Unit 7 Practice Test

1. Given the sets \( A = \{2, 4, 6, 8\} \), \( B = \{2, 4, 6, 8, \ldots, 30\} \), and \( C = \{2, 4, 6, 8, \ldots\} \). Determine which sets are finite or infinite.

2. Given \( H = \{0, 3, 6, 9\} \) and \( J = \{0, 6, 12\} \). Find the sets for \( H \cup J \) and \( H \cap J \). Determine which Venn diagrams represent the union and intersection.

3. Given \( C = \{6, 7, 8\} \) and \( D = \{9, 10, 11, 12\} \). Find the sets for \( C \cup D \) and \( C \cap D \). Determine which Venn diagrams represent the union and intersection.

4. Given the sets \( U = \{10, 20, 30, 40, 50, 60\} \), \( A = \{10\} \), \( B = \{10, 40, 60\} \). Find \( A \cap B \) \( A \cup B \) \( (A \cap B)' \) \( (A \cup B)^c \)

5. \( P \) is the set of positive even integers and \( M \) is the set of multiples of 10. Find \( P \cap M \)

6. Draw a Venn diagram to illustrate the data below.
   
   \( U = \{ \text{all non-negative integers less than 12} \} \)
   \( N = \{ \text{all even natural numbers less than 11} \} \)
   \( P = \{ \text{all one-digit prime numbers} \} \)
7. Ms. Spann asked students to list the activities they participated in over the weekend. She organized the results in a Venn diagram below.

    a. How many students did homework?
    b. How many did homework, played sports, or saw a movie?
    c. How many did all three activities?
    d. How many did none of the activities?
    e. How many students are in the class?
    f. How many did homework and played sports?
    g. How many did homework or played sports?
    h. How many saw a movie and played no sports?
    i. How many did homework and saw a movie, but did not play a sport?
    j. How many did homework or saw a movie, but did not play a sport?

8. Club $M$ has 11 members and Club $R$ has 18. If a total of 24 people belong to the two clubs, how many people belong to both clubs?

9. A basket contains 14 different fruits. If there are 5 oranges, 6 apples, and the remaining are bananas, find the probability of choosing a banana from the basket.
10. The table shows the numbers of brass instrument players in the New York Philharmonic. Suppose one brass instrument player is randomly selected to be a featured performer. Find the probability of each event. Write as a fraction in simplest form.

\[
P(\text{trumpet}) \quad P(\text{not tuba})
\]

<table>
<thead>
<tr>
<th>New York Philharmonic Brass Instrument Players</th>
</tr>
</thead>
<tbody>
<tr>
<td>Horn</td>
</tr>
<tr>
<td>Trombone</td>
</tr>
<tr>
<td>Trumpet</td>
</tr>
<tr>
<td>Tuba</td>
</tr>
</tbody>
</table>

11. When one fair die is tossed, find the probability of rolling the number five and rolling an even number.

12. Your drawer contains 8 red socks and 6 green socks. It is too dark to see which are which. What is the probability that you pick a green sock, then a red sock?

13. Your drawer contains 8 red socks and 6 green socks. It is too dark to see which are which. The first sock picked from the drawer is green. What is the probability that the next sock picked is a red sock?

Statement 1:______________________
Statement 2:______________________
Statement 3:______________________
Statement 4:______________________
14. A face-down deck of cards contains four hearts, five diamonds, four clubs, and three spades. What is the probability that the first two cards drawn will be spades?

15. A face-down deck of cards contains four hearts, five diamonds, four clubs, and three spades. Two cards are drawn without replacement. If the first card drawn is a spade, what is the probability that the next card drawn will be a spade?

Statement 1:________________________________________________________________

Statement 2:________________________________________________________________

Statement 3:________________________________________________________________

Statement 4:________________________________________________________________

16. At Stephenson High School 60% of all students have a car and an Ipod and 70% of all students have a car. What is the probability that a student with a car also has an Ipod?

Optional wording
At Stephenson High School 60% of all students have a car and an Ipod and 70% of all students have a car. What is the probability that a student has an Ipod, given they also own a car?

17. 45% of the children in a school have a dog, 30% have a cat, and 18% have a dog and a cat. What percent of those who have a dog also have a cat?
Problems 18 – 19: Answer each question and find the probabilities.

18. A group of students is donating blood during a blood drive. A student has a \( \frac{2}{5} \) probability of having type \( O \) blood and a \( \frac{1}{5} \) probability of having type \( A \) blood.

   What events are mutually exclusive? ________________________________

   Why? ________________________________

   What is the probability that a student has type \( O \) or type \( A \) blood?

19. Michael has 4 red shirts, 3 green shirts, and 5 blue shirts in his closet. He has to select a shirt to wear to work.

   What events are mutually exclusive? ________________________________

   Why? ________________________________

   If he randomly selects a shirt, what is the probability that he chooses blue or red?

20. In Hillcrest School, 36% of middle school students are in Grade 6, 31% are in grade 7, and 33% are in grade 8. If a middle school student is selected randomly, what is the probability that the student is either in grade 6 or in grade 7?

21. Find the probability on a number cube of rolling a 4 or an even number.

22. Find the probability on a number cube of rolling odd number or a number greater than 2.
23. Of 160 beauty spa customers, 96 had a hair styling and 61 had a manicure. There were 28 customers who had only a manicure. What is the probability that a customer had a hair styling or a manicure?


Step 3: Find probability using Addition Rule for Probability of Inclusive Events

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

24. Of 570 people, 365 were male and 368 had brown hair. Of those with brown hair, 108 were female. What is the probability that a person was male or had brown hair?


Step 3: Find probability using Addition Rule for Probability of Inclusive Events

\[ P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B) \]
Problems 25 – 27: Determine which events are ‘mutually exclusive’ or ‘inclusive’.

25. Events: ‘Choosing a black card from a deck’ and ‘Choosing a 10 from a deck’
   ‘Mutually Exclusive’ or ‘Inclusive’? __________________
   Explain why._________________________________________

26. Events: ‘Sitting down’ and ‘Standing up’
   ‘Mutually Exclusive’ or ‘Inclusive’? __________________
   Explain why._________________________________________

27. Events: ‘Sitting down’ and ‘Scratching your nose’
   ‘Mutually Exclusive’ or ‘Inclusive’? __________________
   Explain why._________________________________________

28. Sarah asked 40 randomly selected underclassmen at her high school whether they were planning to go to college and whether they were planning to move out of their parents’ or guardians’ homes right after high school. The results are summarized in the table. You must show your work.

<table>
<thead>
<tr>
<th>Planning to Move Out</th>
<th>Planning to Go to College</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td></td>
<td>16</td>
<td>8</td>
</tr>
<tr>
<td>No</td>
<td></td>
<td>12</td>
<td>4</td>
</tr>
</tbody>
</table>

a. Make a table of the joint relative frequencies and marginal relative frequencies. Round to the nearest hundredth where appropriate.

<table>
<thead>
<tr>
<th>Planning to Go to College</th>
<th>Yes</th>
<th>No</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

b. If it is given that an underclassman is planning to go to college, what is the probability that the underclassman is not planning to move out?

c. What is the probability that if a student does not plan to go to college, they plan to move out?