Probability

Reporting Category Probability and Statistics

Topic Determining the probability of independent and dependent events

Primary SOL 8.12 The student will determine the probability of independent and dependent events, with and without replacement.

Materials
- Twenty different items—5 red, 8 blue, and 7 yellow
- Shopping bag
- Sorting Cards (attached)
- Number cubes
- Spinners
- Coins

Vocabulary

probability, likelihood, events, outcomes (earlier grades*)*

independent events, dependent events, with replacement, without replacement (8.12)

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

1. Display 5 red, 8 blue, and 7 yellow items, and have students count how many items of each color there are and how many items there are in total. Record these numbers. Put the items in a shopping bag, and have students find each of the following, starting with a full bag each time:
   - The probability of drawing a red item out of the bag.
   - The probability of drawing a blue item out of the bag.
   - The probability of drawing a yellow item out of the bag.
   - The probability of drawing a black item out of the bag.

2. Now have the students discuss with partners how to find the probability of drawing a red item and then drawing a blue item. After the discussions, have several pairs of students share their thinking. Discuss with the class the difference between drawing a red item that is then set aside before the second draw and drawing a red item that is then put back in the bag before the second draw. Ask students in which situation the outcome of the first draw affects the outcome of the second draw. Ask, "What is the probability of drawing a red, setting it aside, and then drawing another red? Does the outcome of the second draw depend on the first?" Have partners discuss the difference between dependent and independent events.

3. Distribute a set of Sorting Cards to each pair of students. Have partners sort the cards into two groups—one for independent events and another for dependent events. When they have finished sorting, review each card, and allow partners to correct their sorts, if necessary. Then, have partners find the probability of each event.

Assessment
- **Questions**
  - o Sharon has four coins in her pocket—a dime, a penny, a nickel, and a quarter. She needs 26 cents to pay the cashier. She reaches in her pocket and pulls out two coins. What is the probability that she pulled out exactly 26 cents?
  - o How do you find the probability of dependent events?
- **Journal/Writing Prompts**
  - o Explain the difference between independent events and dependent events.
  - o Explain why not replacing an object in a set of objects after drawing it out of that set affects the probability of a second draw.

Extensions and Connections (for all students)
- Have students create their own experiments and then find the probability of their experiments, with and without replacement.
- Have students use Internet resources for spinning a spinner or rolling a die to solve practical problems.
- Have students calculate the probability of *not* drawing a certain item from the bag.
- Have students compare different situations to determine which has a higher probability of occurring.

Strategies for Differentiation
- Before using the Sorting Cards, review with students the different types of cards in a deck.
- For every problem, have students write whether the event is dependent or independent.
- Have students actually complete the experiments.
- Use fewer items so the denominator is 12 or less.
- Review multiplying fractions and reducing fractions before beginning probability.
- Provide a recording sheet for students to show their work.

Sorting Cards

Copy cards on cardstock, and cut out.

What is the probability of drawing a King from a deck of cards, putting it back in the deck, shuffling the deck, and then drawing a Jack?	What is the probability of drawing the Queen of Hearts from a deck of cards, putting it back in the deck, shuffling the deck, and then drawing the same card again?
What is the probability of drawing a black card from a deck of cards, putting it aside, and then drawing a red card?	You have a bag of 10 marbles. Four are red and 6 are blue. What is the probability of drawing a red marble, putting it aside, and then drawing another red marble?
What is the probability of flipping heads on a coin and then flipping tails?	What is the probability of rolling a 3 on a number cube and then flipping heads on a coin?
You have a bag of 10 marbles. Four are red and 6 are blue. What is the probability of drawing a blue marble, putting it aside, and then drawing a red marble?	Each letter in the word MATH is written on a card and put into a bag. What is the probability of drawing the A, putting it aside, and then drawing the H?
You have a bag of 10 marbles. Four are red and 6 are blue. What is the probability of drawing a red marble, putting it back in the bag, and then drawing another red marble?	What is the probability of drawing a King from a deck of cards, putting it aside, and then drawing another King?