Name_____  Date _____

# 12.3 Two-Way Tables and Probability
**For use with Exploration 12.3**

**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.

**Survey of 80 Students**

Play an instrument: 25
16
Speak a foreign language: 30
9
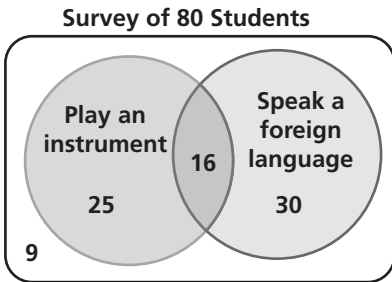
| | Play an Instrument | Do Not Play an Instrument | Total |
|---|---|---|---|
| **Speak a Foreign Language** | | | |
| **Do Not Speak a Foreign Language** | | | |
| **Total** | | | |

    **a.** How many students play an instrument?

    **b.** How many students speak a foreign language?

    **c.** How many students play an instrument and speak a foreign language?

    **d.** How many students do not play an instrument and do not speak a foreign language?

    **e.** 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

    **a.** plays an instrument.

**12.3** **Two-Way Tables and Probability** (continued)

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**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.

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**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?

# 12.3 Notetaking with Vocabulary
**For use after Lesson 12.3**

**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:**

**12.3** **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.

**12.3** **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.