

Conditional Relative Frequencies

AP Statistics | Unit 2 | joint, marginal, conditional, and association

1. Three kinds of relative frequency

400 students at a school (hypothetical data): do they play video games, and are they on the honor roll?

	Gamer	Not a gamer	Total
Honor roll	70	30	100
Not on it	230	70	300
Total	300	100	400

What goes in the denominator

Joint: one cell $\div$ the grand total. $\frac{70}{400} = 17.5\%$ of all students are gamers *and* on the honor roll.

Marginal: a row or column total $\div$ the grand total. $\frac{300}{400} = 75\%$ of all students are gamers.

Conditional: one cell $\div$ *its* row or column total. Of the honor-roll students, $\frac{70}{100} = 70\%$ are gamers.

The words *of*, *among*, *given* name the group that goes in the denominator.

2. The denominator is everything

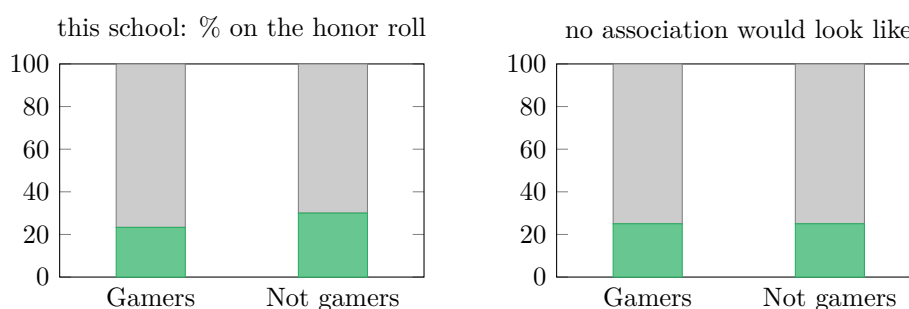
“70% of honor-roll students play video games” reads across the honor-roll *row*. To ask whether gaming goes with being on the honor roll, read down the gamer *column* instead:

of the gamers: $\frac{70}{300} \approx 23\%$ are on the honor roll.

Same cell on top, a different total on the bottom, a completely different number. The honor roll is 70% gamers simply because 75% of all students are gamers.

3. Association

Compare the **conditional** percentages across the groups:



If the percentages **differ**, the variables are **associated**: knowing one changes the chance of the other. If every group has the same percentage (the overall 25%), there is no association. Back the word up with numbers:

There is an association between playing video games and being on the honor roll: about 23% of gamers are on the honor roll, compared with 30% of non-gamers.

Associated does not mean one causes the other; this is a survey, not an experiment.

Where students lose points

1. The wrong denominator: find “of”, “among”, “given” and divide by that group’s total.
2. Flipping the conditional: % of honor-roll students who are gamers $\neq$ % of gamers on the honor roll.
3. Dividing by the grand total when the question is about one group.
4. Comparing counts, not conditional percentages, to claim an association.
5. “Association” with no numbers, or treated as causation.

Now practise it

Theory sticks once you use it. On **sad-academy.com** you’ll find practice questions for this exact subtopic in the AP format, and an AI that grades your free-response answers against the scoring guidelines, the way an AP reader would.

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