

AIM: TWO-WAY FREQUENCY TABLES

DO NOW: Let's poll the class and fill in the table below.

		Hair Color			Total
		Blonde	Red	Brunette	
Eye Color	Blue				total blue eyes
	Brown				total brown eyes
	Green				total green eyes
Total		total blonde hair	total red hair	total brunette hair	Table total

Two way frequency table are a visual representation of the possible relationships between two sets of categorical data.

Joint Frequency.

You are joining one variable from the row with one variable from the column.

		Hair Color			Total
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Total		total blonde hair	total red hair	total brunette hair	Table total

Joint freq.

Marginal Frequency.

The numbers on the edges (in the margins) of the table. The cells that contains the sum of the totals.

		Hair Color			Total
		Blonde	Red	Brunette	
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	Brown				total brown eyes
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Total		total blonde hair	total red hair	total brunette hair	Table total

Marginal Frequency

If your table *does not* include a **total row** and **total column**, you must ALWAYS add it!

The "sum of the row totals" equal the "sum of the column totals."



Example 1: Use the two-way frequency table below to answer the following questions.

	Like Longboards	Do Not Like Longboards	total
Like Snowmobiles	80	25	105
Do not like Snowmobiles	45	10	55
total	125	35	160

- | | | | |
|--|--|---|--|
| 1. How many students said they "like" snowmobiles?
<u>105</u> | 2. How many of the students "like" snowmobiles, but "do not like" longboards?
<u>25</u> | 3. How many students said they "do not like" longboards?
<u>35</u> | 4. Which of the following values is referred to as "marginal frequency"?
a) 10 b) 25 c) 35 d) 45 |
|--|--|---|--|

5. Give an example of a value that is part of "joint frequency". Explain what that value means. Joining two things together.
80 → liked snowmobiles & like skateboards

Example 2: Use the two-way frequency table below to answer the following questions.

	Sport Utility Vehicle (SUV)	Sports Car	Totals
male	21	39	60
female	135	45	180
Totals	156	84	240

6. How many people responded to the survey?
240
7. How many males responded to the survey?
60
8. How many people chose an SUV?
156
9. How many females chose a sports car?
45
10. How many males chose an SUV?
21

Example 3: Finish filling in the two-way frequency table using the data provided below.

- 4 students indicated "super strength" as their favorite power.
- 0 of those students were female.
- 14 students indicated "telepathy" as their favorite power.
- 13 of those students were female.

	To Fly	Freeze Time	Invisibility	Super Strength	Telepathy	Total
Females	10	14	17	0	13	54
Males	11	16	7	4	1	39
Total	21	30	24	4	14	93

11. How many females chose telepathy as their favorite super power?
13
12. How many students chose invisibility as their favorite super power? total 24
13. Which super power is the most popular?
freeze time

Joint Relative Frequency Is determined by *dividing* the values of each category by the total number of values.

MathBits.com		Sport Utility Vehicle (SUV)		Sports Car	Totals
male	$\frac{21}{240} = 0.09$	$\frac{39}{240} = 0.16$	$\frac{60}{240} = 0.25$		
female	$\frac{135}{240} = 0.56$	$\frac{45}{240} = 0.19$	$\frac{180}{240} = 0.75$		
Totals	$\frac{156}{240} = 0.65$	$\frac{84}{240} = 0.35$	$\frac{240}{240} = 1.00$		

Whole Table Relative Frequencies -
 Divide all cells by 240.

Marginal Relative Frequency- Is determined by *adding* the joint relative frequencies in each row and column.

MathBits.com		Sport Utility Vehicle (SUV)		Sports Car	Totals
male	$\frac{21}{240} = 0.09$	$\frac{39}{240} = 0.16$	$\frac{60}{240} = 0.25$		
female	$\frac{135}{240} = 0.56$	$\frac{45}{240} = 0.19$	$\frac{180}{240} = 0.75$		
Totals	$\frac{156}{240} = 0.65$	$\frac{84}{240} = 0.35$	$\frac{240}{240} = 1.00$		

Whole Table Relative Frequencies -
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Example 4: Use the two-way frequency table below to answer the following questions.

	Sport Utility Vehicle (SUV)	Sports Car	Totals
male	$\frac{21}{240} = 0.09$	$\frac{39}{240} = 0.16$	$\frac{60}{240} = 0.25$
female	$\frac{135}{240} = 0.56$	$\frac{45}{240} = 0.19$	$\frac{180}{240} = 0.75$
Totals	$\frac{156}{240} = 0.65$	$\frac{84}{240} = 0.35$	$\frac{240}{240} = 1.00$

MathBits.com

14. What percentage of the survey takers was female? 75%

15. What is the relative frequency of males choosing a sports car? $\frac{39}{240} = 0.16$

16. Were there a higher percentage of males or females choosing an SUV?

higher percentage of females

Example 5: The table shows the number of books sold at a library sale. Fill in the two-way table of the joint and marginal relative frequencies to the nearest tenth.

	Fiction	Nonfiction	
Hardcover	28	52	80
Paperback	94	36	130
	122	88	210

	Fiction	Nonfiction	Total
Hardcover	$\frac{28}{210} \approx .13$	$\frac{52}{210} \approx .25$	$\frac{80}{210} \approx .38$
Paperback	$\frac{94}{210} \approx .45$	$\frac{36}{210} \approx .17$	$\frac{130}{210} \approx .62$
Total	$\frac{122}{210} \approx .58$	$\frac{88}{210} \approx .42$	$\frac{210}{210} = 1$

17. What is the **joint relative frequency** of nonfiction paperback books that the library sold?

$$.17 \rightarrow 17\%$$

18. What is the **marginal relative frequency** of fiction books that the library sold?

$$.58 \rightarrow 58\%$$

Example 6: Complete the table below by calculating the relative frequencies for each cell (nearest thousandth).

	To Fly	Freeze Time	Invisibility	Super Strength	Telepathy	Total
Females	$\frac{10}{93} \approx .108$	$\frac{14}{93} \approx .151$	$\frac{17}{93} \approx .183$	$\frac{0}{93} = 0$	$\frac{13}{93} \approx .140$	$\frac{54}{93} \approx .581$
Males	$\frac{11}{93} \approx .118$	$\frac{16}{93} \approx .172$	$\frac{7}{93} \approx .075$	$\frac{4}{93} \approx .043$	$\frac{1}{93} \approx .011$	$\frac{39}{93} \approx .419$
Total	$\frac{21}{93} \approx .226$	$\frac{30}{93} \approx .323$	$\frac{24}{93} \approx .258$	$\frac{4}{93} \approx .043$	$\frac{14}{93} \approx .151$	$\frac{93}{93} = 1$

19. What percentage of students selected “telepathy” as their favorite superpower?

$$15.1\%$$

20. What percent of the total were males that preferred “super strength” as their favorite superpower?

$$4.3\%$$

21. What is the joint relative frequency for females who selected “invisibility” as their favorite superpower?

$$18.3\%$$

22. What is the marginal relative frequency for “freeze time”? Interpret the meaning of this value.

$$32.3\%$$