

Two Way Frequency Tables

https://learnzillion.com/lesson_plans/546-2-use-two-way-frequency-tables-frequency-count-vs-relative-frequency



Getting the Idea

Two-Way Frequency Tables

The **frequency** of a piece of data is the number of times it appears in a data set. A **frequency distribution** is a way of grouping data so that meaningful patterns can be found. A frequency distribution table is used to show the total for each category or group.

Example 1

A sporting goods store recorded the number of tents sold each week in February and used the data to make a frequency table.

Tents Sold

Week	Tallies	Frequency
1		5
2		12
3		7
4		10
	Total	34

What percentage of all the tents sold in February were sold during the first two weeks of the month?

1.

Tents Sold

Week	Tallies	Frequency
1		5
2		12
3		7
4		10
	Total	34

What percentage of all the tents sold in February were sold during the first two weeks of the month?

Strategy Use the frequency distribution table.

Step 1

Look at the frequency column for Weeks 1 and 2.

5 tents were sold during Week 1.

12 tents were sold during Week 2.

So, $5 + 12$, or 17, tents were sold during that two-week period.

Step 2

Find the percentage.

The table shows that a total of 34 tents were sold in February.

$$\frac{17}{34} = 0.5 = 0.5 \times 100\% = 50\%$$

Solution Exactly 50% of the tents sold in February were sold during the first two weeks of the month.

In Example 1, you calculated the percentage of tents that were sold during a certain time period. Sometimes, it is helpful to show percentages in a frequency table by including a column for **relative frequency**. The relative frequency of a given category is found by dividing the frequency of that category by the sum of all the frequencies.

Example 2

The number of computers owned by the family of each student in Ms. Fontana's class is shown below.

0, 2, 1, 3, 2, 4, 0, 2, 2, 3, 1, 2, 3, 3, 2, 0, 1, 4, 2, 3, 5, 2, 1, 5, 0

Here is how that information looks in a partially-completed frequency distribution table.

Computers Owned by Students' Families

Computers Owned	Frequency	Relative Frequency
0	4	16%
1	4	16%
2	8	32%
3	5	20%
4	2	8%
5	2	8%
Total	25	100%

Complete the last column of the table. Check that the relative frequencies total 100%.

Strategy Find the relative frequencies that are missing from the table.

Step 1

Find the relative frequency for the "3 computers" row.

Five of 25 students' families have 3 computers.

$$\frac{5}{25} = 0.2 = 0.2 \cdot 100\% = 20\%$$

Note: Relative frequency can be shown as either a decimal or a percent.

Step 2

Find the relative frequency for the other two rows.

Since both rows show frequencies of 2, their relative frequencies will be the same.

$$\frac{2}{25} = 0.08 = 0.08 \cdot 100\% = 8\%$$

Step 3

Be sure that all the relative frequencies add up to 100%.

$$16\% + 16\% + 32\% + 20\% + 8\% + 8\% = 100\% \quad \checkmark$$

Solution The row for "3 computers" should show 20% as the relative frequency. The rows for "4 computers" and "5 computers" should each show 8% as the relative frequency.

In Examples 1 and 2, we compared the frequencies of data collected about one variable. Sometimes, you may want to look at two variables at the same time and determine if there is a relationship between them. One way to do that is to create a **two-way table**. You can enter either frequency counts or relative frequencies in the cells of the table.

Example 3

Ten students in a class were asked two questions. They were asked to tell if they do chores at home or not. They were then asked if they receive an allowance or not. The results are shown below.

Student Survey										
Student	Abby	Bella	Chris	Deb	Erin	Frank	Gus	Hal	Isadore	John
Chores	Yes	Yes	No	No	No	Yes	Yes	Yes	No	Yes
Allowance	Yes	Yes	No	No	No	Yes	Yes	No	Yes	No

Create a two-way table to show the frequency counts for these data.

3.

Strategy

Determine how the table will look. Then fill in the frequencies.



Determine how the table will look.

Include a column for "allowance" and a column for "no allowance" along the top.

Include a row for "chores" and a row for "no chores" along the left side.



Decide how to fill in the first row of cells.

Four students (Abby, Bella, Frank, and Gus) do chores and get an allowance.

The first cell shows "chores" and "allowance." Record 4 in the first cell.

Two students (Hal and John) do chores and get no allowance. Record 2 in the second cell.

Find and record the total for that row: $4 + 2 = 6$.

	Allowance	No Allowance	Total
Chores	4	2	6
No Chores			
Total			



Complete the second row in the table. Then add the columns and record those totals.

	Allowance	No Allowance	Total
Chores	4	2	6
No Chores	1	3	4
Total	5	5	10

Solution

The two-way table in Step 3 organizes the data.

Example 4

Look back at the two-way table in Example 3. Can you conclude that students who get an allowance are more likely to do chores than students who do not? Find the relative frequencies for the columns in the table and see.

	Allowance	No Allowance	Total
Chores	4	2	6
No Chores	1	3	4
Total	5	5	10

Strategy Recreate the two-way table, showing the relative frequencies for the columns.

Step 1

Find the relative frequencies.

Of all students who get an allowance, $\frac{4}{5}$, or 80%, also do chores, while $\frac{1}{5}$, or 20%, do not.

Of all students who do not get an allowance, $\frac{2}{5}$, or 40%, also do chores, while $\frac{3}{5}$, or 60%, do not.

	Allowance	No Allowance	Total
Chores	40%	20%	60%
No Chores	20%	30%	40%
Total	50%	50%	100%

Step 2

What conclusions can you draw?

The data do show that students who do chores are more likely to get an allowance than students who do not do chores, because 80% of the students who get an allowance also do chores.



5.



Coached Example

The P.E. teachers want to offer students a choice of several electives: yoga, flag football, or ultimate Frisbee. They wanted to see if the boys and girls had different first choices. So, they surveyed 200 students and made a two-way table that showed the relative frequencies for the rows, as shown below.

	Yoga	Flag Football	Frisbee	Total
Boys	0.05	0.65	0.30	1.00
Girls	0.60	0.05	0.35	1.00
Total	0.325	0.35	0.325	1.00

Is there any P.E. elective that seems to be about as popular among both boys and girls?

Since the table shows the relative frequencies for each row, you can look at the relationship between gender and P.E. elective preferences.

The probability that a girl will prefer yoga is .60, while the probability that a boy will prefer yoga is .05. So, yoga is more popular among the girls.

Similarly, boys are more likely to prefer flag football.

The probability that a boy will prefer Frisbee is .30, and the probability that a girl will prefer Frisbee is .35.

What does that tell you about that elective choice?

Of all the electives, frisbee seems to be similarly popular among both boys and girls.