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Study Guide Worksheet 13-5

Probability of Compound Events

If the outcome of one event does not affect the outcome of a second event, the two events are independent. The probability of two independent events can be found by multiplying the probability of the first event by the probability of the second event. $P(A \text{ and } B) = P(A) \times P(B)$

Example A die is tossed and a coin is flipped. Find the probability of getting an odd number and a tail.

$P(\text{odd number}) = \frac{1}{2}$ $P(\text{tail}) = \frac{1}{2}$
$P(\text{odd number and tail}) = \frac{1}{2} \times \frac{1}{2}$ or $\frac{1}{4}$

The probability of getting an odd number and a tail is $\frac{1}{4}$.

If the outcome of one event affects the outcome of a second event, the two events are dependent. The probability of two dependent events can be found by multiplying: $P(A \text{ and } B) = P(A) \times P(B)$.

Example There are 6 black socks and 4 white socks in a drawer. If one is taken out without looking and then a second is taken out, what is the probability they will both be black?

$P(\text{first sock black}) = \frac{6}{10}$ or $\frac{3}{5}$
$P(\text{second sock black}) = \frac{5}{9}$ After the first draw, there are 9 socks left and 5 are black.

$P(\text{two black socks}) = \frac{3}{5} \times \frac{5}{9}$
$= \frac{1}{3}$

The probability of choosing two black socks is $\frac{1}{3}$.

If you draw a card from a deck numbered 1 through 10 and toss a die, find the probability of each outcome.

1. a 10 and a 3

2. two even numbers

3. two prime numbers

4. two odd numbers

5. an even number and a prime

6. a 7 and a 5

There are 4 red pencils, 6 green pencils, and 5 yellow pencils in a jar. Once a pencil is selected, it is not replaced. Find the probability of each outcome.

7. a red and a yellow

8. two green

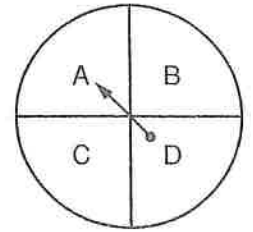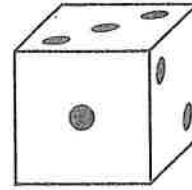9. a green and a yellow

Practice Worksheet 13-5

Probability of Compound Events

A die is rolled and the spinner is spun. Find each probability.

1. P(1 and A)

2. P(odd and B)

3. P(composite and C)

4. P(prime and D)

5. P(1 and E)

6. Why are these independent events?

In a bag there are 3 red marbles, 2 yellow marbles, and 1 blue marble. Once a marble is selected, it is not replaced. Find the probability of each outcome.

7. a red marble and then a yellow marble

8. a blue marble and then a yellow marble

9. a red marble and then a blue marble

10. any color marble except yellow and then a yellow marble

11. a red marble three times in a row

In a bag there are 3 red marbles, 2 yellow marbles, and 1 blue marble. After a marble is selected, it is replaced. Using this new situation, find the probability of each outcome listed above.

12. Exercise 7

13. Exercise 8

14. Exercise 9
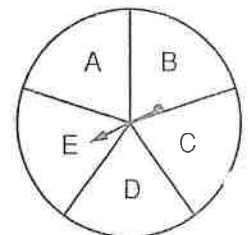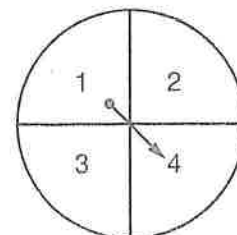
15. Exercise 10

16. Exercise 11

Each spinner is spun once. Find each probability.

17. 2 and B

18. even number and C

19. odd number and vowel

20. prime number and D

1. Peter decided to put his hand in a bag that was sitting on the kitchen table. He Didn't know what was in the bag, but he pulled the following out of the bag: M&M's....Blue, Blue, Red, Yellow, Green, Red, Yellow, and Orange.

    A.   What is the probability that Peter will pull out a Yellow M&M the next time he picks out of this bag?

    B.   Is this theoretical or experimental probability?

2. Jasmine wants to toss three coins at the same time to see what she will end up with. What is the probability that she will come up with two heads? Is this theoretical or experimental probability?

3. If you roll a number cube, what is the probability of rolling a 4 or a 6?

4. If you roll a number cube, what is the probability that you will roll a number that is more than 3?

5. The following marbles are in a bag: 4 Green, 2 Red, 6 Yellow, 5 Orange, and 3 brown. Mary reached in a took out a green and a yellow marble. She then put these marbles in her pocket. Shane came by and picked a marble out of the bag. What is the probability that he picked out a yellow marble?

6. You roll a number cube. If you roll the cube 30 times, how many times would you expect to get a 3 or 5?

7. The following letters are in a bag: A, B, B, C, D, D, D, C, A, A, A, A, O, T, T

   If you reached in the bag and pulled out a letter 45 times, how many times would you expect to get an A?

8. You first roll a die and then you spin the spinner. What is the probability of rolling an even number and spinning a C?
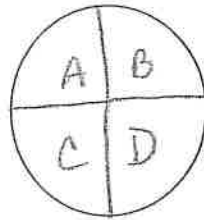
9. You and your friend are playing a game. You both spin the following spinner twice. You take the sum of the two dice to see who wins. You win if you get an even sum. Your friend wins if you have an odd sum. Is this a fair game?
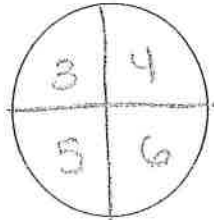
PROBABILITY OF INDEPENDENT EVENTS

Suppose you have a number cube with faces numbered 1 through 6 and five cards. The cards are red, green, yellow, blue, and black. For one roll of the number cube and one draw of a card, what is:

1. P(5 and black)? $\frac{1}{30}$ P(5 and black) = P(5) × P(black) = $\frac{1}{6}$ × $\frac{1}{5}$ = $\frac{1}{30}$

2. P(2 and not blue)? .

3. P(not 3 and not red)? _

4. P(any number and black or yellow)?

5. P(1 or 4 and yellow)?

6. P(6 and white)? __

7. P(any number and any color)?

8. P(5 and not yellow or green)? __

9. P(2 or 3 and any color)?

A bookstore has a shelf for newly-released books. There are 4 autobiographies, 12 fiction, and 8 technical books on the shelf.

10. Two customers each bought a book from the shelf of newly-released books. What is the probability that both were autobiographies? What is the probability that the first was a fiction book, and the second was a technical book?

11. Three customers each bought a book from the shelf of new books. What is the probability that the first was an autobiography, the second a technical book, and the third fiction?

Solve.

12. Joseph is rolling an eight-sided number cube with faces numbered 1 through 8 and a six-sided number cube with faces numbered 1 through 6. What is the probability of rolling a four or a five on the eight-sided cube and a one or a three on the six-sided cube?

13. A nominating committee wants to choose a male and a female to work on a city beautification proposal. If there are 4 males and 5 females up for nomination, and William and Rachel are two of those up for nomination, what are the chances that they will both be chosen? ┤

14. Gary has two six-sided number cubes with faces numbered 1 through 6. What is the probability that the same number will appear on both cubes in one roll?

Probability of Two Events

Tell whether the events are independent or dependent. Explain.

1. rolling a die and then rolling a second die

2. choosing two cards from a deck so that they make a "pair" (the number value is the same)

3. selecting a compact disc from a storage case and then selecting a second disc without replacing the first

Find each probability.

4. Two dice are rolled. Find the probability that an even number is rolled on one die and an odd number is rolled on the second die.

5. Two coins are tossed in order. What is the probability of getting a head on the first coin and then getting a tail on the second coin?

6. Suppose you have a bag containing two red marbles, two blue marbles, and two white marbles. You choose two marbles without looking.

   a. What is the probability that you will choose a red marble and then a blue marble without replacing the red one?

   b. What is the probability that you will choose two red marbles in a row without replacing the first one?

7. A coin purse contains 10 pennies, 5 nickels, 3 dimes, and 2 quarters. Two coins are selected without the first one being replaced. Find *P*(quarter, then nickel).

8. A coin purse contains 10 pennies, 5 nickels, 3 dimes, and 2 quarters. Two coins are selected without the first one being replaced. Find *P*(nickel, then nickel).

9. Two dice are rolled. Find the probability that a multiple of three is rolled on one die and an even number is rolled on the second die.