Math 6 Practice

Name ____________________________

There are 3 red, 1 blue, and 2 yellow marbles in a bag. Once a marble is selected, it is **NOT REPLACED**. Find each probability.

1. \( P(\text{red and then yellow}) \)

2. \( P(\text{blue and then yellow}) \)

3. \( P(\text{red and then blue}) \)

4. \( P(\text{two yellow marbles in a row}) \)

5. A store sells a box of highlighters that contains 4 yellow, 3 blue, 2 pink, and 1 green highlighter. What is the probability of randomly picking 1 blue and 1 pink highlighter from the box?

6. Angelina makes 70% of her free throws. What is the probability that she will make her next two free throws?

For Exercises 7 & 8, use the information in the table.

At a car rental office, 63% of the customers are men and 37% are women.

7. What is the probability that the next customer will be a woman who requests a convertible?

8. What is the probability that the next customer will be a man who requests either a compact car or luxury car?

<table>
<thead>
<tr>
<th>Car Requests</th>
<th>25%</th>
<th>37%</th>
<th>10%</th>
<th>16%</th>
<th>12%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compact</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full-size</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Convertible</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SUV</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Luxury</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
6.16a
The student will compare and contrast dependent and independent events.

Dependent and Independent Events

<table>
<thead>
<tr>
<th>Two events are dependent events</th>
<th>Two events are independent events</th>
</tr>
</thead>
<tbody>
<tr>
<td>if the occurrence of one affects the likelihood that the other will occur.</td>
<td>if the occurrence of one does not affect the likelihood that the other will occur.</td>
</tr>
</tbody>
</table>

EXAMPLE
Anita chooses two cards from a standard deck of 52 cards. In each case, explain whether choosing the first card and the second card are independent or dependent events.

a. Anita chooses a card. She puts the card back into the deck before she chooses the second card.

b. Anita chooses a card. She chooses the next card without putting the first card back.

Solution
a. When Anita chooses the first card, there are 52 cards to choose from. Since Anita replaces the first card before she chooses a second card, the deck will still have 52 cards to choose from. The events are independent.

b. When Anita chooses the first card, there are 52 cards to choose from. If Anita does not replace the first card before she chooses a second card, the deck will only have 51 cards to choose from. The events are dependent.

1 Max has 5 shirts and 4 pairs of pants. This morning he randomly chose a shirt (event S) and then he chooses the pair of pants he thinks best matches the shirt (event P). Which of the following is true?
   A Events S and P are independent.
   B Event S depends on event P.
   C Event P depends on event S.
   D Events S and P are not related.

2 Jerry tossed a fair coin five times. The coin landed on heads every time. If Jerry tosses the coin again, which statement is true?
   F The coin is more likely to land on heads than on tails.
   G The coin is more likely to land on tails than on heads.
   H The coin is equally likely to land on tails or heads.
   J The coin must land on heads.
3  Casey will randomly pick two shapes from the bag below. If Casey picks a triangle, puts it back, and then picks again, which statement is true?

![Triangle and Circle Shapes]

A  The events “picking a triangle” and “picking a circle” are dependent.
B  The events “picking a triangle” and “picking a triangle” are independent.
C  The events “picking a triangle” and “picking a polygon” are dependent.
D  The events “picking a triangle” and “picking a circle” cannot occur one after the other.

4  A bag contains 2 red marbles and 3 green marbles. A marble is randomly selected (event A). The marble is replaced and another marble is selected (event B). Which of the following is true?

F  Events A and B are independent.
G  Event A depends on event B.
H  Event B depends on event A.
J  Events A and B are not related.

5  A bag contains 3 blue marbles, 3 green marbles, and 2 red marbles. Amy wants to find the probability of selecting a blue, then a red marble. She will put the first marble she selects in her pocket. Which of the following is true?

A  The two events are independent.
B  The second event depends on the first.
C  The first event depends on the second.
D  The events are not related.

6  Which of the following events are dependent?

F  A student spins a fair 1–6 spinner. The first spin is 3. The second spin is 1.
G  A student chooses a card from a deck of 20 cards. The student keeps the card and chooses another one.
H  A student tosses a coin three times. The results are tosses heads, heads, tails.
J  A student chooses a blue marble from a cup. The student returns it and chooses another marble.
The student will determine probabilities for dependent and independent events.

**Independent Events**

Two events $A$ and $B$ are independent if the occurrence of event $A$ does not affect the probability of event $B$.

\[ P(A \text{ and } B) = P(A) \cdot P(B) \]

**Dependent Events**

Two events $A$ and $B$ are dependent if the occurrence of event $A$ does affect the probability of event $B$.

\[ P(A \text{ and } B) = P(A) \cdot P(B \text{ given } A) \]

**EXAMPLE 1**

A coin is flipped three times. What is the probability that heads occurs each time?

**Solution**

These are independent events. The probability of heads on the first flip is $\frac{1}{2}$. The probability of heads on the second flip is $\frac{1}{2}$. The probability of heads on the third flip is $\frac{1}{2}$. The probability that heads occurs each time is $\frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2} = \frac{1}{8}$.

**EXAMPLE 2**

A bag contains 1 red, 2 blue, and 3 green marbles. Two marbles are drawn from a bag. The first one is blue. What is the probability that both marbles are blue?

**Solution**

These are dependent events. The probability that the first marble is blue is $\frac{2}{6}$ or $\frac{1}{3}$. Once one blue marble is removed, the sample space changes to 1 red, 1 blue, and 3 green. The probability that the second marble is blue is $\frac{1}{5}$. The probability that both marbles are blue is $\frac{1}{3} \cdot \frac{1}{5} = \frac{1}{15}$.

1. A bag contains 3 red marbles and 4 green marbles. Without looking, you pick a marble with your right hand and then pick another marble with your left hand. What is the probability of picking 2 green marbles?

   - A $\frac{12}{30}$
   - B $\frac{2}{7}$
   - C $\frac{4}{7}$
   - D $\frac{15}{14}$

2. Miguel spins the spinner below. Then he tosses a coin.

![Spinner Diagram](image_url)

What is the probability that the spinner stops on A and the coin lands on heads?

- F $\frac{1}{8}$
- G $\frac{1}{4}$
- H $\frac{3}{8}$
- J $\frac{3}{4}$
3. A bag contains 10 tiles with the numbers 1 through 10. What is the probability of choosing an even number or a 7?

A \( \frac{1}{5} \)  
B \( \frac{1}{2} \)  
C \( \frac{6}{10} \)  
D \( \frac{1}{35} \)

4. A store is giving away small, medium, and large gift bags. The bags come in one of four colors—red, blue, yellow, and green. A customer has an equally likely chance of receiving any size or color gift bag. What is the probability that a customer will receive a large, red bag?

F \( \frac{1}{12} \)  
G \( \frac{1}{4} \)  
H \( \frac{1}{3} \)  
J \( \frac{1}{2} \)

5. The probability of picking a circle from the bag below is \( \frac{1}{3} \).

Without looking, Casey picks a circle and then puts it back. How does this affect the probability that she will pick a circle on her second draw?

A The probability the second shape is a circle is equal to \( \frac{1}{2} \) because the bag still has 6 circles and 18 shapes.
B The probability the second shape is a circle is greater than \( \frac{1}{3} \) because there are only 17 shapes in the bag to choose from.
C The probability the second shape is a circle is less than \( \frac{1}{3} \) because there are only 17 shapes in the bag to choose from.
D The probability the second shape is a circle is less than \( \frac{1}{3} \) because there are only 5 circles in the bag.

6. A card is randomly selected from the cards shown below.

What is the probability that the selected card will be a 4 or an odd number?

F \( \frac{1}{4} \)  
G \( \frac{3}{8} \)  
H \( \frac{1}{2} \)  
J \( \frac{5}{8} \)

Use the spinner below for 7 and 8.

7. If you spin the spinner, what is the probability it will land on A or B?

A \( \frac{1}{4} \)  
B \( \frac{1}{2} \)  
C \( \frac{3}{4} \)  
D \( \frac{1}{3} \)

8. Which of the following statements is not true?

F The probability of spinning B is the same as the probability of spinning A or C.
G The probability of spinning C is the same as the probability of spinning A.
H The probability of spinning A two times is less than the probability of spinning A one time.
J The probability of spinning A is equal to the probability of spinning B.