

10.3

Two-Way Tables and Probability

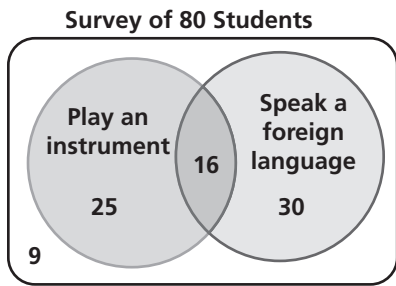
For use with Exploration 10.3

Essential Question How can you construct and interpret a two-way table?

1 EXPLORATION: Completing and Using a Two-Way Table

Work with a partner. A *two-way table* displays the same information as a Venn diagram. In a two-way table, one category is represented by the rows and the other category is represented by the columns.

The Venn diagram shows the results of a survey in which 80 students were asked whether they play a musical instrument and whether they speak a foreign language. Use the Venn diagram to complete the two-way table. Then use the two-way table to answer each question.



	Play an Instrument	Do Not Play an Instrument	Total
Speak a Foreign Language			
Do Not Speak a Foreign Language			
Total			

- How many students play an instrument?
- How many students speak a foreign language?
- How many students play an instrument and speak a foreign language?
- How many students do not play an instrument and do not speak a foreign language?
- How many students play an instrument and do not speak a foreign language?

2 EXPLORATION: Two-Way Tables and Probability

Work with a partner. In Exploration 1, one student is selected at random from the 80 students who took the survey. Find the probability that the student

- plays an instrument.

10.3 Two-Way Tables and Probability (continued)**2 EXPLORATION: Two-Way Tables and Probability (continued)**

- b. speaks a foreign language.
- c. plays an instrument and speaks a foreign language.
- d. does not play an instrument and does not speak a foreign language.
- e. plays an instrument and does not speak a foreign language.

3 EXPLORATION: Conducting a Survey

Go to *BigIdeasMath.com* for an interactive tool to investigate this exploration.

Work with your class. Conduct a survey of students in your class. Choose two categories that are different from those given in Explorations 1 and 2. Then summarize the results in both a Venn diagram and a two-way table. Discuss the results.

Communicate Your Answer

- 4. How can you construct and interpret a two-way table?
- 5. How can you use a two-way table to determine probabilities?

10.3**Notetaking with Vocabulary**

For use after Lesson 10.3

In your own words, write the meaning of each vocabulary term.

two-way table

joint frequency

marginal frequency

joint relative frequency

marginal relative frequency

conditional relative frequency

Core Concepts**Relative and Conditional Relative Frequencies**

A **joint relative frequency** is the ratio of a frequency that is not in the total row or the total column to the total number of values or observations.

A **marginal relative frequency** is the sum of the joint relative frequencies in a row or a column.

A **conditional relative frequency** is the ratio of a joint relative frequency to the marginal relative frequency. You can find a conditional relative frequency using a row total or a column total of a two-way table.

Notes:

10.3 Notetaking with Vocabulary (continued)**Extra Practice**

In Exercises 1 and 2, complete the two-way table.

1.

		Arrival		
		Tardy	On Time	Total
Method	Walk	22		
	City Bus			60
Total			58	130

2.

		Response		
		Yes	No	Total
Age	Under 21		24	25
	Over 21	29		
Total		30		75

3. A survey was taken of 100 families with one child and 86 families with two or more children to determine whether they were saving for college. Of those, 94 of the families with one child and 60 of the families with two or more children were saving for college. Organize these results in a two-way table. Then find and interpret the marginal frequencies.

10.3 Notetaking with Vocabulary (continued)

4. In a survey, 214 ninth graders played video games every day of the week and 22 ninth graders did not play video games every day of the week. Of those that played every day of the week, 36 had trouble sleeping at night. Of those that did not play every day of the week, 7 had trouble sleeping at night. Make a two-way table that shows the joint and marginal relative frequencies.
5. For financial reasons, a school district is debating about eliminating a Computer Programming class at the high school. The district surveyed parents, students, and teachers. The results, given as joint relative frequencies, are shown in the two-way table.

		Population		
		Parents	Students	Teachers
Response	Yes	0.58	0.08	0.10
	No	0.06	0.15	0.03

- a. What is the probability that a randomly selected parent voted to eliminate the class?
- b. What is the probability that a randomly selected student did not want to eliminate the class?
- c. Determine whether voting to eliminate the class and being a teacher are independent events.