ADDING PROBABILITIES

MUTUALLY EXCLUSIVE EVENTS

Events that cannot occur at the same time

If two events, A and B, are mutually exclusive, then

$$P(A \text{ or } B) = P(A) + P(B)$$

EXAMPLE 1: KEISHA HAS A STACK OF 8 BASEBALL CARDS, 5 BASKETBALL CARDS, AND 6 SOCCER CARDS. IF SHE SELECTS A CARD AT RANDOM FROM THE STACK, WHAT IS THE PROBABILITY THAT IT IS A BASEBALL OR A SOCCER CARD?

$$\frac{8}{19} + \frac{6}{19} = \boxed{\frac{14}{19}}$$

EXAMPLE 2: THERE ARE 7 GIRLS AND 6 BOYS ON THE JUNIOR CLASS HOMECOMING COMMITTEE. A SUBCOMMITTEE OF 4 PEOPLE IS BEING CHOSEN AT RANDOM TO DECIDE THE THEME FOR THE CLASS FLOAT. WHAT IS THE PROBABILITY THAT THE SUBCOMMITTEE WILL HAVE AT LEAST 2 GIRLS?

$$P(2 \text{ girls}) + P(3 \text{ girls}) + P(4 \text{ girls})$$

$$\frac{C(7,2)\cdot C(6,2)}{C(13,4)} + \frac{C(7,3)\cdot C(6,1)}{C(13,4)} + \frac{C(7,4)\cdot C(6,0)}{C(13,4)}$$

$$\frac{315}{715} + \frac{210}{715} + \frac{35}{715} = \frac{112}{143} \approx .78$$

INCLUSIVE EVENTS

Two events that are not mutually exclusive- able to occur at the same time.

If two events, A and B, are inclusive:

$$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$$

EXAMPLE 3: THE ENROLLMENT AT SOUTHBURG HIGH SCHOOL IS 1400. SUPPOSED 550 STUDENTS TAKE FRENCH, 700 TAKE ALGEBRA, AND 400 TAKE BOTH FRENCH AND ALGEBRA. WHAT IS THE PROBABILITY THAT A STUDENT SELECTED AT RANDOM TAKES FRENCH OR ALGEBRA?

$P(\text{French}) = \frac{550}{1400}$

$P(\text{algebra}) = \frac{700}{1400}$

$P(\text{French + algebra}) = \frac{400}{1400}$

$\frac{550}{1400} + \frac{700}{1400} - \frac{400}{1400} = \boxed{\frac{17}{28}}$

EXAMPLE 4: A PAIR OF DICE IS ROLLED. WHAT IS THE PROBABILITY THAT THE SUM IS ODD OR A MULTIPLE OF 3?

$\frac{18}{36} + \frac{12}{36} - \frac{6}{36} = \boxed{\frac{2}{3}}$

1,2 2,3
2,1 3,2
1,4 2,5
4,1 5,2
1,6 etc.
6,1