

6 5 4 3 2 1

6x5x4x3x2x1=6! Or 720 permutations

If order doesn't matter, you have a COMBINATION.

They should really call it a "Permutation Lock"

A Combination is choosing some items from a set of n elements.

The order does not matter.

Remember: **Combination think Choose**

Ex 4: Three friends out of a group of five have to go help Mrs. Cameron carry books to the library. How many combinations of friends can be picked?

$$\text{Number of combinations} = \frac{\text{\# of Arrangements of the 3 friends}}{\text{Permutation of the 3 friends}}$$

$$\text{Number of combinations} = \frac{5 \times 4 \times 3}{3!} = \frac{60}{6} = 10 \text{ combinations}$$

eg. 2 Pick 4 Pool balls out of 16 to place on the table.

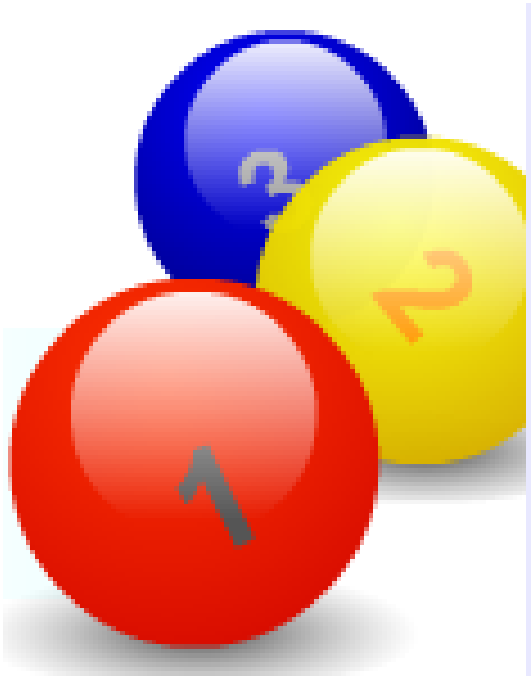
$$\text{\# of Combinations} = \frac{\text{\# of arrangements for the 4 balls}}{\text{\# of permutations for the 4 items}}$$

$$\text{\# of Combinations} = \frac{\text{(ways to pick \#1) x (ways to pick \#2) x (ways to pick \#3) x (ways to pick \#4)}}{\text{\# of permutations for the 4 items}}$$

$$\text{\# of Combinations} = \frac{16 \times 15 \times 14 \times 13}{4!} = 1820$$

Therefore one can pick 1820 different combinations of 4 pool balls from 16 on the table.

Permutations vs Combinations Challenge



Permutation or Combination

A) One chooses 3 different toppings on a tofu burger from a choice of 15 toppings.

Combination

~~Permutation~~

Permutation or Combination

B) Arrange all 6 shirts in your closet. Order is important.

~~Combination~~

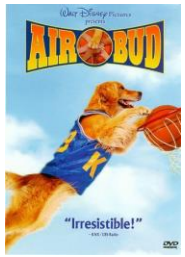
Permutation

Permutation or Combination

C) Take your two favourite movies from a collection of 15 dvds to a friend's for a slumber party.

Combination

~~Permutation~~



Permutation or Combination

D) Make a poker hand by taking the top 5 cards from a deck.

Combination

~~Permutation~~

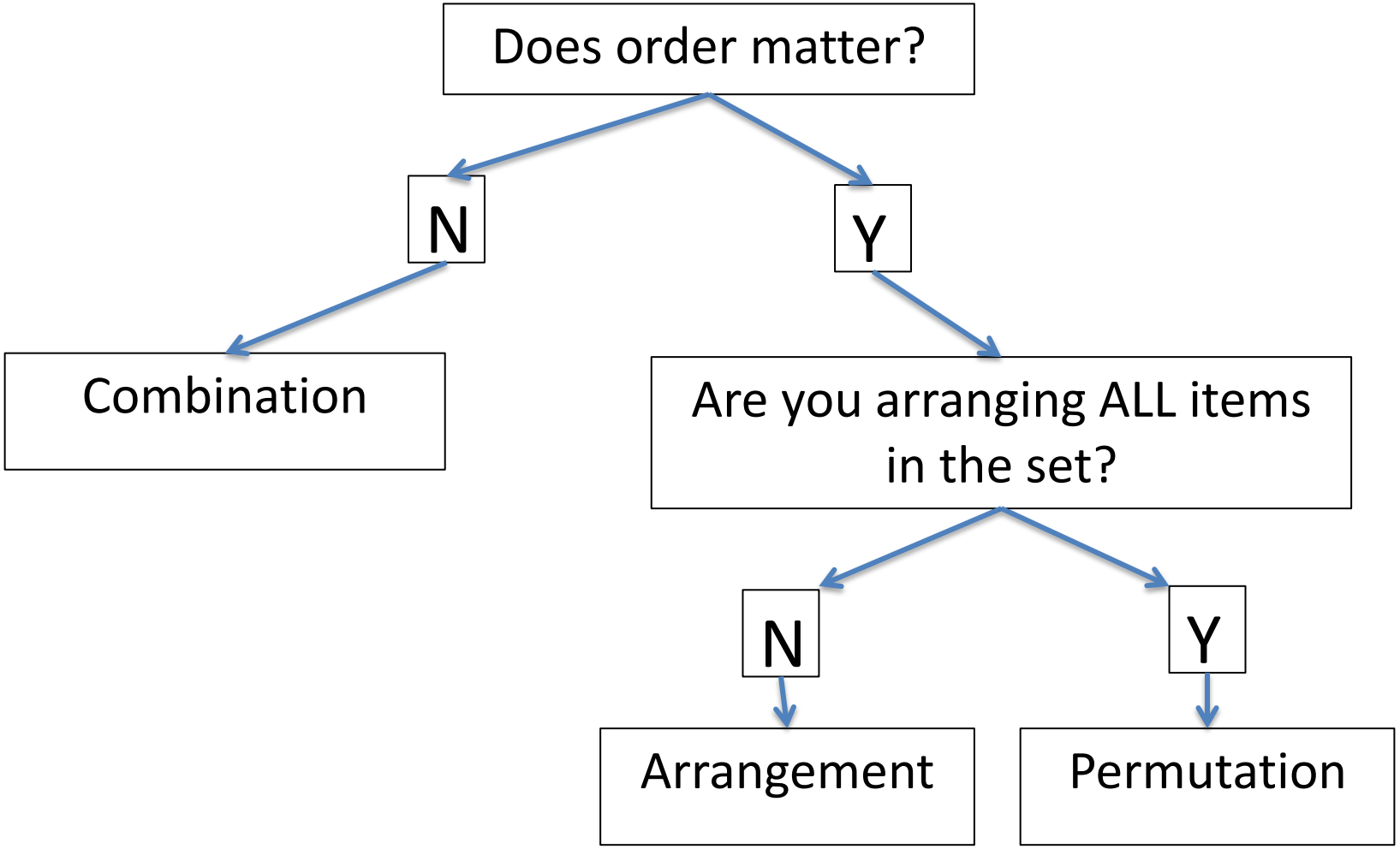
Permutation or Combination

E) A teacher organizes all 12 class tests in alphabetical order.

~~Combination~~

Permutation

SUMMARY


Does order matter?
N
Y
Combination
Are you arranging ALL items in the set?
N
Y
Arrangement
Permutation