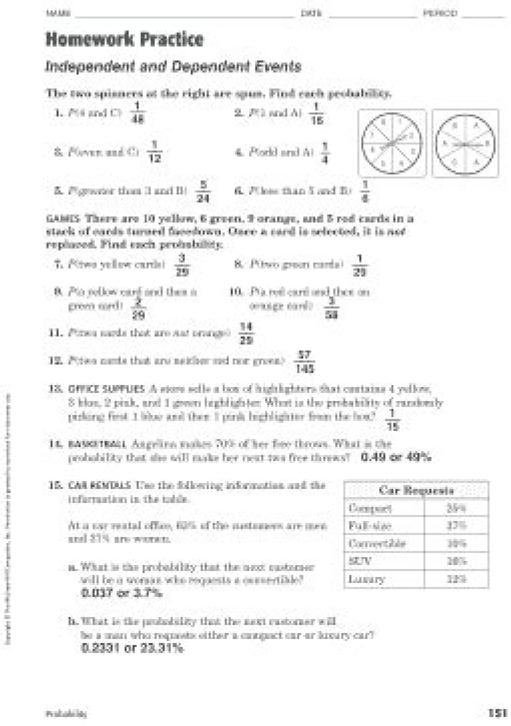
Lesson 7 Skills Practice Independent And Dependent Events



NAME ________________ DATE ________ PERIOD ______

Homework Practice

Independent and Dependent Events

The two spinners at the right are spun. Find each probability.

1. *P*(4 and C) $\frac{1}{48}$
2. *P*(1 and A) $\frac{1}{16}$
3. *P*(even and C) $\frac{1}{12}$
4. *P*(odd and A) $\frac{1}{4}$
5. *P*(greater than 3 and B) $\frac{5}{24}$
6. *P*(less than 5 and B) $\frac{1}{6}$

GAMES There are 10 yellow, 6 green, 9 orange, and 5 red cards in a stack of cards turned facedown. Once a card is selected, it is *not* replaced. Find each probability.

7. *P*(two yellow cards) $\frac{3}{29}$
8. *P*(two green cards) $\frac{1}{29}$
9. *P*(a yellow card and then a green card) $\frac{2}{29}$
10. *P*(a red card and then an orange card) $\frac{3}{58}$
11. *P*(two cards that are *not* orange) $\frac{14}{29}$
12. *P*(two cards that are neither red nor green) $\frac{57}{145}$
13. **OFFICE SUPPLIES** 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 first 1 blue and then 1 pink highlighter from the box? $\frac{1}{15}$
14. **BASKETBALL** Angelina makes 70% of her free throws. What is the probability that she will make her next two free throws? **0.49 or 49%**
15. **CAR RENTALS** Use the following information and the information in the table.

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

Car Requests	
Compact	25%
Full-size	27%
Convertible	10%
SUV	26%
Luxury	12%

a. What is the probability that the next customer will be a woman who requests a convertible? **0.037 or 3.7%**

b. What is the probability that the next customer will be a man who requests either a compact car or luxury car? **0.2331 or 23.31%**

Probability 151

Lesson 7 Skills Practice Independent and Dependent Events is a crucial topic in probability that helps students understand the nature of events and how they interact with each other. Mastering the concepts of independent and dependent events is essential not only for academic success but also for real-world applications in fields such as statistics, finance, and science. In this article, we will explore the definitions, differences, examples, and practice problems related to independent and dependent events, ensuring a comprehensive understanding of these fundamental concepts.

Understanding Events in Probability

In probability, an event is a specific outcome or a set of outcomes from a random experiment. Events can be classified into two main categories: independent events and dependent events.

What Are Independent Events?

Independent events are those events where the occurrence of one event does not affect the probability of the occurrence of another event. In simpler terms, the outcome of one event is completely unrelated to the outcome of another.

Examples of Independent Events:
- Flipping a coin: The result of one coin flip does not influence the result of another coin flip.
- Rolling a die: The outcome of one roll of a die does not impact the outcome of subsequent rolls.
- Drawing cards from a well-shuffled deck, replacing the card each time: Each draw is independent of the others.

What Are Dependent Events?

Dependent events, on the other hand, are events where the occurrence of one event does affect the probability of the occurrence of another event. This means the outcome of one event is linked to the outcome of another.

Examples of Dependent Events:
- Drawing cards from a deck without replacement: The probability of drawing a specific card changes based on the cards that have already been drawn.
- Weather conditions affecting attendance at an outdoor event: If it rains, fewer people may attend, thus impacting the outcome of ticket sales.
- Selecting marbles from a bag: If you draw a marble and do not put it back, the total number of marbles changes, affecting the probability of drawing another specific marble.

Differences Between Independent and Dependent Events

Understanding the differences between independent and dependent events is essential in solving probability problems. Here are the key distinctions:

- **Definition:** Independent events do not influence each other, while dependent events do.
- **Probability Calculation:** For independent events, the probability of both events occurring is calculated by multiplying their individual probabilities. For dependent events, the probability of the second event is calculated based on the outcome of the first.
- **Examples:** Coin flips and die rolls are classic examples of independent events, while drawing cards without replacement highlights dependent events.

Calculating Probabilities of Independent and Dependent Events

To effectively utilize these concepts, it is vital to understand how to calculate the probabilities associated with independent and dependent events.

Calculating Probability of Independent Events

The probability of two independent events A and B occurring can be calculated using the formula:

$$P(A \text{ and } B) = P(A) \times P(B)$$

Example:
If the probability of flipping a head (Event A) is $\frac{1}{2}$ and the probability of rolling a 3 on a die (Event B) is $\frac{1}{6}$, then the probability of both events occurring is:

$$P(A \text{ and } B) = \frac{1}{2} \times \frac{1}{6} = \frac{1}{12}$$

Calculating Probability of Dependent Events

For dependent events, the probability of both events occurring is calculated by:

$$P(A \text{ and } B) = P(A) \times P(B|A)$$

Here, $P(B|A)$ is the probability of event B occurring given that event A has already occurred.

Example:
Suppose you have a bag with 5 red marbles and 3 blue marbles. If you draw one marble without replacement (Event A), the probability of then drawing a blue marble (Event B) is dependent on the first draw.

- Probability of drawing a red marble first (Event A): $P(A) = \frac{5}{8}$
- If a red marble is drawn first, there are now 4 red and 3 blue marbles left. Thus, the probability of drawing a blue marble second (Event B given A): $P(B|A) = \frac{3}{7}$

The probability of both events is:

$$P(A \text{ and } B) = P(A) \times P(B|A) = \frac{5}{8} \times \frac{3}{7} = \frac{15}{56}$$

Practice Problems for Independent and Dependent Events

Practicing with problems is an effective way to solidify your understanding of independent and dependent events. Here are some practice problems to try:

Independent Events Practice Problems

1. A bag contains 4 green balls and 6 yellow balls. If you draw one ball, replace it, and then draw another, what is the probability of drawing a green ball both times?

2. You flip a coin and roll a die. What is the probability of getting heads and a 4?

Dependent Events Practice Problems

1. A box contains 3 red apples, 2 green apples, and 5 yellow apples. If you pick one apple and do not replace it, what is the probability of picking a green apple first and then a yellow apple?

2. In a class of 30 students, 12 are girls and 18 are boys. If a student is randomly selected and not replaced, what is the probability that the first student chosen is a girl and the second student chosen is also a girl?

Conclusion

Understanding **Lesson 7 Skills Practice Independent and Dependent Events** is essential for mastering probability concepts. By differentiating between independent and dependent events, calculating probabilities correctly, and practicing with real-world examples, students can gain confidence in their probability skills. Whether for academic purposes or personal interest, a solid grasp of these concepts will equip learners with the tools they need to analyze and interpret various scenarios involving chance and uncertainty.

Frequently Asked Questions

What is the difference between independent and dependent events in probability?

Independent events are those whose outcomes do not affect each other, while dependent events are those where the outcome of one event influences the outcome of another.

Can you provide an example of two independent events?

Flipping a coin and rolling a die are independent events because the result of the coin flip does not affect the die roll.

What is an example of dependent events?

Drawing two cards from a deck without replacement is a dependent event because the outcome of the first draw affects the probabilities for the second draw.

How do you calculate the probability of independent events occurring together?

For independent events A and B, the probability of both events occurring is calculated by multiplying their probabilities: P(A and B) = P(A) P(B).

What formula is used to find the probability of dependent events?

For dependent events A and B, the probability is calculated using P(A and B) = P(A) P(B|A), where P(B|A) is the probability of B occurring given that A has occurred.

How can you determine if two events are independent?

Two events A and B are independent if P(A and B) = P(A) P(B). If this equality does not hold, the events are dependent.

What is the significance of understanding independent and dependent events in real-life scenarios?

Understanding these concepts helps in making informed decisions based on probabilities, such as in risk assessment, gambling, and predicting outcomes in various fields.

What is the probability of drawing a red card and then a black card from a standard deck of cards without replacement?

The probability of drawing a red card first is 26/52. After drawing a red card, there are 51 cards left, and the probability of drawing a black card next is 26/51. Therefore, the combined probability is (26/52) (26/51).

What are some common misconceptions about independent and dependent events?

A common misconception is that independent events must be unrelated entirely; they can be related in context but still be independent in probability if their outcomes do not influence each other.

How does the concept of conditional probability relate to dependent events?

Conditional probability is the probability of an event occurring given that another event has already occurred. It is crucial for calculating the probabilities of dependent events.

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