**CH.14 PROBABILITY NOTES** NAME: Class notes 14.2 PER:

### basic counting principle

If ***event 1 can*** occur ***m*** different ways and ***event 2 can*** occur ***n*** different ways (after the first has occurred), then the two events can occur ***m•n*** ways.

**→Use a decision chart to compute your answer!**

____ · ____ · ____ · ____

### permutation

an arrangement of items in a certain order where items *cannot be repeated* (such as students sitting in a row of desks.)

**The number of permutations of n objects is n!**

**P(n, r):** the number of permutations of **n** objects taken **r** at a time.

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

### distinguishable permutation

The number of permutations of **n** objects of which **p** are alike, **q** are alike, and **r** are alike :

$$\frac{n!}{p!q!r!etc.}$$

*repetitions must be accounted for*

*be sure to use parentheses around denominator when solving in a calculator!*

### combination

the order of the items is not a consideration and items *cannot be repeated* (a combination pizza or a committee of people)

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

### independent events

**independent events** do NOT affect each other (rolling dice)

**dependent events** do affect each other (choosing cards from a deck, no replacement)

### Probability

$$P = \frac{\#\text{ of desired outcomes}}{\text{total \# of outcomes}}$$

**Sample Space:** set of all outcomes

Complements

**P(A)** = probability of event A

**P(A′)** = prob. of event A not happening

**P(A) + P(A′) = 1**

### intersection of two events

**P(A ∩ B)**
**same as**
**P(A and B) = P(A)•P(B)**

### union of two events

**P(A ∪ B) → same as P(A or B)**

**→mutually exclusive events**

cannot happen at the same time

**P(A or B) = P(A) + P(B)**

**→NOT mutually exclusive**

some objects can satisfy the conditions of both events

**P(A or B) = P(A) + P(B) − P(both)**

## Standard deck of playing cards:

- **52 cards→ 4 suits (spades, hearts, clubs, diamonds)**
- **Each suit has 13 cards**
- **Face cards: Jack, Queen, King**

- **Aces are low unless stated otherwise (Ace = 1)**

### conditional probability

reduces the sample space since an event has already occurred

$P(A|B)$ = The probability of "event A" given "event B."