

Dependent Probability

Independent vs. Dependent

INDEPENDENT

A teacher calls on a student by drawing a popsicle stick. After the student has answered the question, **their name goes back in the cup with the rest of the students.**

DEPENDENT

A teacher calls on a student by drawing a popsicle stick. After the student has answered the question, **their name stays out of the cup until everyone else has been called on.**

Independent vs. Dependent

INDEPENDENT

- pick something, then return it
- denominator stays the same with each pick
- item has the same probability of being picked each time
- There can be multiple picks as long as one item is picked at a time

Key Words: replaced, returned, put back

DEPENDENT

- pick something, keep it out
- denominator decreases after each pick
- item has a better probability of being picked each time
- there can be multiple picks as long as one item is picked at a time

Key Words: keep it, do not return

Example 1

A card is drawn from a deck of eight cards with letters A, B, C, D, E, F, G, and H. The card is not replaced and a second card is drawn. What is the probability of getting a B and an F card?

$$\frac{1}{8} \times \frac{1}{7} = \frac{1}{56} = 1.8\%$$

Example 2

What is the probability of drawing a Jack from a deck of cards, putting it aside, and then drawing another jack?

$$\frac{4}{52} \times \frac{3}{51} = \frac{12}{2652} = .45\%$$

Example 3

You have tiles numbered 1 through 9 in a bag. What is the probability of drawing the number 7, putting it aside, and then drawing a number greater than 5?

$$\frac{1}{9} \times \frac{3}{8} = \frac{3}{72} = 4.2\%$$

Example 4

Mr. Parietti needs two students to help him with a science demonstration for his class of 18 girls and 12 boys. He randomly chooses one student who comes to the front of the room. He then chooses a second student from those still seated. What is the probability that both students chosen are girls?

$$\frac{18}{30} \times \frac{17}{29} = \frac{306}{870} = 35.2\%$$

Example 5

In a shipment of 20 computers, 3 are defective. Three computers are randomly selected and tested. What is the probability that all three are defective if the first and second ones are not replaced after being tested?

$$\frac{3}{20} \times \frac{2}{19} \times \frac{1}{18} = \frac{6}{6840} = .09\%$$

0.00087719... E⁻⁴

Example 6

5 out of 20 students got an A on the test. What is the probability that three randomly chosen students all got A's?

$$\frac{5}{20} \cdot \frac{4}{19} \cdot \frac{3}{18} = .87\% = \frac{60}{6840}$$

Example 7

You pull a marble from a bag with 20 red, 20 white, and 10 green marbles. You hold onto it and then pull another marble. What is the probability of pulling a red marble and then pulling a green marble?

$$\frac{20}{50} \cdot \frac{10}{49} = \frac{200}{2450} = 8.2\%$$

A jar contains 6 blue, 3 red, 5 green, and 2 yellow candies.

Ex. 8: P(a red then green) if not replaced.

Ex. 9: P(two blue candies) if not replaced.

Ex. 10: P(three greens) if not replaced.