

## TWO WAY FREQUENCY TABLES COMMON CORE ALGEBRA I



So far we have worked with **quantitative data** for a **single variable**, for example weight of baby chicks or number of video enabled devices. We can also work with **categorical data** or data that shows how many things **surveyed** fall into a **given category**.

**Exercise #1:** Let's do a quick categorical survey in this class. By a show of hands, determine how many students fall into each of the following categories for eye color.

Brown Eyes

Blue Eyes

Green Eyes

Other

Although surveys of data that contain only one category are interesting, statisticians are often interested in how responses to two categories relate to one another. For example, we may want to know how a person's gender (one category) affects what profession (a second category) they would prefer when they grow up. We may want to know if a person's hair color (one category) has any relationship to their eye color (a second category). This type of data is summarized in a **two-way frequency table**.

**Exercise #2:** A class of 20 students recorded their hair color and eye color which are shown in the **two-way frequency table** below.

		Hair Color			Total
		Black	Blond	Red	
Eye Color	Blue	3	4	1	8
	Brown	5	2	0	7
	Green	1	1	3	5
	Total	9	7	4	20

- (a) How many students had blond hair and blue eyes?      (b) How many students had red hair?

- (c) Construct a table that shows the **joint relative frequencies** and the **marginal relative frequencies** for the data above.

		Hair Color			Total
		Black	Blond	Red	
Eye Color	Blue				
	Brown				
	Green				
	Total				



We would like to understand **associations** or **trends** within the data set, i.e. would a response to one category tell us something about the response to the other category?

**Exercise #3:** Let's see if there is a connection between eye color and hair color by using **conditional relative frequencies**.

		Hair Color			Total
		Black	Blond	Red	
Eye Color	Blue	3	4	1	8
	Brown	5	2	0	7
	Green	1	1	3	5
	Total	9	7	4	20

- (a) What is the conditional relative frequency of having green eyes if you have red hair? (This is equivalent to asking what the percent of people with red hair have green eyes.)
- (b) What is the conditional relative frequency of having green eyes if you have black hair?
- (c) Does it appear that having green eyes has a dependency or at least an association with having red hair? Explain.
- (d) Is it more likely that a person with black hair has blue eyes or that a person with blond hair has brown eyes? Use conditional marginal frequencies to support your answer.

**Exercise #4:** A survey of 52 graduating seniors was conducted to determine if there was a connection between the gender of the student and whether they were going on to college. Based on this data, what is more likely: that someone going to college is female or that someone who is female is going to college? These may seem like the same thing, but are quite different.

	Gender		Total
	Male	Female	
Going to College	16	13	29
Not Going to College	14	9	23
Total	30	22	52



Name: \_\_\_\_\_

Date: \_\_\_\_\_

## TWO WAY FREQUENCY TABLES COMMON CORE ALGEBRA I HOMEWORK

A survey was done to determine the relationship between gender and subject preference. A total of 56 students were surveyed to determine if they liked math, English, social studies, or science as their favorite subject. The results were then broken down based on whether the respondent was male or female.

	Math	English	Social Studies	Science	Total
Female	8	6	11	5	30
Male	10	4	8	4	26
Total	18	10	19	9	56

- Which of the following is closest to the joint relative frequency of being a male who likes social studies?  
(1) 0.42                      (3) 0.31  
(2) 0.14                      (4) 0.56
- Which of the following is the marginal relative frequency of liking math?  
(1)  $\frac{18}{36}$                       (3)  $\frac{10}{18}$   
(2)  $\frac{8}{10}$                       (4)  $\frac{18}{56}$
- What percent of female students liked English as their favorite subject?  
(1) 20%                      (3) 11%  
(2) 16%                      (4) 60%
- A person looking at this table concludes that it is more likely that a female student will like social studies than a male student will like math. Is this correct? Justify your answer.
- Is it more likely that a person who likes social studies will be female or that a person who is female will like social studies? Justify.



Demographers are trying to understand the association between where a person lives and how they commute to work. They survey 100 people in three cities with the results shown below.

	Car	Train	Walk	Total
New York	5	25	10	40
Los Angeles	18	12	5	35
Chicago	8	14	3	25
Total	31	51	18	100

6. Fill in the table below with the relative frequencies.

	Car	Train	Walk	Total
New York				
Los Angeles				
Chicago				
Total				

7. Given that a person rides a train to work, what is the conditional relative frequency that they live in New York?

(1) 0.25                      (3) 0.49

(2) 0.63                      (4) 0.82

8. If a person lives in Los Angeles, what is the conditional relative frequency that they drive a car?

(1) 0.42                      (3) 0.68

(2) 0.16                      (4) 0.51

9. Which of the following is the marginal frequency of walking to work?

(1) 18%                      (3) 25%

(2) 60%                      (4) 44%

10. Is a person more likely to ride a train if they live in New York or if they live in Chicago? Justify your answer.

