10.2

It's So Hot Outside!

Relative Frequency Distribution

LEARNING GOALS

In this lesson, you will:

- Construct and interpret relative frequency distribution and relative frequency marginal distributions displayed in two-way tables for categorical data.
- Analyze and use relative frequency marginal distributions to make decisions for a problem situation.

KEY TERMS

- relative frequency distribution
- relative frequency marginal distribution

Humans are warm-blooded mammals. Normal human body temperature can range from 97°F to 99°F so anything significantly higher or lower than that can cause major issues. Hypothermia and hyperthermia are two conditions that can occur when the body's temperature is greatly different from normal body temperature. Hypothermia occurs when the body's temperature drops below 95°F. This occurs when the body is exposed to low temperatures for an extended period of time. Hyperthermia is the opposite of hypothermia and occurs when the body is exposed to high temperatures for a prolonged period of time. Hyperthermia occurs when the body produces more heat than it can emit and the body's temperature climbs to over 100°F.

While it seems like that is not much of a change in temperature, your body is well equipped to regulate its temperature and you can actually be exposed to heat or cold for some time before experiencing any hyperthermia or hypothermia symptoms.

PROBLEM 1 What Do You Want to Do?

The Northpointe community outreach director wants to plan special summer activities for the members of Northpointe. He posts a survey on the local newspaper's website to gather information on the favorite activities of the community members. Participants identified their age and then chose from four given activities. The responses gathered from the survey are shown.

Activities Preferred During Hot Weather

	Sports	Movies	Reading	Walking	Total
Students Age 18 Years Old and Under	20	30	22	8	
Adults Age 19 Thru 50 Years Old	10	32	25	43	
Adults Over 50 Years Old	5	20	35	30	
Total					

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1. Complete the frequency marginal distribution for the data given.

While the raw data provides some information, it is often more efficient to use percents when analyzing data. The relative frequencies of each data entry can provide that information. Representing the relative frequencies for joint data displayed in a two-way table is called a *relative frequency distribution*. The **relative frequency distribution** provides the ratio of occurrences in each category to the total number of occurrences. Displaying the relative frequencies for the rows or columns is called a *relative frequency marginal distribution*. The **relative frequency marginal distribution** provides the ratio of total occurrences for each category to the total number of occurrences.

2. Construct a relative frequency distribution and relative frequency marginal distribution of the data.

Activities Preferred During Hot Weather

	Sports	Movies	Reading	Walking	Total
Students Age 18 Years Old and Under					
Adults Age 19 Thru 50 Years Old					
Adults Over 50 Years Old					
Total					

3. After creating the relative frequency distribution and relative frequency marginal distribution, the students in Mr. Thomas's class made the following statements.

For each statement explain why the student is correct or incorrect. If the student is incorrect tell what the correct statement would be.

4. Which age group made up the smallest percent of people surveyed?

5. Which activity was preferred by the largest percent of people surveyed?

PROBLEM 2 How Does the Data Stack Up?

Previously, you used a bar graph to visually represent data. Another way to represent data is to use a stacked bar graph in which the bars are stacked on top of each other as opposed to sitting next to each other.

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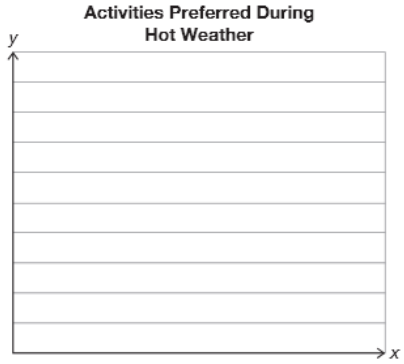
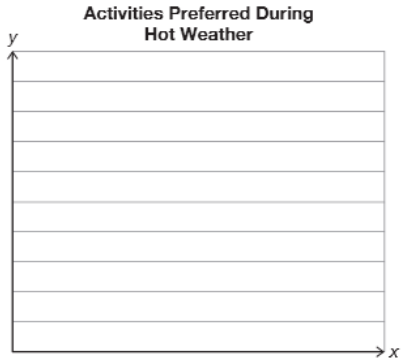
1. Construct a stacked bar graph of the relative frequency distribution. Let the *x*-axis represent age group.



2. What conclusions can you draw by examining the graph?

3. Construct a stacked bar graph of the relative frequency distribution. Let the *x*-axis represent the activities.



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4. What conclusions can you draw by examining the graph?

5. Name some advantages of graphing the data by age group. Name some advantages of graphing the data by activity.

PROBLEM 3 So What Should We Do?

Now that the community outreach director has gathered this information, he wants to use it to plan different activities for the summer.

1. Analyze each activity shown. Determine whether you think the activity would be a good idea to have during the summer. Explain your reasoning based on the data.
   a. Start a walking club for community members age 19 to 50.

   b. Set up an over age 50 soccer tournament.

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   c. Start an age 18 and under ultimate Frisbee league.

2. The community outreach director wants to offer one summer activity each week that will appeal to all ages of the community. Write a letter to the community outreach director recommending one activity and tell why the other activities may not be the best activities during the summer. Use the data to support your idea.

Be prepared to share your solutions and methods.