

Denominator Detectives

Use the denominator to identify two kinds of relative frequency.

CCSS.Math.Content.HSS-ID.B.5 "Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies)..."

NAME _____

DATE _____

JOINT RELATIVE FREQUENCY

A joint relative frequency divides by the total number of all observations. It tells how often two categories occur together.

At a zoo, 14 of 175 guests were members who visited the reptile house: 14/175.

CONDITIONAL RELATIVE FREQUENCY

A conditional relative frequency divides by the total in one selected group. It tells how often something occurs within that group.

Among 60 guests who arrived by train, 21 visited the reptile house: 21/60.

1 SORT _____ 8 items

For each item, circle TOGETHER or WITHIN, then pick two items and explain how the denominator helped you decide.

- | | | | |
|----|--|--------------------------------|------------------------------|
| 1. | A district surveys 500 students. Ninety are seniors who ride the bus: 90/500. | ☐ TOGETHER | ☐ WITHIN |
| 2. | Among 160 ninth graders, 64 prefer drama: 64/160. | ☐ TOGETHER | ☐ WITHIN |
| 3. | Of 240 customers, 30 used a coupon and paid with cash: 30/240. | ☐ TOGETHER | ☐ WITHIN |
| 4. | Among 75 student athletes, 45 play a fall sport: 45/75. | ☐ TOGETHER | ☐ WITHIN |
| 5. | Among 110 students who own a bike, 44 wear a helmet: 44/110. | ☐ TOGETHER | ☐ WITHIN |
| 6. | At a clinic, 27 of 180 patients were children who received a flu shot: 27/180. | ☐ TOGETHER | ☐ WITHIN |
| 7. | Of 90 voters surveyed, 36 were independent and supported Measure A: 36/90. | ☐ TOGETHER | ☐ WITHIN |
| 8. | Among 50 independent voters, 20 supported Measure A: 20/50. | ☐ TOGETHER | ☐ WITHIN |

2

PROVE IT

Explain your thinking

Pick two items from Part 1. For each one, tell how you knew where it belonged.

ITEM # _____ HOW I KNEW _____

ITEM # _____ HOW I KNEW _____

3

MAKE YOUR OWN

One of each

Write one new joint relative-frequency example and one new conditional relative-frequency example, including a numerator and denominator in each.

TOGETHER

WITHIN

CHALLENGE

At one school, 72% of robotics club students plan to study engineering, while 38% of students not in robotics club plan to study engineering. Write one sentence stating whether the data suggest an association and why.

PART 1 • SORT

#	ITEM	CATEGORY	WHY
1	A district surveys 500 students. Ninety are seniors who ride the bus: 90/500.	TOGETHER	The denominator is the grand total, 500, and the numerator names two categories.
2	Among 160 ninth graders, 64 prefer drama: 64/160.	WITHIN	The denominator is the selected group, ninth graders.
3	Of 240 customers, 30 used a coupon and paid with cash: 30/240.	TOGETHER	The denominator is all customers, and the numerator combines coupon use and payment type.
4	Among 75 student athletes, 45 play a fall sport: 45/75.	WITHIN	The denominator is the subgroup of student athletes.
5	Among 110 students who own a bike, 44 wear a helmet: 44/110.	WITHIN	The denominator is the subgroup of students who own a bike.
6	At a clinic, 27 of 180 patients were children who received a flu shot: 27/180.	TOGETHER	The denominator is all patients, and the numerator names age group and shot status.
7	Of 90 voters surveyed, 36 were independent and supported Measure A: 36/90.	TOGETHER	The denominator is all surveyed voters, and the numerator names party group and position.
8	Among 50 independent voters, 20 supported Measure A: 20/50.	WITHIN	The denominator is the subgroup of independent voters.

PART 2 • PROVE IT

Accept any explanation that names the deciding feature from the rule box for the chosen item.

PART 3 • MAKE YOUR OWN (SAMPLE ANSWERS)

- **TOGETHER:** Joint relative frequency: In a poll of 300 residents, 45 were renters who favored a park bond, so the relative frequency is 45/300.
- **WITHIN:** Conditional relative frequency: Among 75 renters in the poll, 45 favored a park bond, so the relative frequency is 45/75.

Challenge: The data suggest an association because planning to study engineering is more common among robotics club students, 72%, than among students not in the club, 38%.

Accept equivalent contexts when a joint example divides a cell count by the grand total and a conditional example divides a cell count by a subgroup total. In the challenge, accept a claim that the data suggest an association with a comparison of 72% and 38%, but do not accept a causal claim.