

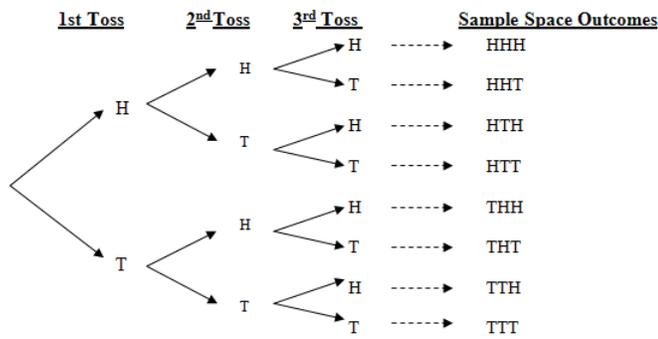
In probability theory, the sample space of an experiment or random trial is the set of all possible outcomes or results of that experiment. A sample space is usually denoted using set notation, and the possible outcomes are listed as elements in the set. It is common to refer to a sample space by the labels S , Ω , or U (for "universal set").

For example, if the experiment is tossing a coin, the sample space is typically the set {head, tail}. For tossing two coins, the corresponding sample space would be {(head,head), (head,tail), (tail,head), (tail,tail)}. For tossing a single six-sided die, the typical sample space is {1, 2, 3, 4, 5, 6} (in which the result of interest is the number of dots facing up).

For us, a subset of the sample space is called an event. Also, we will define the probability of an event as

$$P(\text{event}) = \frac{\text{number of outcomes in event}}{\text{number of outcomes in sample space}}$$

The illustration below shows the sample space for tossing a coin 3 times



Find the probability of showing 1 tail on three tosses of a coin.

$$P(1 \text{ Tail}) = \frac{3}{8}$$

Exer. 1-6: Determine the sample space for the experiment.

1. A coin and a six-sided die are tossed.
2. A six-sided die is tossed twice and the sum of the results is recorded.
3. A taste tester has to rank three varieties of orange juice, A, B, and C, according to preference.
4. Two marbles are selected (without replacement) from a sack containing two red marbles, two blue marbles, and one yellow marble. The color of each marble is recorded.
5. Two county supervisors are selected from five supervisors, A, B, C, D, and E, to study a recycling plan.
6. A sales representative makes presentations of a product in three homes per day. In each home there may be a sale (denote by S) or there may be no sale (denote by F).

Exer. 7-10: Find the probability for the experiment of tossing a coin three times. Use the sample space $S = \{HHH, HHT, HTH, HTT, THH, THT, TTH, TTT\}$

7. The probability of getting exactly two tails
8. The probability of getting a head on the first toss
9. The probability of getting at least one head
10. The probability of getting at least two heads

Exer. 11-14: Find the probability for the experiment of selecting one card from a standard deck of 52 playing cards.

11. The card is a face card.
12. The card is not a black face card.
13. The card is a face card or an ace.
14. The card is a 9 or lower. (Aces are low.)

Exer. 15-18: Find the probability for the experiment of tossing a six-sided die twice.

15. The sum is 6.

16. The sum is at least 8.

17. The sum is less than 11.

18. The sum is odd or prime

Exer. 19-22: Find the probability for the experiment of drawing two marbles (without replacement) from a bag containing one green, two yellow, and three red marbles.

19. Both marbles are red.

20. Both marbles are yellow.

21. Neither marble is yellow.

22. The marbles are of different colors.