Name _____ Date _____

12.2 Independent and Dependent Events

For use with Exploration 12.2

Essential Question How can you determine whether two events are independent or dependent?

Two events are **independent events** when the occurrence of one event does not affect the occurrence of the other event. Two events are **dependent events** when the occurrence of one event *does* affect the occurrence of the other event.

1 EXPLORATION: Identifying Independent and Dependent Events

Work with a partner. Determine whether the events are independent or dependent. Explain your reasoning.

a. Two six-sided dice are rolled.

b. Six pieces of paper, numbered 1 through 6, are in a bag. Two pieces of paper are selected one at a time without replacement.

2 EXPLORATION: Finding Experimental Probabilities

Go to *BigIdeasMath.com* for an interactive tool to investigate this exploration.

Work with a partner.

a. In Exploration 1(a), experimentally estimate the probability that the sum of the two numbers rolled is 7. Describe your experiment.

b. In Exploration 1(b), experimentally estimate the probability that the sum of the two numbers selected is 7. Describe your experiment.

12.2 Independent and Dependent Events (continued)

3 EXPLORATION: Finding Theoretical Probabilities

Work with a partner.

a. In Exploration 1(a), find the theoretical probability that the sum of the two numbers rolled is 7. Then compare your answer with the experimental probability you found in Exploration 2(a).

b. In Exploration 1(b), find the theoretical probability that the sum of the two numbers selected is 7. Then compare your answer with the experimental probability you found in Exploration 2(b).

c. Compare the probabilities you obtained in parts (a) and (b).

Communicate Your Answer

4. How can you determine whether two events are independent or dependent?

5. Determine whether the events are independent or dependent. Explain your reasoning.

a. You roll a 4 on a six-sided die and spin red on a spinner.

b. Your teacher chooses a student to lead a group, chooses another student to lead a second group, and chooses a third student to lead a third group.

Name _____ Date _____

12.2 Notetaking with Vocabulary

For use after Lesson 12.2

In your own words, write the meaning of each vocabulary term.

independent events

dependent events

conditional probability

Core Concepts

Probability of Independent Events

Words Two events A and B are independent events if and only if the probability that both events occur is the product of the probabilities of the events.

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

Notes:

Name_____ Date _____

12.2 Notetaking with Vocabulary (continued)

Probability of Dependent Events

Words If two events A and B are dependent events, then the probability that both events occur is the product of the probability of the first event and the conditional probability of the second event given the first event.

Symbols $P(A \text{ and } B) = P(A) \bullet P(B \mid A)$

Example Using the information in Example 2:

$$P(\text{girl first and girl second}) = P(\text{girl first}) \bullet P(\text{girl second} \mid \text{girl first})$$

$$= \frac{9}{12} \bullet \frac{6}{9} = \frac{1}{2}$$

Notes:

Extra Practice

In Exercises 1 and 2, determine whether the events are independent. Explain your reasoning.

1. You have three white golf balls and two yellow golf balls in a bag. You randomly select one golf ball to hit now and another golf ball to place in your pocket. Use a sample space to determine whether randomly selecting a white golf ball first and then a white golf ball second are independent events.

2. Your friend writes a phone number down on a piece of paper but the last three numbers get smudged after being in your pocket all day long. You decide to randomly choose numbers for each of the three digits. Use a sample space to determine whether guessing the first digit correctly and the second digit correctly are independent events.

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12.2 Notetaking with Vocabulary (continued)

3. You are trying to guess a three-letter password that uses only the letters A, E, I, O, U, and Y. Letters can be used more than once. Find the probability that you pick the correct password "YOU."

4. You are trying to guess a three-letter password that uses only the letters A, E, I, O, U, and Y. Letters *cannot* be used more than once. Find the probability that you pick the correct password "AIE."

5. The table shows the number of male and female college students who played collegiate basketball and collegiate soccer in the United States in a recent year.

	Collegiate Soccer	Collegiate Basketball
Male	37,240	31,863
Female	36,523	28,002

a. Find the probability that a randomly selected collegiate soccer player is female.

b. Find the probability that a randomly selected male student is a collegiate basketball player.