



PLANIT
TEACHERS

Understanding Probability: Exploring Union and Intersection of Events

Student Name: _____

Class: _____

Due Date: _____

Introduction to Probability

Probability is a measure of the likelihood of an event occurring. It is a number between 0 and 1, where 0 represents an impossible event and 1 represents a certain event. Probability is used in various aspects of life, such as insurance, medicine, and weather forecasting.

Union of Events

The union of two events, A and B, is the event that occurs if either A or B or both occur. It is denoted as $A \cup B$. The probability of the union of two events is calculated using the formula:

$$P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

Complete these concept checks:

1. Define and give an example of the union of two events.

2. Calculate the probability of the union of two events using the given formula.

Intersection of Events

The intersection of two events, A and B, is the event that occurs if both A and B occur. It is denoted as $A \cap B$. The probability of the intersection of two events is calculated using the formula:

$$P(A \cap B) = P(A) * P(B)$$

Complete these concept checks:

1. Define and give an example of the intersection of two events.

2. Calculate the probability of the intersection of two events using the given formula.

Calculating Probabilities

To calculate the probability of the union or intersection of events, we need to know the individual probabilities of the events. The following formulas are used:

$$P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

$$P(A \cap B) = P(A) * P(B)$$

Complete these concept checks:

1. Calculate the probability of the union of two events using the given formula.

2. Calculate the probability of the intersection of two events using the given formula.

Probability has numerous real-world applications, such as:

- Insurance: calculating the probability of a house being damaged by flood or fire
- Medicine: calculating the probability of a patient having a certain disease
- Weather forecasting: calculating the probability of rain or snow

Complete these concept checks:

1. Give an example of a real-world application of probability.

2. Explain how probability is used in the given example.

Activity 1: Calculating Probabilities

Calculate the probability of the union and intersection of the following events:

- Event A: rolling a 6 on a die
- Event B: rolling an even number on a die

$$P(A) = 1/6$$

$$P(B) = 1/2$$

1. Calculate $P(A \cup B)$

2. Calculate $P(A \cap B)$

Activity 2: Real-World Scenarios

Read the following scenarios and calculate the probability of the union or intersection of events:

- Scenario 1: A student is either a member of the school soccer team or the basketball team. The probability of being a member of the soccer team is 0.3, and the probability of being a member of the basketball team is 0.2.
- Scenario 2: A patient has either diabetes or hypertension. The probability of having diabetes is 0.1, and the probability of having hypertension is 0.2.

1. Calculate the probability of the union of events in Scenario 1

2. Calculate the probability of the intersection of events in Scenario 2

Conclusion

In conclusion, understanding the union and intersection of events is crucial in probability theory. By calculating the probabilities of combined events, we can make informed decisions in various aspects of life. The activities and questions in this worksheet are designed to help students understand and apply the concepts of union and intersection of events.

Complete these concept checks:

1. Summarize the importance of understanding the union and intersection of events in probability theory.

2. Explain how the activities and questions in this worksheet help students understand and apply the concepts of union and intersection of events.

Answer Key

The following are the answers to the activities and questions in this worksheet:

- Activity 1: Calculating Probabilities
 - $P(A \cup B) = P(A) + P(B) - P(A \cap B) = 1/6 + 1/2 - 1/6 = 1/2$
 - $P(A \cap B) = P(A) * P(B) = 1/6 * 1/2 = 1/12$
- Activity 2: Real-World Scenarios
 - $P(A \cup B) = P(A) + P(B) - P(A \cap B) = 0.3 + 0.2 - 0.1 = 0.4$
 - $P(A \cap B) = P(A) * P(B) = 0.1 * 0.2 = 0.02$