Warm-Up

The three primary colors are red, blue, and green. Students in a homeroom were surveyed to determine their favorite primary color. The table below shows the results of the survey.

Student	Favorite Color
John	red
Sue	blue
Keesha	blue
Buddy	red
Michael	green
Carrie	blue
Jeff	red
Brady	red
Megan	green
Maura	green
Roman	red
Taylor	blue
Jessica	blue
Bill	red

(You don't have to copy the chart.)

1. How many girls preferred green?

2. How many boys preferred blue?

3. How did you determine your answers to Questions 1 and 2?

4. Is there another way to view this data so it would be easier to determine these answers?

Interpreting Frequency Distributions

Standards: S.ID. 5

Learning Targets: I will be able to create and interpret frequency distributions as well as caculate joint and marginal frequencies.

Vocabulary: two-way frequency table, frequency distribution, joint frequency, frequency marginal distribution

PROBLEM 1 Hot Lunch!

Ms. Seymour is the school cafeteria supervisor at Williams High School. She has been asked to cut her food budget for the upcoming school year. One idea she has is to cut the number of meal choices during the week. However, determining which meal to cut will not be an easy decision. Ms. Seymour wonders if there is a difference in students' favorite cafeteria meals by grade level. She decides to survey the students in Mr. Kolbe's gym class, which consists of 9th and 10th graders. She recorded the results of her survey in the table shown.

Grade	Favorite Meal
9	Salad bar
10	Burgers
10	Pizza
10	Chicken nuggets
10	Chicken nuggets
9	Burgers
10	Salad bar
9	Salad bar
10	Chicken nuggets
9	Burgers
10	Pizza
9	Salad bar
9	Burgers
10	Burgers
9	Chicken nuggets
9	Salad bar
10	Chicken nuggets
10	Chicken nuggets
10	Salad bar
10	Burgers
10	Salad bar
9	Burgers
9	Pizza
10	Chicken nuggets
10	Salad bar
9	Salad bar
10	Pizza
9	Pizza
10	Chicken nuggets
9	Pizza

1. Analyze Ms. Seymour's data table.

   a. Can you summarize her findings just by looking at her data table? Explain why or why not.

   b. Identify the variables of the data from Ms. Seymour's survey. Are the variables in the table numerical? Explain your reasoning.

Previously, you explored the relationship between two variables that had data values that were quantitative, or numerical. Data that can be grouped into categories, such as favorite meals, are called **categorical data**.

One method of organizing categorical data is to use a *two-way frequency table*. A **two-way frequency table** displays categorical data by representing the number of occurrences that fall into each group for two variables. On the table, one variable is divided into rows and the other is divided into columns.

2. Identify the groups for the variable, grade level. How many groups are there for this variable?

3. Identify the groups for the variable, favorite meal.
How many groups are there for this variable?

4. Create a two-way frequency table of the data.

   a. Enter the name of each group.

   b. Record the favorite meal for each student in the appropriate row using tally marks. Then, write the frequency of each meal for each grade level.

Favorite Meals of Students

Grade Level				

5. What observations can you make from the data about the students' favorite meals?

The table you created is a *frequency distribution*. A **frequency distribution** displays the frequencies for categorical data in a two-way table. Each time you determined the frequency of one favorite meal of one of the grade levels, you recorded a *joint frequency*. Any frequency you record within the body of a two-way frequency table is known as a **joint frequency**.

A two-way frequency table is helpful in organizing each group's frequency in an efficient way. However, it is common to determine the total number of people surveyed just to ensure that a good survey was taken. Determining this total is also helpful to ensure that you recorded the data accurately within the table. For example, if you know 50 people took part in the survey, and the sum of the joint frequencies is 47, then you know that you are missing three data points from the data set.

6. Use the data from your frequency distribution to determine the total number of 9th graders and 10th graders, and to determine the total number of frequencies for each favorite meal category.

Favorite Meals of Students

Grade Level	Burgers	Chicken Nuggets	Pizza	Salad Bar	Total
9th grade					
10th grade					
Total					

You just created a *frequency marginal distribution* of the data by determining the totals for each group. A **frequency marginal distribution** displays the total of the frequencies of the rows or columns of a frequency distribution.

7. Analyze the frequency marginal distribution to answer each question.

a. How many 9th graders participated in the survey?

b. How many students prefer burgers?

c. How many students prefer chicken nuggets?

d. How many 10th graders participated in the survey?

e. How many students prefer salad bar?

8. What do you notice about the total number of students who prefer burgers, chicken nuggets, pizza, and salad bar; and the total number of 9th and 10th graders? Can you use this observation to determine if you correctly determined the frequency distribution?

9. Use the frequency marginal distribution to answer each question.

   a. Which meal is the least favorite of all students?

   b. Which meal is the least favorite of 9th graders?

   c. Which meal is the most favorite of all students?

   d. Which meal is the most favorite of the 10th graders?

PROBLEM 3 Putting It All Together

Ms. Seymour must decide on a plan for the upcoming school year. The principal of the school would like Ms. Seymour to present her data and a graph to justify her decision to cut costs.

1. Which meal choice would you cut according to the data? Explain why you would discontinue that meal choice. Then explain which graph you would recommend Ms. Seymour use when she presents her plan.

Warm-Up

The three primary colors are red, blue, and green. Students in a homeroom were surveyed to determine their favorite primary color. The table shows the results of the survey. Use the table to create a two-way frequency table--make sure to include the marginal frequencies.

Student	Favorite Color
John	red
Sue	blue
Keesha	blue
Buddy	red
Michael	green
Carrie	blue
Jeff	red
Brady	red
Megan	green
Maura	green
Roman	red
(boy) Taylor	blue
Jessica	red
Bill	red
Bob	blue
Tim	blue

Relative Frequency Distributions

Standards: S.ID.5

Learning Targets: I will be able to create and interpret frequency distributions as well as caculate joint and marginal frequencies.

Vocabulary: relative frequency distribution, relative frequency marginal distribution

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					

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.

**remember to calculate a percent:

number given ÷ total number * 100

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

Relative Frequency Distribution:

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					

How do I calculate each relative frequency marginal distribution?

Activities Preferred During Hot Weather

	Sports	Movies	Reading	Walking	Total
Students Age 18 Years Old and Under	7.1 %				
Adults Age 19 Thru 50 Years Old					
Adults Over 50 Years Old					
Total					

You finish the rest. What do you think should be on the "box" where the two totals come together?

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

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

Marie

7.1% of students age 18 and under prefer playing sports in the hot weather.

Shane

1.07% of adults over age 50 prefer walking in the hot weather.

Olivia

More adults over 50 responded to the survey than any other age group.

Isaac

29.3% of participants in the survey prefer watching movies or reading in the hot weather.

Aaron

Playing sports is the least popular activity in the hot weather according to the survey results.

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 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.

   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.

Warm-Up

You took a survey of men and women to determine their favorite drink. The three drinks were coffee, tea, and water. For men, 13 liked coffee, 7 liked tea, and 8 liked water. For women, 4 liked coffee, 11 liked tea, and 15 liked water. Create a two way frequency distribution to show this data.

	Men	Women	Total
Coffee	13	4	17
Tea	7	11	18
Water	8	15	23
Total	28	30	58

What is the percentage of women who preferred tea or water to drink?

A survey was conducted to determine the favorite sport of high school students. In 9th grade, 25 preferred soccer, 18 preferred baseball, 38 preferred football, and 32 preferred basketball. In 10th grade, 23 preferred soccer, 28 preferred baseball, 24 preferred football, and 34 preferred basketball. In 11th grade, 12 preferred soccer, 29 preferred baseball, 42 preferred football, and 22 preferred basketball. In 12th grade, 21 preferred soccer, 26 preferred baseball, 33 preferred football, and 39 preferred basketball.

Create a two way frequency distribution to display this data and then answer the questions that follow.

	9th	10th	11th	12th	Total
Soccer					
Baseball					
Football					
Basketball					
Total					

1.) How many students participated in the survey?

2.) What is the percentage of students who preferred baseball?

3.) What is the percentage of students who preferred football?

4.) What is the percentage of 9^{th} graders who preferred soccer?

5.) What is the percentage of 10^{th} graders who preferred basketball?

6.) What percentage of people who like soccer are in the 12^{th} grade?

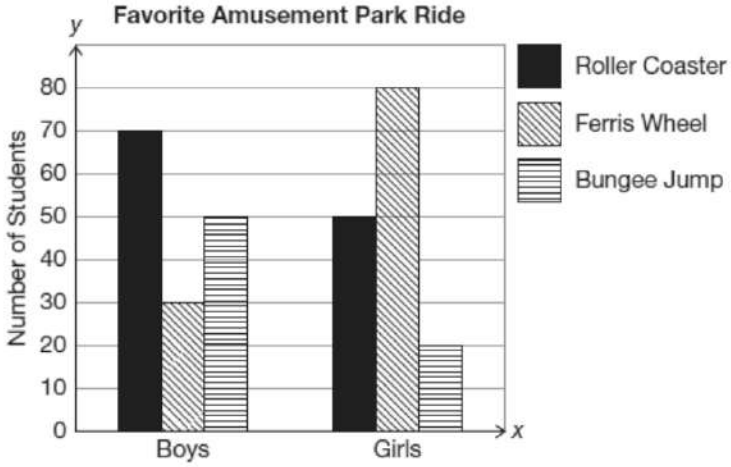
7.) What percentage of people who like football are in the 11^{th} grade?

9.) Create a relative frequency table.

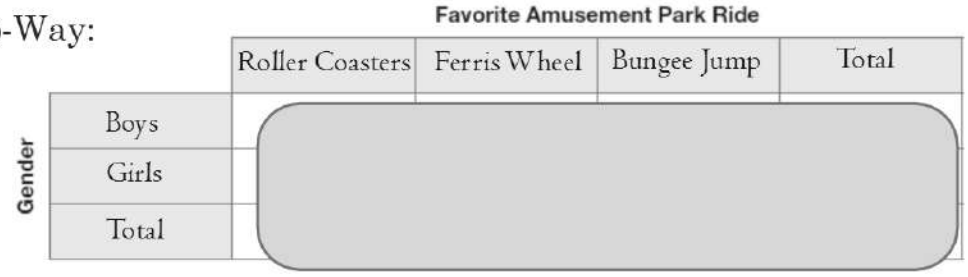
	9th	10th	11th	12th	Total
Soccer					
Baseball					
Football					
Basketball					
Total					

Warm-Up

1. Construct a relative frequency distribution and a relative frequency marginal distribution of the data using the bar graph provided.



Two-Way:



Relative: