

Two-Way Tables and Relative Frequencies

Grade 8 math · Worksheet Answer Key · Standards: 8.SP.A.4

Each solution shows the division behind every percent and states the comparison in words. If your percents differ, check which total you divided by, since swapping rows and columns changes the meaning of the result.

Standards: 8.SP.A.4 · **Level:** Grade 8

Problem 1 Find the totals

Row totals: $18 + 12 = 30$ and $14 + 26 = 40$.

Column totals: $18 + 14 = 32$ and $12 + 26 = 38$.

Grand total: $30 + 40 = 70$.

Rows 30 and 40; columns 32 and 38; total 70

Problem 2 Read one cell

Find the row for pet owners and the column for students who like hiking.

18 students

Problem 3 Marginal count

Add the column: $12 + 26 = 38$.

38 students

Problem 4 From a list to a table

Count each pair: (Y, Y) appears 3 times, (Y, N) 3 times, (N, Y) once, and (N, N) 3 times.

	Plays instrument	No instrument	Total
Reads for fun	3	3	6
Does not read	1	3	4
Total	4	6	10

3, 3, 1, 3 with row totals 6 and 4 and column totals 4 and 6

Problem 5 Share of the whole

$18 \div 70 \approx 0.2571$.

About 25.7%

Problem 6 Row percents

Pet owners: $18 \div 30 = 60\%$ like hiking and $12 \div 30 = 40\%$ do not.

No pet: $14 \div 40 = 35\%$ like hiking and $26 \div 40 = 65\%$ do not.

Pet owners: 60% and 40%; no pet: 35% and 65%

Problem 7 Column percents

Likes hiking (total 32): $18 \div 32 = 56.25\%$ and $14 \div 32 = 43.75\%$.

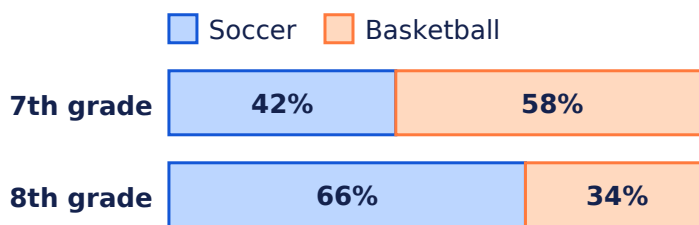
Does not like hiking (total 38): $12 \div 38 \approx 31.6\%$ and $26 \div 38 \approx 68.4\%$.

Likes hiking: 56.3% and 43.8%; does not: 31.6% and 68.4%

Problem 8 Row percents from a table

7th grade: $21 \div 50 = 42\%$ and $29 \div 50 = 58\%$.

8th grade: $33 \div 50 = 66\%$ and $17 \div 50 = 34\%$.



Row relative frequencies.

7th: 42% soccer, 58% basketball; 8th: 66% soccer, 34% basketball

Problem 9 Compare the groups

Soccer is chosen by 66% of eighth graders and 42% of seventh graders, a gap of 24 percentage points.

Eighth graders; yes, grade and favorite sport appear to be associated

Problem 10 Read the bars

The streaming share is 80% for the younger group and 45% for the older group. The percents differ a lot.

Yes, there is an association: younger people are more likely to use streaming

Problem 11 Missing entries

Row 1: $40 - 25 = 15$. Row 2: $50 - 20 = 30$.

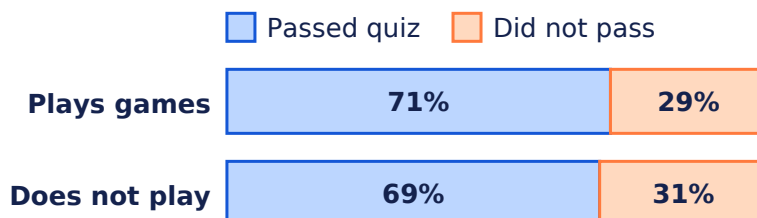
Column totals: $25 + 30 = 55$ and $15 + 20 = 35$. Check: $55 + 35 = 90$.

Blanks 15 and 30; column totals 55 and 35

Problem 12 A table with no pattern

Plays games: $17 \div 24 \approx 71\%$ passed and $7 \div 24 \approx 29\%$ did not.

Does not play: $11 \div 16 \approx 69\%$ passed and $5 \div 16 \approx 31\%$ did not.



Row relative frequencies, rounded to the nearest percent.

The rows are almost the same (71% and 69%), so there is little or no association

Problem 13 Explain a percent

A row relative frequency divides by the row total, so it compares within the group of eighth graders.

60% of the eighth graders in the survey bring a bag lunch

Problem 14 Big and small groups

Seventh graders: $54 \div 300 = 18\%$. Eighth graders: $36 \div 150 = 24\%$.

Although most members are seventh graders, they are a much bigger group.

Eighth graders are more likely to join (24% versus 18%)

Problem 15 Three grades

Sixth: $18 \div 60 = 30\%$. Seventh: $22 \div 60 \approx 36.7\%$. Eighth: $35 \div 60 \approx 58.3\%$.

The percent who walk rises with grade (30%, 36.7%, 58.3%), so older students are more likely to walk

Problem 16 Chess and math

Members: 9 qualified, 3 did not. Non-members: 7 qualified, 21 did not. Totals: 16 qualified, 24 did not, 40 students.

Members: $9 \div 12 = 75\%$. Non-members: $7 \div 28 = 25\%$.

75% versus 25%: club members are much more likely to qualify, a strong association

Problem 17 Tea or coffee

Adults: $0.60 \cdot 200 = 120$. Tea: $0.25 \cdot 120 = 30$; coffee: 90.

Children: 75% of 80 = 60 prefer tea; 20 prefer coffee.

	Tea	Coffee	Total
Adults	30	90	120
Children	60	20	80
Total	90	110	200

Adults: 30 tea, 90 coffee; children: 60 tea, 20 coffee. Children prefer tea far more often (75% versus 25%), so age group and drink are associated

Problem 18 Check a claim

40 of 70 members are eighth graders, about 57.1%, but that compares members with each other.

Row percents: eighth grade $40 \div 200 = 20\%$; seventh grade $30 \div 100 = 30\%$.

Mia is not right: seventh graders are more likely to join (30% versus 20%)

Problem 19 Smartwatches

Under 30: $105 \div 150 = 70\%$. 30 or older: $100 \div 250 = 40\%$.

Overall: $(105 + 100) \div 400 = 205 \div 400 = 51.25\%$.

70% and 40%; overall about 51.3%; younger people are more likely to own a smartwatch

Problem 20 Which percent?

Compare the honor-roll percent within each group, which means row relative frequencies when the rows are the sports groups.

In sports: $36 \div 90 = 40\%$. Not in sports: $24 \div 110 \approx 21.8\%$.

Compare 40% and 21.8%; students in sports are more likely to be on the honor roll