Time Frame: 50 minutes

Subject Matter: The Multiplication Rules of Probability

Anticipatory Set:

Multiply the following without using a calculator.

1. $\frac{1}{4}×\frac{1}{2}$ 2. $\frac{3}{7}×\frac{2}{5}$ 3. $\frac{5}{6}×\frac{1}{3}$

Objective: TSWBAT find the probability of compound events using the multiplication rule # 1.

Standards: DA – 1.1, 1.2, & 1.5

Materials: Textbook, O.H.P. & Transparencies

**SHOW ME**

Presentation of Information:

Definition of Terms:

Two events ***A*** and ***B*** are ***independent events*** if the fact that ***A*** occurs does not affect the probability of ***B*** occurring.

Examples of Independent events

1. If a coin is tossed and then a die is rolled.
2. Rolling a die and getting a 6, and then rolling a second die and getting a 3.
3. Drawing a card from a deck and getting a queen, replacing it, and drawing a second card and getting a jack.
* **Multiplication Rule # 1**

When two events A and B are independent, the probability of both occurring is

***P(A*** and ***B) = P(A)*** $×$ ***P(B)***

**Example 1:**

 A coin is flipped and a die is rolled. Find the probability of getting a head on the coin and a 4 on the die.

 Solution:

1. Rule: ***P(A*** and ***B) = P(A)*** $×$ ***P(B)***
2. ***P(head*** and ***4) = P(head)*** $×$ ***P(4)*** $= \frac{1}{2}×\frac{1}{6}= \frac{1}{12}$

**Example 2:**

 A card is drawn from a deck and replaced; then a second card is drawn. Find the probability of getting a queen and then an ace.

 Solution:

1. Rule: ***P(A*** and ***B) = P(A)*** $×$ ***P(B)***

***P(queen*** and ***ace) = P(queen)*** $×$ ***P(ace)*** $= \frac{4}{52}×\frac{4}{52}= \frac{16}{2704}= \frac{1}{169}$

**Example 3:**

 An urn contains 3 red balls, 2 blue balls, and 5 white balls. A ball is selected and its color is noted. Then it is replaced. A second ball is selected and its color is noted. Find the probability of each of these.

1. Selecting two balls.
2. Selecting a blue ball and then a white ball.
3. Selecting a red ball and then a blue ball.

 Solution:

* ***P(blue*** and ***blue) = P(blue)*** $×$ ***P(blue)*** $= \frac{2}{10}×\frac{2}{10}= \frac{4}{100}= \frac{1}{25}$
* ***P(blue*** and ***white) = P(blue)*** $×$ ***P(white)*** $= \frac{2}{10}×\frac{5}{10}= \frac{10}{100}= \frac{1}{10}$
* ***P(red*** and ***blue) = P(red)*** $×$ ***P(blue)*** $= \frac{3}{10}×\frac{2}{10}= \frac{6}{100}= \frac{3}{50}$

**Example 4:**

A Harris poll found that 46% of Americans say they suffer great stress at least once a week. If three people are selected at random, find the probability that all three will say that they suffer stress at least once a week.

 Solution:

 Let S denote stress. Then

* ***P(S*** *and* ***S*** *and* ***S******) = P(S)*** $×$ ***P(S)*** $×$ ***P(S)***
* ***P(S*** *and* ***S*** *and* ***S******) = (0.46)*** $×$ ***(0.46)*** $×$ ***(0.46) = 0.097***

**Example 5:**

Approximately 9% of men have a type of color blindness that prevents them from distinguishing between red and green. If three men are selected at random, find the probability that all of them will have type of red-green color blindness.

 Solution:

 Let C denote red-green color blindness. Then

* ***P(C*** *and* ***C*** *and* ***C******) = P(C)*** $×$ ***P(C)*** $×$ ***P(C)***
* ***P(S*** *and* ***S*** *and* ***S******) = (0.09)*** $×$ ***(0.09)*** $×$ ***(0.09) = 0.000729***

**Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**LET ME TRY**

1. If 18% of all Americans are underweight, find the probability that if three Americans are selected at random all will be underweight. (*Source: 100% American*)
2. A survey found that 68%of the book buyers are 40 years or older. If two book buyers are selected at random, find the probability that both are 40 years or older. (*Source: USA TODAY Snapshot*)
3. At a local university 54.3% of incoming first-year students have computers. If three students are selected at random, find the following probabilities.
4. None have computers.
5. All have computers.
6. Three cards are drawn from a deck with replacement. Find these probabilities.
7. All are jacks
8. All are clubs
9. All are red cards

**Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**HOMEWORK**

1. Seventy-three percent of diners favor the practice of tipping to reward good service. If five diners are selected at random, what is the probability that all five are in favor of tipping?
2. If 25% of U.S. federal prison inmates are not U.S. citizens, find the probability that two randomly selected federal prison inmates will not be U.S. citizens.
3. If two cards are selected from a deck of cards with replacement, find these probabilities.
4. Both are spades.
5. Both are same suit.
6. Both are kings.