

Probability Models

Today I Can

1. Construct and use probability models.

Two-Way Frequency Table (a.k.a Contingency Table)

A display of the frequencies of data in 2 or more different categories.

Example 1. The table shows data about students grade level and whether or not they work part-time. Find each probability.

	Part time job	No part time job	Totals
Junior	19	31	
Senior	44		50
Totals		37	100

(a) Junior and does not work

(b) Senior and does work

Conditional Probability

The probability that an event will occur given that another event has already occurred.

- The probability event B occurs given that event A has occurred: $P(B|A)$
- The probability event A occurs given that event B has occurred: $P(A|B)$
- Typically, whatever follows the key words and phrases *if*, *given that*, or *suppose* is the value that goes in the denominator.

Example 2. Respondents of a poll were asked whether they were for, against, or had no opinion about a bill before the state legislature that would increase minimum wage.

Age Group	For	Against	No Opinion	Total
18-29	310	50	20	380
30-45	200	30	10	240
46-60	120	20	30	170
Over 60	150	20	40	210
Total	780	120	100	1000

- (a) What is the probability that a randomly selected person is over 60 years old given that the person had no opinion?
- (b) What is the probability that a randomly selected person is 30-45 years old if the person is in favor?
- (c) Suppose someone who is against the bill is selected, what is the probability that they are 18-29?
- (d) What is the probability that a randomly selected person is *not* 18-29, given that the person is in favor of the bill?

Example 3. A company has 150 sales representatives. Two months after a sales seminar, the company vice-president made the table based on sales results.

	Attended	Did not attend	Total
Increased Sales	0.48	0.02	0.5
No increased sales	0.32	0.18	0.5
Total	0.8	0.2	1

- (a) What is the probability that someone who attended the seminar had an increase in sales?
- (b) What is the probability that a randomly selected sales representative, who did not attend the seminar, did not see an increase in sales?