

Goal: Use principles of probability to develop theorems for finding probabilities of unions or complementary events

Warm Up: According to the Nielsen Media Research in October 2008, of the 113.1 million US households that owned at least one TV set, 82% had 2 or more TV sets and 88% received basic cable. From this information, what are the largest and smallest percent of households that might have both 2 or more TV sets and also have basic cable?

Questions

Activity 1: Using a pair of fair six-sided dice:

| Sum | Your Frequency | Class Frequency |
|-----|----------------|-----------------|
| 2 | | |
| 3 | | |
| 4 | | |
| 5 | | |
| 6 | | |
| 7 | | |
| 8 | | |
| 9 | | |
| 10 | | |
| 11 | | |
| 12 | | |

1. Toss the dice 20 times and record the sum of the face-up numbers each time.
2. Complete the frequency table.
3. a. What was the class's relative frequency of having a sum of 7?
 b. What was the class's relative frequency of having a sum of 12?

c. What was the class's relative frequency of having a sum of 7 or 11?

4. Complete the table and answer the questions about the class

| | |
|-----------------|--|
| # of sophomores | |
| # of juniors | |
| # of seniors | |
| # of males | |
| # of females | |

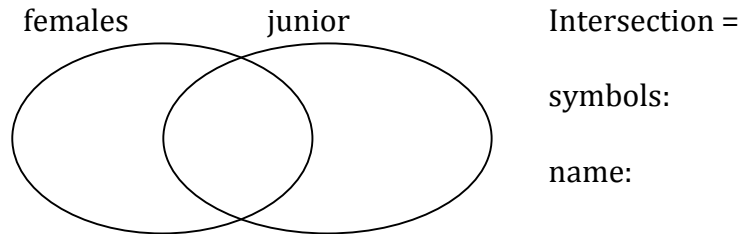
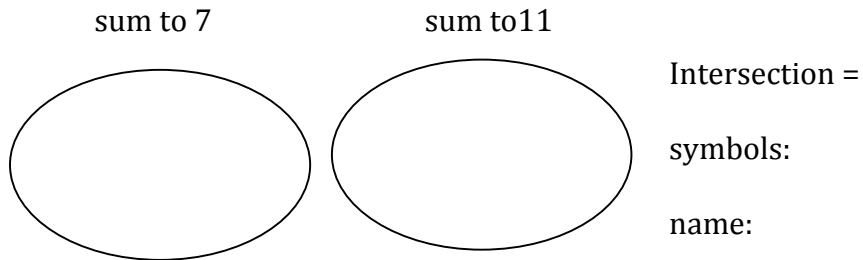
- a. What is the probability of randomly selecting a junior from the class?
- b. What is the probability of randomly selecting a female from the class?

c. What is the probability of randomly selecting a junior or a female from the class?

Questions

Overlapping Events

In the situations above, some outcomes overlap and others do not.



Example 1: In a standard deck of cards, how many cards are face cards or and aces?

Addition Counting Principle (Mutually Exclusive Form)
If two finite sets A and B are mutually exclusive, then $N(A \cup B) = N(A) + N(B)$.

Example 2: In a standard deck of cards, how many cards are even and red? How many are even or red?

Addition Counting Principle (General Form)
For any finite sets A and B , $N(A \cup B) = N(A) + N(B) - N(A \cap B)$.

Example 3: Suppose at Swenson Memorial High School, 298 students study French, Spanish or both. The school reports that 115 students are enrolled in French while 209 are enrolled in Spanish. How many study both?

Theorem (Probability of the Union of Events, General Form)

If A and B are any events in the same finite sample space, then $P(A \text{ or } B) = P(A \cup B) = P(A) + P(B) - P(A \cap B)$.

Example 4: In a standard deck of cards,

- a. What is the probability of choosing face card?
- b. What is the probability of choosing a red card?
- c. What is the probability of choosing an even numbered card?
- d. What is $P(\text{even and red})$?
- e. What is $P(\text{even or red})$?

Example 5: A pair of six-sided dice is thrown. If the dice are fair, what is the probability that the dice show doubles or a sum less than 10?

Questions

Questions

Complementary Events

Complementary events are events that have intersection _____ and their union is _____

Theorem (Probability of Complements)

If A is any event, then $P(\text{not } A) = 1 - P(A)$.

Example 6: At Swenson Memorial HS, what is the probability of randomly selecting a student who is not studying both French and Spanish?

Example 7: In a standard deck of cards,

- a. What is the probability of choosing a non-red card?

- b. What is the probability of choosing not even or red?

Summary: