

A sample space in which each of the outcomes has the same chance of occurring is called a UNIFORM SAMPLE SPACE.

The probability of an event, $P(E)$ is a number between 0 and 1, inclusive. If $P(E) = 0$, then the event E is impossible. If $P(E) = 1$, then the event E is certain.

The *theoretical probability* of an event E occurring is based on the sample space S having equally likely outcomes. Then probability of the event E occurring is

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

Example: Consider flipping a fair coin three times. What is the uniform sample space?

- (a) What is the probability that exactly one head is seen?

- (b) What is the probability that two or more heads are seen?

- (c) What is the probability that more than 3 heads are seen?

Consider the uniform sample space $S = \{s_1, s_2, \dots, s_n\}$, with n outcomes. The n events that contain a single outcome, $\{s_1\}$, $\{s_2\}$. . . $\{s_n\}$ are called *simple* events.

A *probability distribution table* has the following properties:

1. Each of the entries is mutually exclusive with all other entries
2. The sum of the probabilities is 1

PROBABILITY DISTRIBUTION TABLE:

Event	probability

Example

Find the probability distribution table for the number of heads when a coin is tossed 3 times.

What is the probability of 2 or more heads?

A class has 150 students and the maximum grade possible in this class is 100. Eleven students had a grade of 90 or more. Forty-one students had grades of 80 or more. Fifty-seven students had a grade that was greater than or equal to 60 but less than 70. Ten students had grades less than 60.

Arrange this information a probability distribution table

Two fair six-sided dice are rolled. One is red and one is green.

1~1 2~1 3~1 4~1 5~1 6~1
 1~2 2~2 3~2 4~2 5~2 6~2
 1~3 2~3 3~3 4~3 5~3 6~3
 1~4 2~4 3~4 4~4 5~4 6~4
 1~5 2~5 3~5 4~5 5~5 6~5
 1~6 2~6 3~6 4~6 5~6 6~6

What is the probability of rolling a sum 2 or a sum of 12? _____ / 36

E is the event that the sum of the numbers shown uppermost is 7

F is the event that the red die shows a 1

G is the event that the green die shows a 6

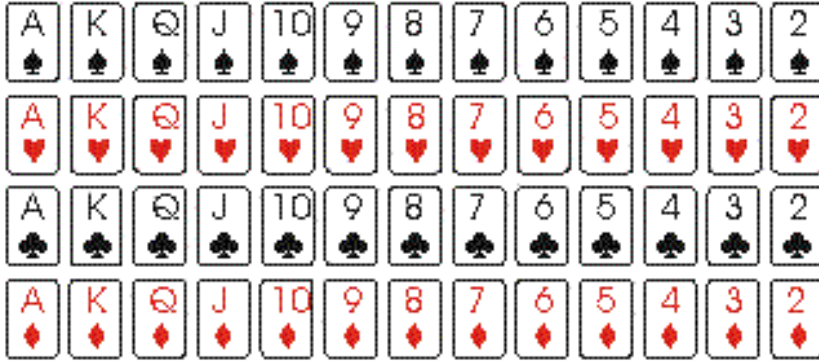
H is the event that the sum of the numbers shown uppermost is 10

(a) $P(E \cup F) = \underline{\hspace{2cm}} / 36$

(b) $P(G \cup H) = \underline{\hspace{2cm}} / 36$

(c) $P(H \cup F) = \underline{\hspace{2cm}} / 36$

A single card is drawn from a standard deck of cards.



- a) What is the probability that a 9 or a 10 is drawn? _____ / 52
- b) What is the probability that a black card or a 3 is drawn? _____ / 52

A survey gave the following results: 45% of the people surveyed drank diet drinks (D) and 25% drank diet drinks and exercised ($D \cap E$) and 24% did not exercise and did not drink diet drinks ($D^c \cap E^c$). Find the probability that:

- a) a person does not drink diet drinks $P(D^c) =$ _____ %
- b) does not exercise and drinks diet drinks $P(E^c \cap D) =$ _____ %
- c) exercises and does not drink diet drinks $P(E \cap D^c) =$ _____ %