

Probability & Statistics



Lesson 1 - Calculate probability for different types of random events using rules of probability and Bayes' theorem.

Lesson 2 - Concepts of a probability distribution

What is Probability

A measure of how likely an event is to occur.

Sample space - The set of all possible outcomes of a statistical experiment.

Event - Is a subset of a sample space

Probability of an event occurring - [video](#)

Formula for calculating probability of an event occurring:

Favourable Outcomes / Sample Space

$$\frac{\text{TOTAL NUMBER OF FAVOURABLE OUTCOMES}}{\text{TOTAL NUMBER OF POSSIBLE OUTCOMES}} = \text{PROBABILITY FORMULA}$$

Example:

Introduction to Probability



Find the probability that a child picked at random plays soccer.

$$P(\text{soccer}) = \frac{\text{soccer}}{\text{total}} = \frac{\text{Event}}{\text{Sample space}} = \frac{3}{10} = 0.3$$

Example 2: What is the probability of 2 coins both landing on heads P(HH):



50% 50%

$$P(HH) = \frac{1}{4} = 0.25$$



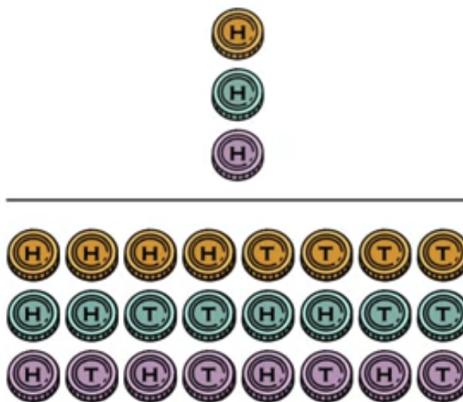
Example 3: What is the probability of 3 coins both landing on heads P(HHH):

Introduction to Probability - Coin Example 3



50% 50%

$$P(HHH) = \frac{1}{8} = 0.125$$



Exercise: What is the probability of obtaining a 6 when rolling a 6-sided dice?

Answer: There are 6 equally likely possibilities and 6 is one of them, therefore the probability is 1/6.



What is the probability of obtaining 6?



$$P(6) = \frac{1}{6}$$

Exercise: What is the probability of obtaining 6,6:



What is the probability of obtaining 6,6?

	1,1	1,2	1,3	1,4	1,5	1,6
2,1	2,2	2,3	2,4	2,5	2,6	
3,1	3,2	3,3	3,4	3,5	3,6	
4,1	4,2	4,3	4,4	4,5	4,6	
5,1	5,2	5,3	5,4	5,5	5,6	
6,1	6,2	6,3	6,4	6,5	6,6	

$$P(6,6) = \frac{1}{36}$$

Complement of Probability

The **complement** of an event A with respect to S is the subset of all elements of S that are not in A . We denote the complement of A by the symbol A' .

What is the probability of a child NOT playing soccer?

$$P(\text{not soccer}) = \frac{7}{10}!$$

Complement of Probability



30%

What is the probability of a child NOT playing soccer?

$$P(\text{not soccer}) = \frac{\text{not soccer}}{\text{total}} = \frac{\text{XXXXXXX}}{\text{XXXXXXX}} = \frac{7}{10} = 0.7$$