

Exercises

- 2.5** An experiment consists of observing the gender of a baby when it is born.
- List the outcomes in the sample space.
 - List all possible events.
 - If the baby is a girl, which event(s) in (b) has (have) occurred?
- 2.6** In an experiment, the number of insects on a randomly selected plant is recorded.
- Specify the sample space for this experiment.
 - Give the set A representing the event of at most three insects being on the plant.
 - Explain why each of the possible outcomes in the sample space is not equally likely.
- 2.7** Of 30 laptop computers available in a supply room, 12 have a wireless card, 8 have a CD/DVD burner, and 14 have neither. In an experiment, a laptop is randomly selected from the supply room and whether or not it has a wireless card or a CD/DVD burner recorded. Using W to denote the event that the selected laptop has a wireless card and B to denote the event that the selected laptop has a CD/DVD burner, symbolically denote the following events and find the number of laptop computers represented by each.
- The selected laptop has both a wireless card and a CD/DVD burner.
 - The selected laptop has either a wireless card or a CD/DVD burner.
 - The selected laptop has a CD/DVD burner only.
 - The selected laptop has either a wireless card or a CD/DVD burner but not both.
- 2.8** In an isolated housing area consisting of 50 households, the residents are allowed to have at most one dog and at most one cat per household. Currently 25 households have a dog, 7 have both a cat and a dog, and 18 have neither a cat nor a dog. An experiment consists of randomly selecting a household and observing whether that household has a cat or a dog, or both. Using D to denote the event that the selected household has a dog and C to denote the event that the selected household has a cat, symbolically denote the following events and identify the number of households represented by each.
- The selected household has a dog but no cat.
 - The selected household has a cat.
 - The selected household has a cat but no dog.
 - The selected household has a cat or a dog but not both.
- 2.9** Four species of fish—black molly, guppy, goldfish, and neon—are available in a fish store. A child has been told that she may choose any two of these fish species for her aquarium. Once she makes the choice, several fish of the two selected species will be purchased.
- Give the sample space for this experiment.
 - Let A denote the event that the child's selections include a black molly. How many outcomes are in A ?
 - Let B , C , and D denote the events that the selections include a guppy, goldfish, and neon, respectively. Symbolically denote the event of selections containing a guppy, but no goldfish or neon, and identify the number of outcomes in the set.
 - List the outcomes in \overline{A} , $AB \cup CD$, $AB \cup \overline{CD}$, and $(A \cup C) \cap (B \cup D)$.
- 2.10** Five applicants (Jim, Don, Mary, Sue, and Nancy) are available for two identical jobs. A supervisor selects two applicants to fill these jobs.
- Give the sample space associated with this experiment.
 - Let A denote the event that at least one male is selected. How many outcomes are in A ?
 - Let B denote the event that *exactly* one male is selected. How many outcomes are in B ?
 - Write the event that two males are selected in terms of A and B .
 - List the outcomes in \overline{A} , AB , $A \cup B$, and \overline{AB} .
- 2.11** Although there is some controversy, tongue rolling (a loop) is generally thought to be a genetic trait. A people have the earlobe attached to the side of the class of 60 students, 13 could not roll their tongue, tongues and had attached earlobes. A student is randomly selected from the class and whether or not the student can roll his or her tongue and whether or not the student has attached earlobes. Let T represent the event that the selected student event that the student has attached earlobes. Symbolically denote the following events and find the number of students represented by each.
- The student can roll his or her tongue.
 - The student can neither roll his or her tongue nor has attached earlobes.
 - The student has attached earlobes but cannot roll his or her tongue.
 - The student can roll his or her tongue or has attached earlobes but cannot do both.
- 2.12** On a large college campus, 84% of the students report using some type of tobacco product within the past month. In an experiment, a student is randomly selected from these two substances during the past month. In an experiment, a student has drunk alcohol or used a tobacco product. Using A to denote the event that the student has drunk alcohol and B to denote the event that the student has used a tobacco product, symbolically denote each of the following events and find the number of students represented by each.
- The selected student has both drunk alcohol and used a tobacco product.
 - The selected student has abstained from both alcohol and tobacco products.
 - The selected student has either consumed alcohol or tobacco products but not both.
- 2.13** On a large college campus, the students are able to get a newspaper, and a national paper. Eighty-two percent of the students read only the school newspaper, 42% read only the school newspaper, 18% read only the national newspaper, and 1% read all three papers. Fifty-two percent read only the school newspaper, and 1% read all three papers. A randomly selected student is asked whether or not they read the school newspaper, local, or national paper. Express each of the following events and find the number of students represented by each.
- The student does not read any paper.
 - The student reads the local paper.
 - The student reads exactly two papers.
 - The student reads at least two papers.
- 2.14** A study of children 15 to 18 years of age in the United States found that 15% of the children in the United States have a computer in their bedroom. It was found that 32% of the children in the United States have a computer in their bedroom, and 32% have a computer in their bedroom, or a computer. Nine percent have a computer in their bedroom, a television, and a CD/tape player, or a computer, a television, a CD/tape player, or a computer, a television, and a CD/tape player. A U.S. child, age 15 to 18, is randomly selected from the study. Let A denote the event that the child has a television, a CD/tape player, or a computer, and let B denote the event that the child has a television, a CD/tape player, and a computer. Symbolically denote the following events in set notation and find the number of children represented by each.
- The child has a television, CD/tape player, and a computer.
 - The child has a television but no CD/tape player.
 - The child has a CD/tape player but no television.
 - The child has at least two of the media types (television, CD/tape player, and a computer) in their bedroom.
- 2.15** Use Venn diagrams to verify the distributive laws.
- 2.16** Use Venn diagrams to verify DeMorgan's second law.