CONDITIONAL PROBABILITY

1. Determine the following conditional probabilities.

Consider a bag with marbles, 3 blue marbles, 2 red marbles, and 5 green marbles. Three marbles are drawn in sequence and are taken without replacement.

i. \( P(\text{2nd draw: blue} \mid \text{1st draw: red}) = \frac{2}{9} \)

ii. \( P(\text{2nd draw: blue} \mid \text{1st draw: blue}) = \frac{0}{1} \)

iii. \( P(\text{3rd draw: blue} \mid \text{1st draw: red, 2nd draw: blue}) = \frac{2}{7} \)

2. Determine the following conditional probabilities.

Consider drawing 1 card from a standard deck of shuffled cards:

i. \( P(\text{Queen} \mid \text{Face Card}) = \frac{4}{12} = \frac{1}{3} \)

ii. \( P(\text{Heart with a Number} \mid \text{Red Card}) = \frac{9}{20} \)

iii. \( P(\text{Card with a Letter} \mid \text{King}) = \frac{4}{26} = \frac{1}{6} \)

iv. \( P(\text{number less than 6} \mid \text{Face Card}) = \frac{0}{12} = 0 \)

v. \( P(\text{Black Jack} \mid \text{Face Card}) = \frac{2}{12} = \frac{1}{6} \)

3. Consider the following table with information about all of the students taking Statistics at Phoenix High School.

<table>
<thead>
<tr>
<th></th>
<th>Full-time</th>
<th>Part-Time</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>28</td>
<td>15</td>
<td>43</td>
</tr>
<tr>
<td>Male</td>
<td>12</td>
<td>16</td>
<td>28</td>
</tr>
<tr>
<td>Total</td>
<td>40</td>
<td>31</td>
<td>71</td>
</tr>
</tbody>
</table>

Determine whether each of the following are Mutually Exclusive or Inclusive and then determine the probability.

4. What is the probability of rolling a standard number cube to a number that is even or greater than 4?

5. What is the probability of rolling two dice and having getting a sum of 4 OR getting a sum greater than 10?
7. What is the probability of randomly selecting a card from a standard 52 card deck and having the card be a red card or a face card?

\[ P(\text{RED CARD}) + P(\text{FACE CARD}) - P(\text{RED AND FACE CARD}) \]
\[ \frac{26}{52} + \frac{12}{52} - \frac{6}{52} = \frac{32}{52} \]

**Circle one of the following:**

- Mutually Exclusive
- Inclusive

**Reduced Fraction:**

\[ \frac{32}{52} = \frac{8}{13} \]

8. What is the probability of randomly selecting a card from a standard 52 card deck and having the card be a face card or an odd numbered card?

\[ P(\text{FACE CARD}) + P(\text{ODD CARD}) - P(\text{FACE CARD AND ODD CARD}) \]
\[ \frac{12}{52} + \frac{16}{52} - \frac{6}{52} = \frac{22}{52} \]

**Circle one of the following:**

- Mutually Exclusive
- Inclusive

**Reduced Fraction:**

\[ \frac{22}{52} = \frac{7}{13} \]

9. The following shows a VENN diagram with the results of a survey a teacher gave to all of her students. It represents where all of the students have gone to eat over the last month. What is the probability of the following?

i. What is the probability of randomly selecting a person from this group and picking a student that has NOT eaten at any of the restaurants OR they ate at McDonald’s?

\[ P(\text{No Restaurant}) + P(\text{McDonald’s}) - P(\text{No Restaurant AND McDonald’s}) \]
\[ \frac{17}{90} + \frac{23}{90} - \frac{0}{90} = \frac{40}{90} \]

**Circle one of the following:**

- Mutually Exclusive
- Inclusive

**Reduced Fraction:**

\[ \frac{40}{90} = \frac{4}{9} \]

ii. What is the probability of randomly selecting a person from this group and picking a student that has eaten at McDonald’s OR Chick-fil-a?

\[ P(\text{McDonald’s}) + P(\text{Chick-fil-a}) - P(\text{McDonald’s AND Chick-fil-a}) \]
\[ \frac{23}{90} + \frac{37}{90} - \frac{10}{90} = \frac{50}{90} \]

**Circle one of the following:**

- Mutually Exclusive
- Inclusive

**Reduced Fraction:**

\[ \frac{50}{90} = \frac{5}{9} \]