

Frequency Table Builder

Use marginals and conditionals to find every cell.

HIGH SCHOOL • MA.912.DP.3.2

MA.912.DP.3.2 "Given marginal and conditional relative frequencies, construct a two-way relative frequency table summarizing categorical bivariate data."

NAME _____

DATE _____

BUILD EACH CELL

Multiply a row or column marginal by the conditional relative frequency within that row or column. Then add across rows and down columns to check the marginal totals.

WORKED EXAMPLE

Rows are A and B. Columns are X and Not X. $P(A)=0.37$, $P(B)=0.63$, $P(X|A)=0.20$, and $P(X|B)=0.60$. Construct the relative frequency table.

1. A and X: $0.37 \times 0.20 = 0.074$.
2. A and Not X: $0.37 - 0.074 = 0.296$.
3. B and X: $0.63 \times 0.60 = 0.378$.
4. Complete the remaining cells and totals.

**Answer: X Not X Total A 0.074 0.296
0.370 B 0.378 0.252 0.630 Total 0.452
0.548 1.000**

PRACTICE 5 problems

- 1** Rows are A and B. Columns are X and Not X. $P(A)=1/2$, $P(B)=1/2$, $P(X|A)=1/3$, and $P(X|B)=3/4$. Construct the table.

ANSWER _____

- 2** Rows are L and M. Columns are X and Not X. $P(L)=2/5$, $P(M)=3/5$, $P(X|L)=1/4$, and $P(X|M)=2/3$. Construct the table.

ANSWER _____

- 3** Rows are P and Q. Columns are Win and Not Win. $P(P)=3/8$, $P(Q)=5/8$, $P(\text{Win}|P)=2/3$, and $P(\text{Win}|Q)=1/5$. Construct the table.

ANSWER _____

- 4** Rows are R and S. Columns are Yes and No. $P(R)=4/9$, $P(S)=5/9$, $P(\text{Yes}|R)=3/4$, and $P(\text{Yes}|S)=2/5$. Construct the table.

ANSWER _____

- 5** Rows are A and B. Columns are X and Not X. $P(A)=1/3$, $P(B)=2/3$, $P(X)=1/2$, and $P(X|A)=3/4$. Construct the table.

ANSWER _____

APPLY IT Show your work

- 1** A student survey has rows Music While Studying and No Music. The columns are Paid App and No Paid App. $P(\text{Music While Studying}) = 3/5$. Of students who use music while studying, $1/2$ use a paid app. Of students who do not use music, $1/4$ use a paid app. Construct the relative frequency table.

WORK SPACE

ANSWER _____

- 2** At a school music festival, rows are Online Buyer and Door Buyer. Columns are T-Shirt and No T-Shirt. $P(\text{Online Buyer}) = 7/12$. Of online buyers, $3/7$ buy a T-shirt. Of door buyers, $2/5$ buy a T-shirt. Construct the relative frequency table.

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

A table has rows A and B and columns X and Not X. $P(A) = 3/5$. Among X, $P(A|X) = 3/4$. Among Not X, $P(A|\text{Not X}) = 1/2$. Construct the table and explain how you found $P(X)$.

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	Rows are A and B. Columns are X and Not X. $P(A)=1/2$, $P(B)=1/2$, $P(X A)=1/3$, and $P(X B)=3/4$. Construct the table.	X Not X Total A 1/6 1/3 1/2 B 3/8 1/8 1/2 Total 13/24 11/24 1
2	Rows are L and M. Columns are X and Not X. $P(L)=2/5$, $P(M)=3/5$, $P(X L)=1/4$, and $P(X M)=2/3$. Construct the table.	X Not X Total L 1/10 3/10 2/5 M 2/5 1/5 3/5 Total 1/2 1/2 1
3	Rows are P and Q. Columns are Win and Not Win. $P(P)=3/8$, $P(Q)=5/8$, $P(\text{Win} P)=2/3$, and $P(\text{Win} Q)=1/5$. Construct the table.	Win Not Win Total P 1/4 1/8 3/8 Q 1/8 1/2 5/8 Total 3/8 5/8 1
4	Rows are R and S. Columns are Yes and No. $P(R)=4/9$, $P(S)=5/9$, $P(\text{Yes} R)=3/4$, and $P(\text{Yes} S)=2/5$. Construct the table.	Yes No Total R 1/3 1/9 4/9 S 2/9 1/3 5/9 Total 5/9 4/9 1
5	Rows are A and B. Columns are X and Not X. $P(A)=1/3$, $P(B)=2/3$, $P(X)=1/2$, and $P(X A)=3/4$. Construct the table.	X Not X Total A 1/4 1/12 1/3 B 1/4 5/12 2/3 Total 1/2 1/2 1

PART 2 • APPLY IT

- Paid App No Paid App Total Music While Studying 3/10 3/10 3/5 No Music 1/10 3/10 2/5 Total 2/5 3/5 1** Use $P(\text{No Music})=2/5$. Multiply each row total by its paid-app conditional frequency, then subtract from each row total.
- T-Shirt No T-Shirt Total Online Buyer 1/4 1/3 7/12 Door Buyer 1/6 1/4 5/12 Total 5/12 7/12 1** Use $P(\text{Door Buyer})=5/12$. Multiply each buyer-group marginal by its T-shirt conditional frequency, then find the no-T-shirt cells by subtraction.

CHALLENGE

X Not X Total A 3/10 3/10 3/5 B 1/10 3/10 2/5 Total 2/5 3/5 1 Let $P(X)=x$. Then $(3/4)x + (1/2)(1-x)=3/5$, so $x=2/5$.

Accept equivalent fractions and correctly labeled tables with rows and columns switched. Totals must sum to 1, and each conditional frequency must match its stated row or column.