

Independent vs. Dependent
Compound Events

Find the following probabilities and determine if the events are independent or dependent.

1. You roll a fair 6-sided die and then draw one card from a standard deck of cards. What is the probability of getting a 2 on the die and drawing a heart?

$$P(2 \text{ and heart}) = \frac{1}{6} \cdot \frac{13}{52} \rightarrow \frac{1}{6} \cdot \frac{1}{4} = \frac{1}{24}$$

Probability = $\frac{1}{24}$

Independent

Dependent

2. You have 3 pairs of red socks, 2 pairs of green socks and 7 pairs of white socks. What is the probability of pulling out one red pair and then pulling out one white pair (without replacement)?

$$P(R \text{ then } W) = \frac{3}{12} \cdot \frac{7}{11} \rightarrow \frac{1}{4} \cdot \frac{7}{11} = \frac{7}{44}$$

Probability = $\frac{7}{44}$

Independent

Dependent

3. You have 3 pairs of red socks, 2 pairs of green socks and 7 pairs of white socks. What is the probability of pulling out one red pair and then pulling out one white pair (with replacement)?

$$P(R \text{ and } W) = \frac{3}{12} \cdot \frac{7}{12} \rightarrow \frac{1}{4} \cdot \frac{7}{12} = \frac{7}{48}$$

Probability = $\frac{7}{48}$

Independent

Dependent

4. You are a 9/10 free throw shooter. You are at the free throw line shooting two free throws. What is the probability that you will make both free throws?

$$P(\text{Make and Make}) = \frac{9}{10} \cdot \frac{9}{10} = \frac{81}{100}$$

Probability = $\frac{81}{100}$

Independent

Dependent

5. You are picking numbers for the lottery, the daily 3. You may choose any number from 0-9. There is a separate set of 10 numbered balls for each of the three digits you may choose. What is the probability of matching all three numbers?

$$P(\text{Match and Match and Match}) = \frac{1}{10} \cdot \frac{1}{10} \cdot \frac{1}{10} = \frac{1}{1,000}$$

Probability = $\frac{1}{1,000}$

Independent

Dependent

key

6. In Illinois, the daily 3 is different. They do not have a different set of numbered balls for each digit. They have one set of numbered balls, and they do not replace a ball once it has been selected. What is the probability of matching all three numbers in Illinois?

$$P(\text{Match then Match then match}) = \frac{1}{10} \cdot \frac{1}{9} \cdot \frac{1}{8} = \frac{1}{720}$$

Probability = $\frac{1}{720}$

Independent

Dependent

7. You draw three cards from a standard deck of playing cards and do NOT replace them after each draw. What is the probability of drawing a 3, then a queen, and then an ace?

$$P(3 \text{ then queen then Ace}) = \frac{4}{52} \cdot \frac{4}{51} \cdot \frac{4}{50} \rightarrow \frac{1}{13} \cdot \frac{4}{51} \cdot \frac{2}{25} = \frac{8}{16,575}$$

Probability = $\frac{8}{16,575}$

Independent

Dependent

8. You draw three cards from a standard deck of playing cards and do NOT replace them after each draw. What is the probability of drawing the 6 of hearts, then any heart, and then a black jack?

$$P(6 \text{ heart then hearts then black Jack}) = \frac{1}{52} \cdot \frac{12}{51} \cdot \frac{2}{50} \rightarrow \frac{12}{52} \cdot \frac{1}{51} \cdot \frac{1}{25} \rightarrow \frac{3}{13} \cdot \frac{1}{51} \cdot \frac{1}{25} \rightarrow \frac{1}{13} \cdot \frac{3}{51} \cdot \frac{1}{25} \rightarrow \frac{1}{13} \cdot \frac{1}{17} \cdot \frac{1}{25} = \frac{1}{5,525}$$

Probability = $\frac{1}{5,525}$

Independent

Dependent

9. You draw three cards from a standard deck of playing cards and replace each card back into the deck after each draw. What is the probability of drawing all 3 cards that are spades?

$$P(\text{Spade and spade and Spade}) = \frac{13}{52} \cdot \frac{13}{52} \cdot \frac{13}{52}$$

$$\therefore \frac{1}{4} \cdot \frac{1}{4} \cdot \frac{1}{4}$$

Probability = $\frac{1}{64}$

Independent

Dependent

10. You and your friend are dress shopping for the winter dance. You tried on three white dresses, two red dresses, a green dress and a blue dress. Your friend tried on two black dresses, a red dress, a white dress, and a yellow dress. What is the probability that you both chose a white dress?

$$P(w \text{ and } w) = \frac{3}{7} \cdot \frac{1}{5}$$

Probability = $\frac{3}{35}$

Independent

Dependent