

Concept: Independent Events

Name:

COMPUTER COMPONENT

Instructions: In  follow the **Content Menu** path:

Probability > Independent Events



Work through all Sub Lessons of the following Lessons **in order**:

- *In This Topic*
- *What Are They?*
- *Examples*
- *Probability*
- *Patterns and Summary*



As you work through the computer exercises, you will be prompted to make notes in your notebook/math journal.

SUMMARY

When the outcome of one event has **no** effect on the outcome of another event, the events are said to be **independent** events.

Complete the following Examples-

Example 1: A coin is tossed and a die is rolled at the same time. What is the probability of throwing a head or tail, and rolling a 1, 2 or 3?

$$\text{solution: } \frac{\text{favorable}}{\text{possible}} = \frac{2 \times 3}{2 \times 6} = \frac{6}{12} = \frac{1}{2}$$

There is a probability of $\frac{1}{2}$, or one chance out of two to select this combination.

Example 2: Three blue balls and one red ball are placed in a box. What is the probability of removing two blue balls if each ball is replaced after it is removed?

$$\text{Solution: } \frac{\text{favorable}}{\text{possible}} = \frac{3 \times 3}{4 \times 4} = \frac{9}{16}$$

There is a probability of $\frac{9}{16}$, or nine chances out of sixteen for this combination.

Example 3: A bag contains tiles with letters on them spelling Probability. A tile is removed and replaced, then another tile is removed and replaced. What is the probability of pulling out a B, replacing it, then pulling out an L tile?

$$\text{Solution: } \frac{\text{favorable}}{\text{possible}} = \frac{2 \times 1}{11 \times 11} = \frac{2}{121}$$

There is only a 2/121, or 2 chances out of 121 to create this combination.

NOTE: *Pattern for Independent Events:* $P(A \text{ and } B) = P(\quad) \times P(\quad)$

OFF COMPUTER EXERCISES

Use your knowledge of Independent Events to find the probability for the following:

1. A coin is tossed and a die is rolled. What is the probability that ...

(a) a tail was tossed and an even number was rolled?

$$\text{Solution: } \frac{\text{favorable}}{\text{possible}} = \frac{1 \times 3}{2 \times 6} = \frac{3}{12} = \frac{1}{4}$$

There is a one in four chance to create this combination.

(b) a head was tossed and a number larger than 4 was rolled?

$$\text{Solution: } \frac{\text{favorable}}{\text{possible}} = \frac{1 \times 2}{2 \times 6} = \frac{2}{12} = \frac{1}{6}$$

There is a one in six chance to create this combination.

2. A card is drawn from a normal 52 card deck. The card number and suit are noted, the card is placed back in the deck, then another card is drawn. Find the probability that ...

(a) the first card was a Queen and the second card was a 10.

$$\text{Solution: } \frac{\text{favorable}}{\text{possible}} = \frac{4 \times 4}{52 \times 52} = \frac{16}{2704} = \frac{1}{84}$$

There is a 1 in 84 chance to create this combination.

(b) the first card was the Queen of Hearts and the second card was an 8.

$$\text{Solution: } \frac{\text{favorable}}{\text{possible}} = \frac{1 \times 4}{52 \times 52} = \frac{4}{2704} = \frac{1}{676}$$

There is a 1 in 676 chance to create this combination.

(c) both cards were Jacks.

$$\text{Solution: } \frac{\text{favorable}}{\text{possible}} = \frac{4 \times 4}{52 \times 52} = \frac{16}{2704} = \frac{1}{84}$$

There is a 1 in 84 chance to create this combination. (Can you tell why this is the same probability as part a above?)

(d) the first card was the 5 of Spades and the second card was the Ace of Hearts.

$$\text{Solution: } \frac{\text{favorable}}{\text{possible}} = \frac{1 \times 1}{52 \times 52} = \frac{1}{2704} = \frac{1}{2704}$$

There is a 1 in 2704 chance to create this combination. (very slim indeed)

3. A bag contains tiles with letters on them spelling the word BANANA.
A tile is removed, taken note of, then replaced. Another tile is then drawn.
Find the probability that ...

(a) the first tile was a B and the second tile was an N.

$$\text{Solution: } \frac{\text{favorable}}{\text{possible}} = \frac{1 \times 2}{6 \times 6} = \frac{2}{36} = \frac{1}{18}$$

There is a 1 in 18 chance to create this combination.

(b) the first tile was an N and the second tile was an A.

$$\text{Solution: } \frac{\text{favorable}}{\text{possible}} = \frac{2 \times 3}{6 \times 6} = \frac{6}{36} = \frac{1}{6}$$

There is a 1 in 6 chance to create this combination

4. You have three pieces of paper in an envelope. One piece of paper has the number 1 written on it, another has the number 2 written on it, and the other has the number 3 written on it. You draw and replace a piece of paper three times. What is the probability that the numbers you drew were ...

(a) 1, 2, 3 (in that order)

$$\text{Solution: } \frac{\text{favorable}}{\text{possible}} = \frac{1 \times 1 \times 1}{3 \times 3 \times 3} = \frac{1}{27}$$

(b) 2, 2, 2 (in that order)

$$\text{Solution: } \frac{\text{favorable}}{\text{possible}} = \frac{1 \times 1 \times 1}{3 \times 3 \times 3} = \frac{1}{27}$$

There is a 1 in 27 probability for each of these target combinations. Why would they be the same each time?

5. Two cards are drawn from a standard deck of 52 playing cards, with replacement. What is the probability that...

(a) both cards are the same color?

$$\text{Solution: } \frac{\text{favorable}}{\text{possible}} = \frac{26 \times 26}{52 \times 52} = \frac{676}{2704} = \frac{1}{4}$$

There is a 1 in 4 probability that both cards are the same color.

(b) both cards are from the same suit?

$$\text{Solution: } \frac{\text{favorable}}{\text{possible}} = \frac{13 \times 13}{52 \times 52} = \frac{169}{2704} = \frac{1}{16}$$

There is a 1 in 16 probability that both cards are the same suit.

- (c) How would your answers to parts (a) and (b) change if you did not replace cards after they were drawn?
