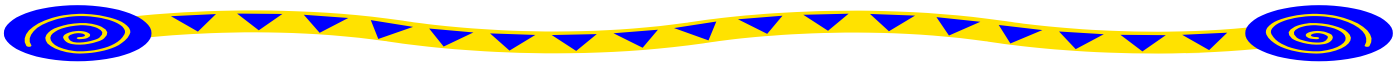
Honors Advanced Algebra

Name: _____

Period: _____ Date: _____

# 13.5 Probability Models

**Target 8.B.** Use the rules of probability to compute probabilities of compound events in a uniform probability model.



A ***two-way frequency table***, or a contingency table, displays the frequency of data in two different categories. You can use two-way frequency tables to organize data and identify sample spaces to approximate probabilities.

## Using a Two-Way Frequency Table

1. The table shows data about student involvement in extracurricular activities at a local high school.

| | Involved in Activities | Not Involved in Activities | Totals |
|---|---|---|---|
| *Male* | 112 | 145 | 257 |
| *Female* | 139 | 120 | 259 |
| *Totals* | 251 | 265 | 516 |

   a. What is the probability that a randomly chosen student is a female who is not involved in extracurricular activities?

   b. What is the probability that a randomly chosen student is a male who is involved in extracurricular activities?

2. The two-way table below shows the number of male and female students by grade level on the prom committee.

| | Male | Female | Totals |
|---|---|---|---|
| **Juniors** | 3 | 4 | 7 |
| **Seniors** | 3 | 2 | 5 |
| **Totals** | 6 | 6 | 12 |

   a. What is the probability that a member of the prom committee is a male who is a junior?

   b. What is the probability that a member of the prom committee is a female who is not a junior?

3. **Attendance at Soccer Camp**

| | 6th graders | 7th graders | 8th graders | Total |
|---|---|---|---|---|
| **Boys** | 7 | 6 | 10 | 23 |
| **Girls** | 8 | 7 | 12 | 27 |
| **Totals** | 15 | 13 | 22 | 50 |

a. P(8th grade boy)

b. P(6th grade girl)

The probability that an event will occur, given that another event has already occurred, is called a ***conditional probability***. You can write the conditional probability of event B, given that A has already occurred, as P(B|A). You read P(B|A) as "the probability of event B, given event A."

**Finding a Probability**

4. 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 the minimum wage.

| Age Group | For | Against | No Opinion | Totals |
|---|---|---|---|---|
| **18-29** | 310 | 50 | 20 | 380 |
| **30-45** | 200 | 30 | 10 | 240 |
| **45-60** | 120 | 20 | 30 | 170 |
| **Over 60** | 150 | 20 | 40 | 210 |
| **Totals** | 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 on the state bill?

b. What is the probability that a randomly selected person is against the state bill, given that they are 45-60 years old?

c. What is the probability that a randomly selected person is 18-29 years old, given that they are against the state bill?

d. What is the probability that a randomly selected person is not 18-29 years old, given that the person is in favor of the state bill?

5. Use the "Attendance at Soccer Camp" two-way frequency table to find each probability.
   a. P($6^{th}$ grade | boy)

   b. P($8^{th}$ grade | girl)

**Using Relative Frequencies**

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

| | ***Attended Seminar*** | ***Did not Attend Seminar*** | ***Totals*** |
|---|---|---|---|
| ***Increased Sales*** | 0.48 | 0.02 | 0.5 |
| ***No Increase in Sales*** | 0.32 | 0.18 | 0.5 |
| ***Totals*** | 0.8 | 0.2 | 1 |

   a. What is the probability that someone who attended the seminar had increased 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?

7. Treatments Given by Veterinarian in One Week

| | **Shots Only** | **Shots and Checkup** | **Totals** |
|---|---|---|---|
| **Dogs** | 0.31 | 0.23 | 0.54 |
| **Cats** | 0.26 | 0.20 | 0.46 |
| **Totals** | 0.57 | 0.43 | 1 |

   a. P(cat | shots only)

   b. P(shots and checkup | dog)