

splits into two embryos, and fraternal twins are from separate fertilized eggs. The table entries reflect the principle that among sets of twins, $1/3$ are identical and $2/3$ are fraternal. Also, identical twins must be of the same sex and the sexes are equally likely (approximately), and sexes of fraternal twins are equally likely.

Sexes of Twins				
	boy/boy	boy/girl	girl/boy	girl/girl
Identical Twins	5	0	0	5
Fraternal Twins	5	5	5	5

25. Identical Twins

- a. After having a sonogram, a pregnant woman learns that she will have twins. What is the probability that she will have identical twins?
- b. After studying the sonogram more closely, the physician tells the pregnant woman that she will give birth to twin boys. What is the probability that she will have identical twins? That is, find the probability of identical twins given that the twins consist of two boys.

26. Fraternal Twins

- a. After having a sonogram, a pregnant woman learns that she will have twins. What is the probability that she will have fraternal twins?
- b. After studying the sonogram more closely, the physician tells the pregnant woman that she will give birth to twins consisting of one boy and one girl. What is the probability that she will have fraternal twins?

27. Fraternal Twins If a pregnant woman is told that she will give birth to fraternal twins, what is the probability that she will have one child of each sex?

28. Fraternal Twins If a pregnant woman is told that she will give birth to fraternal twins, what is the probability that she will give birth to two girls?

29. Redundancy in Computer Hard Drives Assume that there is a 2% rate of disk drive failure in a year (based on data from various sources, including "Failure Trends in Large Disk Drive Population," by Pinheiro et al. of Google, Inc.).

- a. If all of your computer data is stored on a hard disk drive with a copy stored on a second hard disk drive, what is the probability that during a year, you can avoid catastrophe with at least one working drive?
- b. If copies of all of your computer data are stored on three independent hard disk drives, what is the probability that during a year, you can avoid catastrophe with at least one working drive?

30. Redundancy in Aircraft Radios The FAA requires that commercial aircraft used for flying in instrument conditions must have two independent radios instead of one. Assume that for a typical flight, the probability of a radio failure is 0.0035. What is the probability that a particular flight will be safe with at least one working radio? Why does the usual rounding rule of three significant digits not work here? Is this probability high enough to ensure flight safety?

31. Composite Drug Screening Based on the data in Table 4-1, assume that the probability of a randomly selected person testing positive for drug use is 0.134. If drug screening samples are collected from 8 random subjects and combined, find the probability that the combined sample will reveal a positive result. Is that probability low enough so that further testing of the individual samples is rarely necessary?

32. Composite Water Samples The Fairfield County Department of Public Health tests water for contamination due to the presence of *E. coli* (*Escherichia coli*) bacteria. To reduce laboratory costs, water samples from five public swimming areas are combined for one test, and further