Section 9.7 Probability

Objective: In this lesson you learned how to find the probabilities of events and their complements.

Important Vocabulary

Define each term or concept.

**Experiment**  Any happening for which the result is uncertain.

**Outcomes**  The possible results of an experiment.

**Sample space**  The set of all possible outcomes of an experiment.

**Event**  Any sub-collection of a sample space.

**Mutually exclusive**  Two events $A$ and $B$ (from the same sample space) are mutually exclusive if $A$ and $B$ have no outcomes in common.

**Independent events**  Two events are independent if the occurrence of one has no effect on the occurrence of the other.

**Complement of an event**  The collection of all outcomes in the sample space that are not in the event.

I. The Probability of an Event  (Pages 701–704)

If an event $E$ has $n(E)$ equally likely outcomes and its sample space $S$ has $n(S)$ equally likely outcomes, the **probability** of event $E$ is $P(E) = \frac{n(E)}{n(S)}$.

The probability of an event must be between 0 and 1.

If $P(E) = 0$, the event $E$ ______ cannot ______ occur, and $E$ is called a(n) ______ impossible ______ event. If $P(E) = 1$, the event $E$ ______ must_______ occur, and $E$ is called a(n) ______ certain ______ event.

Example 1:  A box contains 3 red marbles, 5 black marbles, and 2 yellow marbles. If a marble is selected at random from the box, what is the probability that it is yellow?

$\frac{1}{5}$
II. Mutually Exclusive Events (Pages 705–706)

If $A$ and $B$ are events in the same sample space, the probability of $A$ or $B$ occurring is given by $P(A \cup B) = P(A) + P(B) - P(A \cap B)$.

To find the probability that one or the other of two mutually exclusive events will occur, . . . add their individual probabilities.

Example 2: A box contains 3 red marbles, 5 black marbles, and 2 yellow marbles. If a marble is selected at random from the box, what is the probability that it is either red or black?

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III. Independent Events (Page 707)

If $A$ and $B$ are independent events, the probability that both $A$ and $B$ will occur is $P(A \text{ and } B) = P(A) \cdot P(B)$.

That is, to find the probability that two independent events will occur, . . . multiply the probabilities of each event.

Example 3: A box contains 3 red marbles, 5 black marbles, and 2 yellow marbles. If two marbles are randomly selected with replacement, what is the probability that both marbles are yellow?

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IV. The Complement of an Event (Page 708)

Let $A$ be an event and let $A'$ be its complement. If the probability of $A$ is $P(A)$, the probability of the complement is $P(A') = 1 - P(A)$.

What you should learn

How to find the probabilities of mutually exclusive events

How to find the probabilities of independent events

How to find the probability of the complement of an event

Homework Assignment

Page(s)

Exercises