

1) Corey is choosing classes; he can pick from 8 maths, 4 english, 12 science and 20 elective courses. If he chooses one of each, how many schedules are possible?

$$8 \cdot 4 \cdot 12 \cdot 20 = \boxed{7,680 \text{ Schedules}}$$

2) Shawn got a girl's number but forgot it. He remembers the 704, the next number was odd, then even and the last was a 6 or 9. How many numbers could it be?

$$\underline{5} \cdot \underline{5} \cdot \underline{10} \cdot \underline{10} \cdot \underline{10} \cdot \underline{10} \cdot \underline{2} = \boxed{500,000}$$

Counting

Our Unit

Today's Main Topic

**Finish FCP,
Combinations and Permutations**

Already Covered this Unit

F.C.P.

Ind v. Dep

Theoretical v. Empirical

**Practice F.C.P.
on WS 102**

State whether the events are independent or dependent.

1. Choosing an ice cream flavor and choosing a topping for the ice cream **Ind**
2. Choosing an offensive player and defensive player of the year for basketball **Ind**
3. From 15 entries in an art contest, determining a 1st, 2nd and 3rd place winners **Dep**
4. Jillian is selecting 2 more courses for her schedule. She must pick one of three morning history classes and one of two afternoon math classes.

Ind

Solve each problem.

5. A briefcase lock has 3 rotating cylinders, each containing 10 digits. How many codes are possible?

1000

$$\underline{10} \cdot \underline{10} \cdot \underline{10} =$$

6. A golf club manufacturer makes irons with 7 different lengths, 3 different grips, 5 different lies and 2 different materials. How many different types of club could be made?

210

7. There are five different routes that a commuter can take from her home to work. In how many ways can she make a round trip if she uses a different route coming and going?

20

~~5~~

$$\underline{5} \cdot \underline{4}$$

8. In how many ways can the four call letters of a radio station be arranged if the first letter must be W or K and no letters are repeated?

27,600

$$\underline{2} \cdot \underline{25} \cdot \underline{24} \cdot \underline{23}$$

Combinations

Shaking
Hands

Combinations

An arrangement of items or events where order is NOT important

ORDER DOES NOT MATTER!

- Just Picking from a Larger Group (no role or ranking)

At an art gallery, the curator is selecting 4 paintings out of 20 on display to showcase an artist's work. How many groups of 4 could be chosen?

Combination (No Order)

$$\frac{n!}{(n-r)!r!}$$

$n = \text{total}$
 $r = \# \text{ Selected}$

$$nC_r$$

$$20C_4$$

$$4,845$$

Permutations

Punching

Permutations

An arrangement of items or events in which the order is important.

ORDER MATTERS!!

- **Rank or Placement (race)**
- **Group with Specific / Different Roles or Jobs**

Ten students are in a race; 1st, 2nd and 3rd will win medals. How many ways can the 10 runners finish 1st, 2nd and 3rd (no ties)?

3 Ways to Answer Permutation (Order)

1) F.C.P. $\underline{10} \cdot \underline{9} \cdot \underline{8} = \boxed{720}$

2) $\frac{n!}{(n-r)!}$

3) Calc. nPr ${}_{10}P_3 = \boxed{720}$

Permutations

Factorials can save you some time with permutations!

$$\text{Ex. } 5! = 5 \times 4 \times 3 \times 2 \times 1$$

There is a board of directors with 10 members;

a. How many ways could they sit in a conference room (there are 10 chairs)?

$$P \quad {}_{10}P_{10} = 10 \cdot 9 \cdot 8 \cdot 7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1 = 3,628,800$$

b. How many ways could they elect a chairperson, vice-chair, treasurer and secretary (only 1 person per job)?

$${}_{10}P_4 = 10 \cdot 9 \cdot 8 \cdot 7 = 5040$$

$${}_{10}C_4 = 210$$