

Section 11-5 Independent Events

Objective: Find the probability of two or more independent events.

Two events are independent if the occurrence or non-occurrence of one event has no effect on the likelihood of the occurrence of the other event. If one event does affect the occurrence of the other, the events are dependent.

Probability of Independent Events
 Events A and B are independent events if and only if
 $P(A \text{ and } B) = P(A) \times P(B)$. Otherwise, A and B are dependent events.

Events $A, B, C,$ and D are independent, and $P(A) = 0.3, P(B) = 0.5, P(C) = 0.4,$ and $P(D) = 0.1$. Find each probability.

1. $P(A \text{ and } B)$ $0.3 \cdot 0.5 = 0.15$
2. $P(C \text{ and } B)$ _____
3. $P(A \text{ and } D)$ $0.3 \cdot 0.1 = 0.03$
4. $P(B \text{ and } D)$ _____
5. $P(C \text{ and } A)$ $0.4 \cdot 0.3 = 0.12$
6. $P(C \text{ and } D)$ _____

A spinner has 8 congruent areas where each area is exactly $\frac{1}{8}$ of the circle each numbered 1 through 8. Find the same probability of each event in three spins of the spinner.

7. All three numbers are 3 or greater than 5. $\frac{4}{8} = \frac{1}{2}$ $\frac{1}{2} \left(\frac{1}{2}\right) \left(\frac{1}{2}\right) = \frac{1}{8}$
8. Exactly one number is 8 or greater than 3. $\left(\frac{5}{8}\right) \left(\frac{3}{8}\right) \left(\frac{3}{8}\right) = \frac{45}{512}$

A bag contains 6 red chips, 9 white chips, and 5 blue chips. A chip is selected and then replaced. Then a second chip is selected. Find probability of each event.

9. Both chips are white Want W total: $6 + 9 + 5 = 20$ $\frac{9}{20} \cdot \frac{9}{20} = \frac{81}{400}$
10. Neither chip is blue. $\frac{15}{20} \cdot \frac{15}{20} = \frac{3}{4} \cdot \frac{3}{4} = \frac{9}{16}$
11. The first chip is red and the second chip is white $\frac{6}{20} \cdot \frac{9}{20} = \frac{27}{200}$
12. The first chip is blue and the second chip is not blue _____
13. Both chips are blue _____
14. The first chip is not red and the second chip is not white _____
15. The first chip is yellow and the second chip is blue _____
16. Both chips are red, white or blue _____