Section 9-7: Probability of Multiple Events

Independent Events:
When the outcome of the first event does NOT affect the outcome of the second event.

P(A and B) = P(A) • P(B)

Dependent Events:
When the outcome of the first event DOES affect the outcome of the second event.

P(A and B) = P(A) • P(BafterA)

A nationwide survey found that 72% of people in the United States like pizza. Three people are selected at random. Find each probability as a percent to the nearest tenth.

1. What is the probability that all three like pizza?

$.72 \cdot .72 \cdot .72 = 37.3\%$

2. What is the probability that only one of them likes pizza?

$.72 \cdot .28 \cdot .28 = 5.6\%$

Mrs. McKenzie needs two students to help her with a science demonstration for her class of 16 girls and 11 boys. She randomly chooses one student who comes to the front of the room. She then chooses a second student from those still seated. Find each probability as a fraction.

1. What is the probability that both students chosen are girls?

$\frac{16}{27} \cdot \frac{15}{26} = \frac{240}{702}$

2. What is the probability that one student is a girl and one student is a boy?

$\frac{16}{27} \cdot \frac{11}{26} = \frac{176}{702}$

Mutually Exclusive Events:
When two events CAN'T happen at the same time.

Are studying for a test and listening to musich mutally exclusive events? NO

Are reading a book and sleeping mutally exclusive? YES

Are being 5'3" tall and being able to dunk a basketball mutually exclusive? NO

Mugsy Bogues was an NBA player at 5'3" tall and he could dunk the ball.

Is each pair of events mutually exclusive?

1. Getting an even number or a 5 when you roll a die. Yes
2. Getting a multiple of 3 or an even number when you roll a die. NO
3. Getting a prime number or an even number when rolling a die. No
4. Rolling a 2 or a 3 on a die. Yes

Two events are NOT mutually exclusive if:

they CAN happen at the same time.

Is each pair of events mutually exclusive?

1. Driving your car and texting. NO
2. Driving your car and swimming. Yes
3. Two numbers add to 5 and have a product of zero. NO
4. Two numbers have an odd product and an odd sum. Yes

Probability of (A or B)

If A and B are NOT mutually exclusive:

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

$P(A \text{ and } B) = P(A) \bullet P(B)$ (USUALLY)

If A and B ARE mutually exclusive:

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

6. Find each probability as a fraction.

a) The probability that it snows today= $\frac{1}{100}$ and the probability that my car doesn't start today = $\frac{2}{75}$

Find P(snows tomorrow or car doesn't start) =

$\frac{75}{75} \cdot \frac{1}{100} + \frac{2}{75} \cdot \frac{100}{100} - \frac{1}{100} \cdot \frac{2}{75}$

$= \frac{75}{7500} + \frac{200}{7500} - \frac{2}{7500}$

$\frac{273}{7500}$

b) The probability that you score more than 10 points in the basketball game is $\frac{3}{8}$ and the probability that you don't score any pionts is $\frac{1}{6}$.

Find P(score > 10 points or score 0 points)=

$\frac{3}{3} \cdot \frac{3}{8} + \frac{1}{6} \cdot \frac{4}{4} = \frac{13}{24}$

The probability that hitter strikes out is 12% and the probability that they get a hit is 30%. Find the probability that, in their next at bat, the hitter strikes out or gets a hit.

P(strike out or get a hit)= 42%

12 + 30