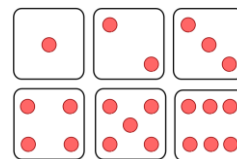


Probability

You are rolling a number cube and want to know how likely you are to roll a certain number. Each time you roll the number cube there are six possible results.



Rolling a number cube is an experiment in which results are observed.



Experiment

- flipping a coin
- rolling a number cube
- guessing a number of jelly beans in a jar

Sample space

- heads, tails
- 1, 2, 3, 4, 5, 6
- whole number



The possible results of an experiment are **outcomes**. When you roll a number cube, there are 6 possible outcomes: rolling a 1, 2, 3, 4, 5, or 6. An **event** is an outcome or a collection of outcomes, such as rolling a 2, or rolling an even number.

Once you specify an event, the outcomes for that event are called favorable outcomes. The favorable outcomes for rolling an even number are rolling a 2, rolling a 4, and rolling a 6.

In mathematics, the chance of occurrence of an event can be measured by a number called the **probability**.

Probability of an Event

The probability of an event when all the outcomes are equally likely is denoted by $P(E)$ and defined as:

$$P(E) = \frac{\text{Number of outcomes favourable to the event}}{\text{Total number of possible outcomes}}$$

- A probability of 0 meant that the event is **impossible**, or can never happen.
- A probability of 1 meant that the event is **certain**, or has to happen.

Example 1: Suppose you roll a number cube. What is the probability that you roll:

A. 5

There are altogether 6 possible outcomes and the occurrence of each of these outcomes is equally likely. Hence, we conclude that each number has an equal chance to appear and the probability of rolling a 5 is equal to $\frac{1}{6}$.

$$P(\text{rolling a 5}) = \frac{\text{number of favourable outcomes}}{\text{number of possible outcomes}} = \frac{1}{6}$$

The probability that you roll a 5 is $\frac{1}{6}$.

B. an even number

Rolls of 2, 4, and 6 are even, so there are 3 favorable outcomes. There are 6 possible outcomes.

$$P(\text{rolling an even number}) = \frac{\text{number of favourable outcomes}}{\text{number of possible outcomes}} = \frac{3}{6} = \frac{1}{2}$$

The probability that you roll an even number is $\frac{1}{2}$.