

Independent and Dependent Events

Name: _____

Independent Events:

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

probability of one event has no effect on the other

(with replacement)

Dependent Events:

probability of one event HAS effect on other

(without replacement)

1. Determine which of the following are examples of independent or dependent events.

a. Rolling a 5 on one die and rolling a 5 on a second die. $P(5 \text{ and } 5)$ I

b. Choosing a cookie from the cookie jar and choosing a jack from a deck of cards. I

c. Selecting a book from the library and selecting a book that is a mystery novel. D

d. Choosing an 8 from a deck of cards, replacing it, and choosing a face card. I

e. Choosing a jack from a deck of cards and choosing another jack, without replacement. D

2. 2 cards are chosen from a deck of cards. The first card is replaced before choosing the second card. What is the probability that they both will be clubs?

I $P(\text{club and club}) = \frac{13}{52} \cdot \frac{13}{52} = \frac{1}{16}$

3. 2 cards are chosen from a deck of cards. The first card is replaced before choosing the second card. What is the probability that they both will be face cards?

I $P(\text{face and face}) = \frac{12}{52} \cdot \frac{12}{52} = \frac{9}{169}$

4. Thomas bought a bag of jelly beans that contained 10 red jelly beans, 15 blue jelly beans, and 12 green jelly beans. What is the probability of Thomas reaching into the bag and pulling out a blue or green jelly bean and then reaching in again and pulling out a red jelly bean? Assume that the first jelly bean is not replaced.

D $P(B/G \text{ and red}) = \frac{27}{37} \cdot \frac{10}{36} =$

5. What is the probability of drawing 2 face cards one after the other from a standard deck of cards without replacement?

D $P(\text{face and face}) = \frac{12}{52} \cdot \frac{11}{51} =$

6. There are 3 quarters, 7 dimes, 13 nickels, and 27 pennies in Jonah's piggy bank. If Jonah chooses 2 of the coins at random one after the other, what is the probability that the first coin chosen is a nickel and the second coin chosen is a quarter? Assume that the first coin is not replaced.

$$P(N \text{ and } Q) = \frac{13}{50} \cdot \frac{3}{49} =$$

7. Steve will draw 2 cards one after the other from a standard deck of cards without replacement. What is the probability that his 2 cards will consist of a heart and a diamond?

$$P(H \text{ and } D) = \frac{13}{52} \cdot \frac{13}{51} =$$

KEY

Independent and Dependent Events Practice:

Use a standard deck of cards.

Recall

Spades ♠	Ace, 2, 3, 4, 5, 6, 7, 8, 9, 10, Jack, Queen, King
Hearts ♥	Ace, 2, 3, 4, 5, 6, 7, 8, 9, 10, Jack, Queen, King
Diamonds ♦	Ace, 2, 3, 4, 5, 6, 7, 8, 9, 10, Jack, Queen, King
Clubs ♣	Ace, 2, 3, 4, 5, 6, 7, 8, 9, 10, Jack, Queen, King

Find the following:

1. P(four or nine)

$$\frac{2}{13}$$

2. P(four and then nine without replacement)

$$\frac{4}{663}$$

3. P(four and then nine with replacement)

$$\frac{1}{169}$$

4. P(nine and another nine without replacement)

$$\frac{1}{221}$$

5. P(nine and another nine with replacement)

$$\frac{1}{169}$$

6. P(spade or nine)

$$\frac{4}{13}$$

7. P(club or two)

$$\frac{4}{13}$$

8. P(king or queen)

$$\frac{2}{13}$$

9. P(king and then a queen without replacement)

$$\frac{4}{663}$$

10. P(king and then a queen with replacement)

$$\frac{1}{169}$$

11. P(red or eight)

$$\frac{7}{13}$$

12. P(club or six)

$$\frac{4}{13}$$

13. P(not 9)

$$\frac{12}{13}$$

14. P(not heart)

$$\frac{39}{52}$$

A bag contains 9 red marbles, 5 green marbles, 4 yellow marbles, and 8 blue marbles. Find the following:

15. P(yellow or green)

$$\frac{9}{26}$$

16. P(yellow and green without replacement)

$$\frac{2}{65}$$

17. P(yellow and green with replacement)

$$\frac{5}{169}$$

18. P(red and another red with replacement)

$$\frac{81}{676}$$

19. P(blue and another blue without replacement)

$$\frac{28}{325}$$

20. P(not green)

$$\frac{21}{26}$$

KEY

HW - Independent vs. Dependent

For questions 1-3, Lisa has 9 rings in her jewelry box. One is gold, 2 are silver, 3 are covered in diamonds, and 2 are stainless steel. If she picks 2 rings, one after the other, find the probability that... (note: she wears the 1st so she doesn't not put it back)

- 1) 1. P(silver and gold) $\frac{1}{36}$ $\frac{2}{9} \cdot \frac{1}{8}$
- 2) 2. P(diamond covered and stainless steel) $\frac{1}{12}$ $\frac{3}{9} \cdot \frac{2}{8}$
- 3) 3. P(silver and stainless steel) $\frac{1}{18}$ $\frac{2}{9} \cdot \frac{2}{8}$

For questions 4-9, find each probability.

- 4) 4. There are 3 literature books, 4 algebra books, and 2 biology books on a shelf. What is the probability someone comes by, takes an algebra book, decides they don't want it, then takes a literature book (in that order)? $\frac{4}{27}$ $\frac{4}{9} \cdot \frac{3}{9}$ (I) *put back*
- 5) 5. A die is rolled two times. What is the probability of rolling a 5 the first time, and an even number the second time? $\frac{1}{12}$
- 6) 6. In the Math Club, 7 of the 20 girls are seniors, and 4 of the 14 boys are seniors. Only 2 seniors can be chosen to represent the school at the state meet. What is the probability that both selections are senior boys? $\frac{2}{187}$
- 7) 7. A card is drawn from a standard deck of cards then replaced and a second card is chosen. What is the probability of drawing an ace the first time and a face card the second time? (Hint: A face cards is a jack, queen, or king). $\frac{3}{169} = \frac{4}{52} \cdot \frac{12}{52}$ (I)
- 8) 8. One tile with each letter of the alphabet is placed in a bag, and 3 are chosen one after the other without replacement. What is the probability that the first tile is a vowel, the second tile is a T, and the third tile is a consonant? $\frac{1}{156}$
- 9) 9. Each of the numbers from 1 to 30 is written on a card and placed in a bag. Two cards are chosen in order. What is the probability that...
- a) Without replacement, the first is an even number and the second is 5? $\frac{1}{58}$
- b) With replacement, the first is odd, and the second is 2? $\frac{1}{60}$