#### Warm-Up

Ms. Holtmeyer is writing a quiz!! She needs to have 5 questions from section 1 which has a possible 15 questions, 4 questions from section 2 (possible 10) and 2 questions from section 3 (possible 5). How many different ways can she write her quiz?

$$\frac{15}{3003}$$
  $\frac{10}{210}$   $\frac{5}{2}$   $\frac{5}{2}$   $\frac{10}{4}$   $\frac{5}{2}$   $\frac{10}{4}$   $\frac{10}{4$ 

# 8.7 Probability

# **SAMPLE SPACE**

The set of all possible outcomes for an experiment is called the sample space.

So what was the sample space for our warm up?

#### **PROBABILITY**

The probability for a selected event is the likelihood of it occurring.

For event E, the probability of it occurring is given by:

$$P(E) = \frac{\text{# of ways } E \text{ can occur}}{Sample Space}$$

Rolling a 7 with two six-sided dice.

Rolling a 2 with two six-sided dice.



Picking a card from a full deck and getting an ace.

$$\frac{4}{52} = \frac{1}{13}$$

Picking a card from a full deck and NOT gettingan ace.

$$\frac{48}{52} = \frac{12}{13}$$

Picking a card from a full deck and getting a red card.

$$\frac{26}{52} = \frac{1}{2}$$

Picking a card from a full deck and NOT getting a red card.



#### **COMPLEMENTS**

The complement of event E, called E', is all of the ways that E can NOT happen.

$$P(E') = 1 - P(E)$$

#### Examples:

$$P(E') = .65456$$
  
 $P(E') = 1 - .65456$ 

$$P(E) = \frac{32}{76}$$

$$P(E') = \frac{74 - \frac{32}{74}}{74 - \frac{32}{74}} = \frac{32}{74}$$

Picking two cards from a full deck, without replacement and getting two jacks.

$$\frac{4}{52} \cdot \frac{3}{51} = \frac{1}{221}$$

Picking two cards from a full deck, without replacement and NOT getting two jacks.

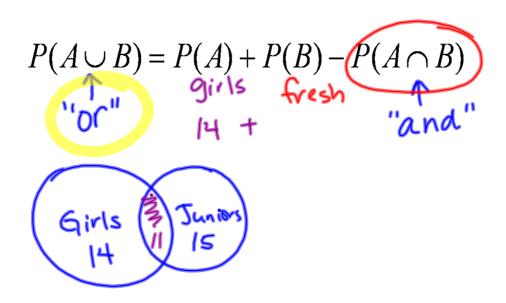
$$\left| - \frac{1}{221} \right| = \frac{220}{221}$$

Picking five cards from a full deck, without replacement and getting four of a kind.

Picking five cards from a full deck, without replacement and NOT getting four of a kind.

# The Probability of the Union of Two Events

If and A and B are events in the same sample space, then the probability of A **or** B occurring is given by:



Picking a card from a deck that is black OR less than or equal to 4. (Aces are low)

$$\frac{26}{52} + \frac{16}{52} - \frac{8}{52} = \frac{34}{52}$$

$$\frac{26}{52} + \frac{16}{52} - \frac{16}{52} = \frac{34}{52}$$

$$\frac{26}{52} + \frac{16}{52} = \frac{34}{52}$$

Picking a card from a deck that is a club OR a face card.

$$\frac{13}{52} + \frac{12}{52} - \frac{3}{52} = \frac{22}{52} = \frac{11}{26}$$

Homework 8.7

page 620 #1 - 35 odd, 43 - 51 odd