



# Standard #: MAFS.912.S-ID.2.5

This document was generated on CPALMS - [www.cpalms.org](http://www.cpalms.org)

Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data. ★

<b>Subject Area:</b> Mathematics	<b>Grade:</b> 912
<b>Domain-Subdomain:</b> Statistics & Probability: Interpreting Categorical & Quantitative Data	<b>Cluster:</b> Level 2: Basic Application of Skills & Concepts
<b>Cluster:</b> <a href="#">Summarize, represent, and interpret data on two categorical and quantitative variables. (Algebra 1 - Supporting Cluster) (Algebra 2 - Supporting Cluster)</a> - Clusters should not be sorted from Major to Supporting and then taught in that order. To do so would strip the coherence of the mathematical ideas and miss the opportunity to enhance the major work of the grade with the supporting clusters.	<b>Date Adopted or Revised:</b> 02/14
<b>Content Complexity Rating:</b> <a href="#">Level 2: Basic Application of Skills &amp; Concepts</a> - <a href="#">More Information</a>	<b>Date of Last Rating:</b> 02/14
<b>Status:</b> State Board Approved	<b>Assessed:</b> Yes

## TEST ITEM SPECIFICATIONS

**Item Type(s):** This benchmark may be assessed using: 1 item(s)

N/A

**Assessment Limits :**

In data with only two categorical variables, items should require the student to determine relative frequencies and use the frequencies to complete the table or to answer questions

**Calculator :**

Neutral

**Clarification :**

Students will create or complete a two-way frequency table to summarize categorical data.

Students will determine if associations/trends are appropriate for the data.

Students will interpret data displayed in a two-way frequency table.

Students will calculate joint, marginal, and conditional relative frequencies.

**Stimulus Attributes :**

Items should use real-world data and be set in a real-world context.

**Response Attributes :**

Items may require the student to apply the basic modeling cycle.

Items may require the student to choose an appropriate level of accuracy.

Items may require the student to choose and interpret units.

## SAMPLE TEST ITEMS (1)

**Test Item #:** [Sample Item 1](#)

**Question:**

A high school drama teacher organizes a musical production. He wants to record the number of students involved in each part of the production . He uses a two-way table to display the data.

The drama teacher knows that approximately 55% more girls participate in the production as actors than as stage crew members.

Complete the two-way table to show a possible breakdown of students.

**Difficulty:** N/A

**Type:** TI: Table Item

## Related Courses

Course Number	Course Title
<a href="#">1200310:</a>	Algebra 1 (Specifically in versions: 2014 - 2015, 2015 and beyond (current))
<a href="#">1200320:</a>	Algebra 1 Honors (Specifically in versions: 2014 - 2015, 2015 and beyond (current))
<a href="#">1200380:</a>	Algebra 1-B (Specifically in versions: 2014 - 2015, 2015 and beyond (current))
<a href="#">1200400:</a>	Intensive Mathematics (Specifically in versions: 2014 - 2015, 2015 and beyond (current))
<a href="#">1210300:</a>	Probability & Statistics with Applications Honors (Specifically in versions: 2014 - 2015, 2015 and beyond (current))
<a href="#">2000350:</a>	Anatomy and Physiology (Specifically in versions: 2014 - 2015, 2015 and beyond (current))
<a href="#">2000360:</a>	Anatomy and Physiology Honors (Specifically in versions: 2014 - 2015, 2015 and beyond (current))
<a href="#">2020910:</a>	Astronomy Solar/Galactic Honors (Specifically in versions: 2014 - 2015, 2015 and beyond (current))
<a href="#">2000320:</a>	Biology 1 Honors (Specifically in versions: 2014 - 2015, 2015 and beyond (current))
<a href="#">2000330:</a>	Biology 2 Honors (Specifically in versions: 2014 - 2015, 2015 - 2018, 2018 and beyond (current))
<a href="#">2003340:</a>	Chemistry 1 (Specifically in versions: 2014 - 2015, 2015 and beyond (current))
<a href="#">2003350:</a>	Chemistry 1 Honors (Specifically in versions: 2014 - 2015, 2015 and beyond (current))
<a href="#">2003360:</a>	Chemistry 2 (Specifically in versions: 2014 - 2015, 2015 and beyond (current))
<a href="#">2001320:</a>	Earth/Space Science Honors (Specifically in versions: 2014 - 2015, 2015 and beyond (current))
<a href="#">2001340:</a>	Environmental Science (Specifically in versions: 2015 and beyond (current))
<a href="#">2000440:</a>	Genetics (Specifically in versions: 2014 - 2015, 2015 and beyond (current))
<a href="#">2002410:</a>	Integrated Science 1 Honors (Specifically in versions: 2014 - 2015, 2015 and beyond (current))
<a href="#">2002430:</a>	Integrated Science 2 Honors (Specifically in versions: 2014 - 2015, 2015 and beyond (current))
<a href="#">2002440:</a>	Integrated Science 3 (Specifically in versions: 2014 - 2015, 2015 and beyond (current))
<a href="#">2002450:</a>	Integrated Science 3 Honors (Specifically in versions: 2014 - 2015, 2015 and beyond (current))
<a href="#">2002510:</a>	Marine Science 1 Honors (Specifically in versions: 2014 - 2015, 2015 and beyond (current))
<a href="#">2002520:</a>	Marine Science 2 (Specifically in versions: 2014 - 2015, 2015 and beyond (current))
<a href="#">2002530:</a>	Marine Science 2 Honors (Specifically in versions: 2014 - 2015, 2015 and beyond (current))
<a href="#">2020710:</a>	Nuclear Radiation Honors (formerly 202071A) (Specifically in versions: 2014 - 2015, 2015 and beyond (current))
<a href="#">2003320:</a>	Physical Science Honors (Specifically in versions: 2014 - 2015, 2015 and beyond (current))
<a href="#">2003380:</a>	Physics 1 (Specifically in versions: 2014 - 2015, 2015 and beyond (current))
<a href="#">2003390:</a>	Physics 1 Honors (Specifically in versions: 2014 - 2015, 2015 and beyond (current))
<a href="#">2003410:</a>	Physics 2 (Specifically in versions: 2014 - 2015, 2015 and beyond (current))
<a href="#">1200410:</a>	Mathematics for College Success (Specifically in versions: 2014 - 2015, 2015 and beyond (current))
<a href="#">1200700:</a>	Mathematics for College Readiness (Specifically in versions: 2014 - 2015, 2015 and beyond (current))
<a href="#">7912090:</a>	Access Algebra 1B (Specifically in versions: 2014 - 2015, 2015 - 2018, 2018 - 2019, 2019 and beyond (current))
<a href="#">7920011:</a>	Access Chemistry 1 (Specifically in versions: 2014 - 2015, 2015 - 2018, 2018 and beyond (current))
<a href="#">2002445:</a>	Integrated Science 3 for Credit Recovery (Specifically in versions: 2014 - 2015, 2015 - 2020 (course terminated))
<a href="#">2003345:</a>	Chemistry 1 for Credit Recovery (Specifically in versions: 2014 - 2015, 2015 and beyond (current))
<a href="#">2003385:</a>	Physics 1 for Credit Recovery (Specifically in versions: 2014 - 2015, 2015 - 2020 (course terminated))
<a href="#">1200315:</a>	Algebra 1 for Credit Recovery (Specifically in versions: 2014 - 2015, 2015 and beyond (current))
<a href="#">1200385:</a>	Algebra 1-B for Credit Recovery (Specifically in versions: 2014 - 2015, 2015 and beyond (current))
<a href="#">7912100:</a>	Fundamental Algebraic Skills (Specifically in versions: 2013 - 2015, 2015 - 2017 (course terminated))
<a href="#">7912075:</a>	Access Algebra 1 (Specifically in versions: 2014 - 2015, 2015 - 2018, 2018 - 2019, 2019 and beyond (current))

## Related Access Points

Access Point

Access Points Number	Access Points Title
<a href="#">MAFS.912.S-ID.2.AP.5a:</a>	Recognize associations and trends in data from a two-way table.

## Related Resources

Lesson Plan

Name	Description
	Introduction to two-way frequency tables. The lesson will be delivered using a PowerPoint presentation.

<a href="#">Are you a CrimiNole or Gatorbait? Two rivalries in one table!:</a>	The teacher will introduce and define joint and marginal frequency, demonstrate how two-way frequency tables are constructed from a given set of data, calculate relative frequencies, and draw conclusions based on the information in the table. Students will practice these skills through guided practice with the teacher, independent practice, and complete a summative assessment to measure student learning. All resources, including the PowerPoint, have been provided.
<a href="#">Breakfast for Champions?:</a>	Students will complete a two-way frequency table to investigate whether breakfast is for champions.
<a href="#">Can You Make Heads or Tails of It?:</a>	This is a lesson for teaching students how to make Two-Way Frequency and Relevant Frequency tables and to use the data collected and displayed in the tables for interpretation and prediction.
<a href="#">Can You Walk In My Shoes?:</a>	Real-life data helps students gain a better understanding of creating dot-plot and/or two-way tables. Students will collect data at the beginning of the lesson and use that data to create double dot plots and frequency tables, finding and interpreting relative frequencies.  The assignment allows students to work collaboratively and cooperatively in groups. They will communicate within groups to compare shoes sizes and ages to acquire their data. From the collection of data they should be able to predict, analyze and organize the data into categories (two-way tables) or place on a number line (dot-plot).  As the class assignment concludes, a discussion of the final class display should take place about the purchasing of shoes versus ages and the relationship that either exists or doesn't exist.
<a href="#">CollegeReview.com:</a>	This is a model-eliciting activity where students have been asked by a new website, CollegeReview.com, to come up with a system to rank various colleges based on five categories; tuition cost, social life, athletics, education, city population and starting salary upon graduation.
<a href="#">Comedy vs. Action Movies Frequency Interpretation:</a>	Using a completed survey of male and female student interest in comedy vs. action movies, the students will create a two-way frequency table using actual data results, fraction results, and percent results. The students will then act as the movie producer and interpret the data to determine if it is in their best interest to make a comedy or action movie. As the Summative Assessment, the student will take on the job/role of an actor/actress and interpret the data to support their decision.
<a href="#">Devising a Measure for Correlation:</a>	This lesson unit is intended to help you assess how well students understand the notion of correlation. In particular this unit aims to identify and help students who have difficulty in understanding correlation as the degree of fit between two variables, making a mathematical model of a situation, testing and improving the model, communicating their reasoning clearly and evaluating alternative models of the situation.
<a href="#">Dropping Out or Staying In: Two-Way Table Analysis:</a>	This lesson will require students to calculate relative frequencies and determine if an association exists within a two-way table. The students will analyze the frequencies and write a response justifying the associations and trends found within the table.
<a href="#">Height Arm Juxtaposition:</a>	This lesson is a Follow Up Activity to the Algebra Institute and allows students to apply their skills on analyzing bivariate data. This STEM lesson allows students the opportunity to investigate if there is a linear relationship between a person's height and arm length. Using technology the students will explore in-depth how to perform a least square regression as a procedure for determining the line of best fit.
<a href="#">High School Dropouts:</a>	Students will examine drop-out rates in the United States in 2012 by gender and race using data provided by the National Center for Education Statistics. Students will create conditional relative frequency tables to interpret the data and identify associations between genders and races and drop out rates.
<a href="#">How hot are hot dogs?:</a>	In this lesson, students will learn how to convert a simple and two-way frequency tables to relative frequency tables through using real world data collected in the classroom.
<a href="#">How Random is "Shuffle Mode"?:</a>	Today's teenager is a savvy consumer of digital music and the constantly-evolving technology that plays it. Ask a typical student what they know about iTunes versus Pandora versus Spotify—most of them will have an opinion on the "best" service for listening to songs. This lesson links students' existing interest in music with the mathematical topics of frequency and relative frequency.  The activity assumes that students know what Shuffle Mode does when they listen to digital music. Shuffle Mode is a function on digital music players that "shuffles" or randomly rearranges the order of a list of songs. Each time a person presses Shuffle Mode, the playlist is rearranged. If we assume a music player's Shuffle Mode is truly random, the chances of any particular song being played would equal 1 divided by the total number of songs (1/total #). This is analogous to rolling a fair die; each number on the die has an equal probability of being rolled (1/6 or 16.7%).
<a href="#">Investigating Relationships With Two-Way Frequency Tables:</a>	In this lesson, students are introduced to two-way frequency tables. They will calculate joint, marginal, and relative frequencies and draw conclusions about the relationship between two categorical variables.
<a href="#">It's Your Choice:</a>	In groups, students will analyze associations between genders in their class by constructing two-way frequency tables and relative frequency tables, and interpreting the results of the data. Students will present their findings to classmates.
<a href="#">Legos, Lunch, and Lollipops: an introduction to two-way frequency tables:</a>	Students will learn how to read, complete, and interpret two-way frequency tables.
<a href="#">Quantitative or Qualitative?:</a>	This lesson will remind students of the differences between quantitative and qualitative data then guide the students through learning how to display quantitative data on a scatter plot then separating the data into qualitative categories to be displayed and interpreted in a frequency table.
<a href="#">Relative Frequency Tables... with extra cheese!:</a>	Have students get colorful in defining marginal, joint and conditional frequencies of two-way frequency tables. Students will take charge in justifying the associations they find in the tables.
	This lesson is an application activity in which students will use relative frequencies to support an argument. Students will be given the task of creating an argument that would support why their club/team should be awarded a monetary

<a href="#">Show Me the Money:</a>	prize that the school has won. The students will create statistical questions, collect their own data, analyze and interpret it to support their claim, present their argument, critique other arguments, and refine their argument for a rebuttal and closing remarks. The project will be graded with the rubric found in the Summative Assessment section, and has a student packet attached as well. All attachments can be modified.
	<p>This MEA is designed to have teams of 4 students look at data in a two-way table. Teams must discuss which categorical or quantitative factors might be the driving force of a song's popularity. Hopefully, popular songs have some common thread running through them.</p> <p>Each team must write down their thought process on how they will create the most popular playlist of songs for a local radio station. A major constraint for each team is to thoroughly explain how they will maximize the 11 minutes available with the most popular songs.</p>
<a href="#">The Music Is On and Popping! Two-way Tables:</a>	<p>Students will be provided with letters from a local radio station, WMMM - where you can receive your "Daily Mix of Music and Math." WMMM has 10 songs and the researchers have collected data on each. Student teams: it is your responsibility to pick the playlist and write a letter to the station supporting why you made your particular selection. The winning team gets an opportunity to record a sound bite which introduces their playlist on the radio.</p> <p>Now, just when the teams believe they have addressed WMMM's request, a twist is thrown in the midst, and the student teams must return to the drawing board and write a second letter to the station which may or may not affect the team's original playlist.</p> <p>Do you have the musical swag to connect the associations?</p>
<a href="#">Two-Way Frequency Table and Relative Frequency:</a>	<p>In this lesson, the student will learn how to set up a two-way frequency table from two categorical variables and use the two-way frequency table to calculate frequency counts and relative frequency. The vocabulary terms learned in this lesson are two-way frequency table, relative frequency, joint frequency, marginal frequency, and conditional frequency.</p> <p>This lesson covers only a portion of the standard. The teacher should complete the standard with a follow-up lesson in which students will make data tables and then use the data to explore probability.</p>
<a href="#">Using Two-Way Frequency Tables to Analyze Data:</a>	The program 60 Minutes reports that parents are intentionally holding their children back in Kindergarten to give them a competitive advantage in sports later on in life. The students are using the data collected to decide if this is really a trend in the US.
<a href="#">What's your preference?:</a>	In this lesson plan, students will be exposed to data collection and construction of two-way frequency tables. They will also learn how to analyze the two-way frequency table by calculating the relative conditional frequency.
<a href="#">What's Your Story?: Exploring Marginal and Conditional Distributions Through Social Networks:</a>	This is an interactive lesson in which students will explore marginal and conditional distributions as they calculate relative frequency of data they have collected regarding the use of cell phones and social networking sites while in the classroom.

#### Formative Assessment

Name	Description
<a href="#">Breakfast Drink Preference:</a>	Students are asked to use data from a survey to create a two-way frequency table.
<a href="#">Conditional Relative Frequency:</a>	Students are asked to use a two-way frequency table to interpret two different conditional relative frequencies.
<a href="#">Marginal and Joint Frequency:</a>	Students are asked to use a two-way frequency table to interpret marginal and joint relative frequencies.
<a href="#">Who Is a Vegetarian?:</a>	Students are given a two-way frequency table and asked to determine if there is a relationship between the two variables.

#### Original Student Tutorial

Name	Description
<a href="#">Data and Frequencies:</a>	Learn to define, calculate, and interpret marginal frequencies, joint frequencies, and conditional frequencies in the context of the data with this interactive tutorial.

#### Problem-Solving Task

Name	Description
<a href="#">Musical Preferences:</a>	This problem solving task asks students to make deductions about what kind of music students like by examining a table with data.

#### Unit/Lesson Sequence

Name	Description
	<p>This sample Algebra 1 CMAP is a fully customizable resource and curriculum-planning tool that provides a framework for the Algebra 1 Course. The units and standards are customizable and the CMAP allows instructors to add lessons, worksheets, and other resources as needed. This CMAP also includes rows that automatically filter and display Math Formative Assessments System tasks, E-Learning Original Student Tutorials and Perspectives Videos that are aligned to the standards, available on CPALMS.</p> <p>Learn more about the sample Algebra 1 CMAP, its features and customizability by watching the following video:</p>

[Sample Algebra 1 Curriculum Plan Using CMAP:](#)

### Using this CMAP

To view an introduction on the CMAP tool, please [click here](#).

To view the CMAP, click on the "Open Resource Page" button above; be sure you are logged in to your iCPALMS account.

To use this CMAP, click on the "Clone" button once the CMAP opens in the "Open Resource Page." Once the CMAP is cloned, you will be able to see it as a class inside your iCPALMS My Planner (CMAPs) app.

To access your My Planner App and the cloned CMAP, click on the iCPALMS tab in the top menu.

All CMAP tutorials can be found within the iCPALMS Planner App or at the following URL: [http://www.cpalms.org/support/tutorials\\_and\\_informational\\_videos.aspx](http://www.cpalms.org/support/tutorials_and_informational_videos.aspx)

### Text Resource

Name	Description
<a href="#">Scientists See the World Differently:</a>	This informational text resource is intended to support reading in the content area. Pew Research Center surveyed scientists and the general public on 12 science oriented issues, including genetically modified foods, vaccines, nuclear power and evolution. Results of the survey showed large discrepancies between the thoughts, causes and recommendations on the issues of the scientists and the general public. Sample sizes and margins of errors are given on the survey results which are represented in percent form. The overall survey showed that the public and the scientists see the world very differently.

### Educational Software / Tool

Name	Description
<a href="#">Two Way Frequency Excel Spreadsheet:</a>	<p>This Excel spreadsheet allows the educator to input data into a two way frequency table and have the resulting relative frequency charts calculated automatically on the second sheet. This resource will assist the educator in checking student calculations on student-generated data quickly and easily.</p> <p>Steps to add data: All data is input on the first spreadsheet; all tables are calculated on the second spreadsheet</p> <ol style="list-style-type: none"><li>1. Modify column and row headings to match your data.</li><li>2. Input joint frequency data.</li><li>3. Click the second tab at the bottom of the window to see the automatic calculations.</li></ol>

### Virtual Manipulative

Name	Description
<a href="#">Univariate and Bivariate Data:</a>	This lesson is designed to introduce students to the difference between univariate and bivariate data, and how the two can be represented graphically. This lesson provides links to model discussions and online graphing applets, as well as suggested ways to integrate them into the lesson. Finally, the lesson provides links to follow-up lessons designed for use in succession with the current one.

### Student Resources

Name	Description
<a href="#">Data and Frequencies:</a>	Learn to define, calculate, and interpret marginal frequencies, joint frequencies, and conditional frequencies in the context of the data with this interactive tutorial.
<a href="#">Musical Preferences:</a>	This problem solving task asks students to make deductions about what kind of music students like by examining a table with data.
<a href="#">Two Way Frequency Excel Spreadsheet:</a>	<p>This Excel spreadsheet allows the educator to input data into a two way frequency table and have the resulting relative frequency charts calculated automatically on the second sheet. This resource will assist the educator in checking student calculations on student-generated data quickly and easily.</p> <p>Steps to add data: All data is input on the first spreadsheet; all tables are calculated on the second spreadsheet</p> <ol style="list-style-type: none"><li>1. Modify column and row headings to match your data.</li><li>2. Input joint frequency data.</li></ol>

3. Click the second tab at the bottom of the window to see the automatic calculations.

## Parent Resources

Name	Description
<a href="#">Musical Preferences:</a>	This problem solving task asks students to make deductions about what kind of music students like by examining a table with data.