

Statistics
Independence

Key

Name: _____

1. Suppose you know that in a class of 30 students, 10 have blue eyes and 20 have brown eyes. Twenty-four of the students are right-handed and 6 are left-handed. Of the left-handers, 2 have blue eyes. Make and fill in a table showing this situation. Then find the probability that a randomly selected person from this classroom is right-handed, given that they have brown eyes.

	B _{IVE}	B _{rown}
LEFT	2	4
RIGHT	8	16

$$\frac{16}{20} = \frac{4}{5} = 80\% = 0.8$$

2. The display below gives a breakdown of the U.S. population by race and age as given by the U.S. Bureau of the Census.

Age	Race				Total
	White	Black	American Indian, Eskimo	Asian, Pacific Islander	
Under 5	15184	2892	202	872	19150
5-9	15560	3147	226	805	19738
10-14	15093	2937	239	770	19040
15-19	15151	2963	219	735	19068
20-24	13970	2598	186	758	17512
25-29	15163	2615	191	900	18869
30-34	16903	2762	184	892	20741
35-39	18710	2858	183	874	22625
40 or older	95600	11175	692	3427	110893
Total	221334	33947	2322	10033	267636

You are working for a polling organization that is about to select a random sample of U.S. residents. What is the probability that the first person selected will be

- a. age 40 or older, given that the person is Asian/Pacific Islander? $\frac{3427}{10033}$
 b. Black, given that the person is under the age of 10? $\frac{2892+3147}{19150+19738}$
 c. under the age of 10, given that the person is white? $\frac{15560+15184}{221334}$
 d. Black or under the age of 10, given that the person is under the age of 30?

$$\frac{(2892+3147) + (15560+15184)}{19150+19738+221334}$$

from under 30

KEY

3. Joseph Lister (British, 1827-1912), surgeon at the Glasgow Royal Infirmary, was one of the first to believe in Pasteur's germ theory of infection. He experimented with using carbolic acid to disinfect operating rooms during amputations. When carbolic acid was used, 34 of 40 patients lived. When carbolic acid was not used, 19 of 35 patients lived. If a patient is selected at random, find

- a. $P(\text{patient died} | \text{carbolic acid used}) = \frac{6}{40}$
- b. $P(\text{carbolic acid used} | \text{patient died}) = \frac{6}{22}$
- c. $P(\text{carbolic acid used and patient died}) = \frac{6}{75}$
- d. $P(\text{carbolic acid used or patient died}) = \frac{56}{75}$

4. Suppose you choose a student at random from your school. In each case, does knowing that event A happened increase the probability of event B, decrease the probability of event B, or leave the probability of event B unchanged?

- a. A: The student is a football player.
B: The student weighs less than 120 pounds.
- b. A: The student has long fingernails.
B: The student is a female.
- c. A: The student is a freshman.
B: The student is male.
- d. A: The student is a freshman.
B: The student is a senior. \rightarrow decrease