PROBABILITY EXERCISE

For the following probability practice questions, use the following formulas. **NOTE:** the formulas are in the basic format and may require slight modification to account for subsequent events. Identify the correct formula, set-up the equation correctly, then calculate the correct final answer (round to two decimals). Each formula is used twice.

**Formula 1:**

\[ p(A) = \frac{\text{Number of events classifiable as } A}{\text{Total number of possible events}} \]

**Formula 2:**

\[ p(A \text{ or } B) = p(A) + p(B) - p(A \text{ and } B) \]

**Formula 3:**

\[ p(A \text{ or } B) = p(A) + p(B) \]

**Formula 4:**

\[ p(A \text{ and } B) = p(A) \times p(B|A) = p(A) \times p(B) \]

**Formula 5:**

\[ p(A \text{ and } B) = p(A) \times p(B|A) \]

1. What is the probability of obtaining a number that is less than or equal to 2 on a single roll of a 6-sided die (1 – 6)?

   Using Formula ______

2. What is the probability of obtaining an odd number or an even number less than or equal to 10 from a sample space of 20 numbers (1 through 20)?

   Using Formula ______
PROBABILITY EXERCISE

3. There are 15 red balls, 15 green balls, and 20 yellow balls thoroughly mixed in a drum. What is the probability of drawing a yellow ball on the first try, not replacing it in the drum, and then drawing a red ball on the second try?

Using Formula ______

4. What is the probability of obtaining an odd number or a number less than 6 from a sample space of 20 numbers (1 through 20)?

Using Formula ______

5. There are 10 red balls and 8 yellow balls thoroughly mixed in a drum. What is the probability of drawing a red ball on the first try, replacing it in the drum, and then drawing a yellow ball on the second try?

Using Formula ______
6. What is the probability of selecting a number less than 6 or selecting an odd number greater than 4 from a sample space of 10 numbers (1 through 10)?

Using Formula ______

7. What is the probability of selecting a number that is a multiple of 2 out of a sample space of 10 numbers (1 – 10)?

Using Formula ______

8. There are 15 red balls, 15 green balls, and 20 yellow balls thoroughly mixed in a drum. What is the probability of drawing a green ball on the first try, replacing it in the drum, drawing a green ball on the second try, replacing it back in the drum, and then drawing a yellow ball on the third try?

Using Formula ______
9. What is the probability of selecting a number that is greater than or equal to 7 or less than 3 from a sample space of numbers from 1 through 10?

Using Formula ______

10. There are 10 red balls, 10 yellow balls, and 10 green balls thoroughly mixed in a drum. What is the probability of drawing a red ball on the first try, not replacing it, then drawing another red ball on the second try, not replacing it, and then drawing another red ball on the third try?

Using Formula ______
For the following probability practice questions, use the following formulas. Note: the formulas are in the basic format and may require slight modification to account for subsequent events. Identify the correct formula, set-up the equation correctly, then calculate the correct final answer (round to two decimals). Each formula is used twice.

**Formula 1:**

\[
p(A) = \frac{\text{Number of events classifiable as } A}{\text{Total number of possible events}}
\]

**Formula 2:**

\[
p(A \text{ or } B) = p(A) + p(B) - p(A \text{ and } B)
\]

**Formula 3:**

\[
p(A \text{ or } B) = p(A) + p(B)
\]

**Formula 4:**

\[
p(A \text{ and } B) = p(A) \times p(B|A) = p(A) \times p(B)
\]

**Formula 5:**

\[
p(A \text{ and } B) = p(A) \times p(B|A)
\]

1. What is the probability of obtaining a number that is less than or equal to 2 on a single roll of a 6-sided die (1 – 6)?

Using Formula 1

\[
p(A) = \frac{\text{Number of events classifiable as } A}{\text{Total number of possible events}}
\]

\[
p(A) = \text{number } \leq 2 = (1, 2) = \frac{2}{6} = .333333 = .33
\]

2. What is the probability of obtaining an odd number or an even number less than or equal to 10 from a sample space of 20 numbers (1 through 20)?

Using Formula 3

\[
p(A \text{ or } B) = p(A) + p(B)
\]

\[
p(A) = \text{odd number } = (1, 3, 5, 7, 9, 11, 13, 15, 17, \text{ or } 19) = \frac{10}{20} = .50
\]

\[
p(B) = \text{even number } \leq 10 = (2, 4, 6, 8, \text{ or } 10) = \frac{5}{20} = .25
\]

\[
.50 + .25 = .75
\]
3. There are 15 red balls, 15 green balls, and 20 yellow balls thoroughly mixed in a drum. What is the probability of drawing a yellow ball on the first try, not replacing it in the drum, and then drawing a red ball on the second try?

**Using Formula 5** \[ p(A \text{ and } B) = p(A) \times p(B|A) \]

- \[ p(A) = \text{drawing a yellow ball} = \frac{20}{50} = .40 \]
- \[ p(B) = \text{drawing a red ball} = \frac{15}{49} = .306122 \]

\[ .40 \times .306122 = .122449 = .12 \]

4. What is the probability of obtaining an odd number or a number less than 6 from a sample space of 20 numbers (1 through 20)?

**Using Formula 2** \[ p(A \text{ or } B) = p(A) + p(B) - p(A \text{ and } B) \]

- \[ p(A) = \text{odd number} = (1, 3, 5, 7, 9, 11, 13, 15, 17, or 19) = \frac{10}{20} = .50 \]
- \[ p(B) = \text{number < 6} = (1, 2, 3, 4, or 5) = \frac{5}{20} = .25 \]

\[ p(A \text{ and } B) = \text{odd number and a number < 6} = (1, 3, and 5) = \frac{3}{20} = .15 \]

\[ .50 + .25 - .15 = .75 - .15 = .60 \]

5. There are 10 red balls and 8 yellow balls thoroughly mixed in a drum. What is the probability of drawing a red ball on the first try, replacing it in the drum, and then drawing a yellow ball on the second try?

**Using Formula 4** \[ p(A \text{ and } B) = p(A) \times p(B|A) = p(A) \times p(B) \]

- \[ p(A) = \text{drawing a red ball} = \frac{10}{18} = .555555 \]
- \[ p(B) = \text{drawing a yellow ball} = \frac{8}{18} = .444444 \]

\[ .555555 \times .444444 = .246914 = .25 \]
6. What is the probability of selecting a number less than 6 or selecting an odd number greater than 4 from a sample space of 10 numbers (1 through 10)?

Using Formula 2

\[ p(A \text{ or } B) = p(A) + p(B) - p(A \text{ and } B) \]

\[ p(A) = \text{ number < 6} = (1, 2, 3, 4, \text{ or } 5) = \frac{5}{10} = .50 \]

\[ p(B) = \text{ odd number > 4} = (5, 7, \text{ or } 9) = \frac{3}{10} = .30 \]

\[ p(A \text{ and } B) = \text{ number < 6 and an odd number > 4} = (5) = \frac{1}{10} = .10 \]

\[ .50 + .30 - .10 = .70 \]

7. What is the probability of selecting a number that is a multiple of 2 out of a sample space of 10 numbers (1 – 10)?

Using Formula 1

\[ p(A) = \frac{\text{Number of events classifiable as } A}{\text{Total number of possible events}} \]

\[ p(A) = \text{ multiple of 2} = (2, 4, 6, 8, \text{ or } 10) = \frac{5}{10} = .50 \]

8. There are 15 red balls, 15 green balls, and 20 yellow balls thoroughly mixed in a drum. What is the probability of drawing a green ball on the first try, replacing it in the drum, drawing a green ball on the second try, replacing it back in the drum, and then drawing a yellow ball on the third try?

Using Formula 4

\[ p(A \text{ and } B) = p(A) \times p(B|A) = p(A) \times p(B) \]

(FYI) Which would extend to \( p(A \text{ and } B \text{ and } C) = p(A) \times p(B|A) \times p(C|AB) = p(A) \times p(B) \times p(C) \)

\[ p(A) = \text{ drawing a green ball} = \frac{15}{50} = .30 \]

\[ p(B) = \text{ drawing a green ball} = \frac{15}{50} = .30 \]

\[ p(C) = \text{ drawing a yellow ball} = \frac{20}{50} = .40 \]

\[ .30 \times .30 \times .40 = .036 = .04 \]
9. What is the probability of selecting a number that is greater than or equal to 7 or less than 3 from a sample space of numbers from 1 through 10?

**Using Formula 3** \( p(A \text{ or } B) = p(A) + p(B) \)

\[
p(A) = \text{number } \geq 7 = (7, 8, 9, \text{ or } 10) = \frac{4}{10} = .40
\]

\[
p(B) = \text{number } < 3 = (1, \text{ or } 2) = \frac{2}{10} = .20
\]

\[
.40 + .20 = .60
\]

10. There are 10 red balls, 10 yellow balls, and 10 green balls thoroughly mixed in a drum. What is the probability of drawing a red ball on the first try, not replacing it, and then drawing another red ball on the second try, not replacing it, and then drawing another red ball on the third try?

**Using Formula 5** \( p(A \text{ and } B) = p(A) \times p(B|A) \)

**FYI** Which would extend to \( p(A \text{ and } B \text{ and } C) = p(A) \times p(B|A) \times p(C|AB) \)

\[
p(A) = \text{drawing a red ball} = \frac{10}{30} = .333333
\]

\[
p(B) = \text{drawing a red ball} = \frac{9}{29} = .310345
\]

\[
p(C) = \text{drawing a red ball} = \frac{8}{28} = .285714
\]

\[
.333333 \times .310345 \times .285714 = .029557 = .03
\]