

AP Statistics - Two Categorical Variables and Two-Way Tables - Quiz

Common Core AP STAT 2.1, AP STAT 2.2, AP STAT 2.3, HSS-ID.B.5 · maths-pdf.fr/en/

Name: _____ Class: _____ Date: ____/____/____

Ten multiple-choice questions test the vocabulary of two-way tables and the choice of denominator. Read the explanations to avoid the usual mix-up of row and column totals.

AP Statistics · Common Core State Standards: **AP STAT 2.1, AP STAT 2.2, AP STAT 2.3, HSS-ID.B.5**

Questions

Question 1

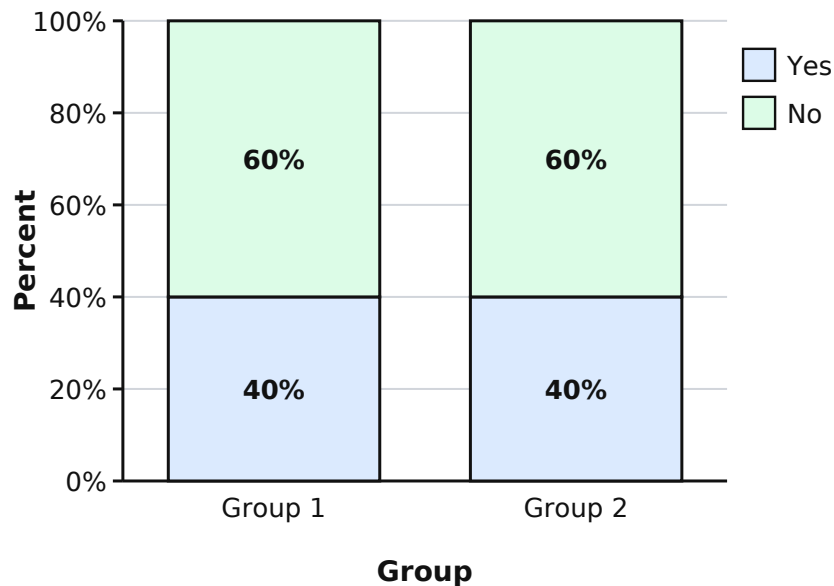
Own \ Sex	Boys	Girls	Total
Yes	30	20	50
No	20	30	50
Total	50	50	100

Pet ownership.

What percent of boys own a pet?

- A. 30%
- B. 50%
- C. 60%
- D. 40%

Question 2



Same percents in both groups.

What does this graph show about the two variables?

- A. No association
- B. A strong association
- C. Group 1 is larger
- D. Group 2 causes yes answers

Question 3

Which kind of relative frequency divides a cell by the grand total?

- A. Marginal
- B. Joint
- C. Conditional
- D. Cumulative

Question 4

	X	Y	Total
A	10	40	50
B	30	20	50
Total	40	60	100

A table.

What is the conditional percent of Y that are in category A?

- A. 40%
- B. 33.3%

- C. 66.7%
- D. 25%

Question 5

Which pair of variables should have the response percents compared?

- A. Compare percents of the response within each explanatory group
- B. Compare cell counts only
- C. Compare marginal totals only
- D. Compare the grand total

Question 6

Simpson's paradox happens when:

- A. a table has too many cells
- B. the data are quantitative
- C. a sample is not random
- D. a trend reverses after splitting the data by a lurking variable

Question 7

A segmented bar graph shows:

- A. the mean of each group
- B. the correlation
- C. the median
- D. conditional distributions of the response for each explanatory group

Question 8

In a two-way table with 200 total, 50 are in row 1. What is the marginal relative frequency of row 1?

- A. 50%
- B. 25%
- C. 4%
- D. 75%

Question 9

An observational study finds an association between two categorical variables. We can conclude:

- A. one causes the other
- B. the variables are associated, but not necessarily causally
- C. the sample is biased
- D. there is no relationship

Question 10

In a table, 12 of 40 smokers and 18 of 120 nonsmokers have asthma. Which is correct?

- A. Smokers have asthma at 30% compared with 15% for nonsmokers
- B. Nonsmokers have more asthma because 18 is greater than 12
- C. Both groups have the same percent
- D. Smokers have asthma at 12%

Answers

1. **C** - Among the 50 boys, 30 own a pet, so $30/50 = 60\%$. 30% is the joint percent of all 100 students.
2. **A** - The conditional percents are identical, so knowing the group tells nothing about the answer.
3. **B** - A joint relative frequency uses the grand total. Conditional divides by a group total.
4. **C** - Y has $40 + 20 = 60$ individuals and 40 are in A, so $40/60 = 66.7\%$.
5. **A** - Raw counts depend on group size, so compare conditional percents.
6. **D** - Combined results can differ from subgroup results because group sizes differ.
7. **D** - Each bar is one group and the segments are its conditional percents, which add to 100%.
8. **B** - $50/200 = 0.25$. A common error is to divide by the number of cells.
9. **B** - Only a randomized experiment supports causation.
10. **A** - Compare percents: $12/40 = 30\%$ and $18/120 = 15\%$. The larger count belongs to the larger group.

Remember

- Two-way tables show counts for combinations of two categorical variables.
- Marginal = total / grand total; joint = cell / grand total; conditional = cell / group total.
- Compare conditional percentages of the response across explanatory groups to detect association.
- Segmented bar graphs display conditional distributions side by side.
- Association is not causation, and combined data can hide Simpson's paradox.