

Algebra 1 · Two-Way Tables, Scatter Plots and Correlation · Quiz

Common Core S-ID.B.5, S-ID.B.6, S-ID.C.7, S-ID.C.8, S-ID.C.9 · mathovore.fr

Name: _____ Date: ____/____/____ Score: _____

Ten multiple-choice questions check the key ideas of this chapter: relative frequencies in two-way tables, interpreting slope and intercept, residuals, residual plots, the correlation coefficient and causation. Choose the one best answer for each question, then read the explanation to learn from any miss.

Algebra 1 Common Core: S-ID.B.5 · S-ID.B.6 · S-ID.C.7 · S-ID.C.8 · S-ID.C.9

Questions

Question 1

Using the table, what is the conditional relative frequency of using the library, given that the student is in grade 9?

Grade	Used the library		
	Yes	No	Total
Grade 9	30	20	50
Grade 10	24	26	50
Total	54	46	100

Library use by grade.

- A. 30%
- B. 56%
- C. 60%
- D. 54%

Question 2

In a survey of 200 students, 80 are in band, and 50 of those band members are in grade 9. What is the joint relative frequency of band and grade 9?

- A. 62.5%
- B. 40%
- C. 37.5%
- D. 25%

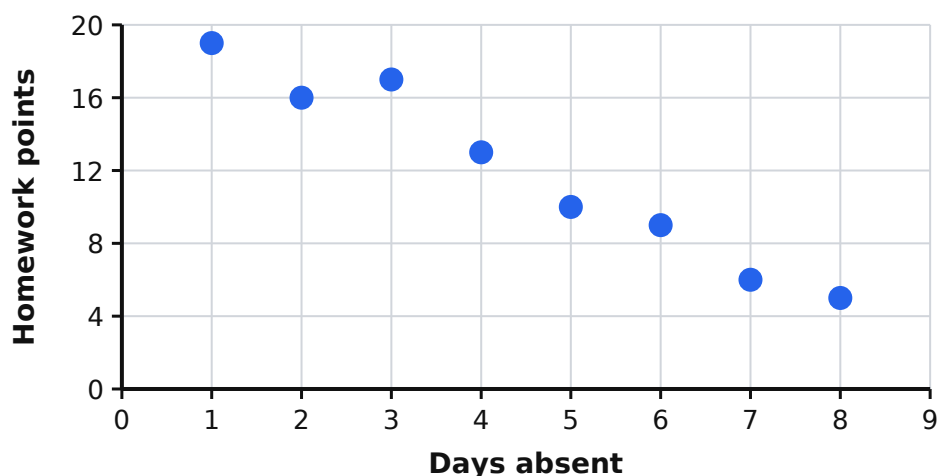
Question 3

The line $y = 2.4x + 31$ models a child's predicted height y in inches at age x years for ages 3 to 8. What does the slope 2.4 mean?

- A. Predicted height at age 0 is 2.4 inches
- B. The average child is 2.4 years old
- C. Predicted height rises about 2.4 inches per year of age
- D. Height and age have a correlation of 2.4

Question 4

The scatter plot compares days absent with homework points. Which statement describes the association?



Homework points and absences.

- A. Negative and strong
- B. Positive and strong
- C. Negative and weak
- D. No association

Question 5

A line predicts a quiz score of 62 for a student, but the student actually scores 70. What is the residual?

- A. -8
- B. 8
- C. 132

D. 66

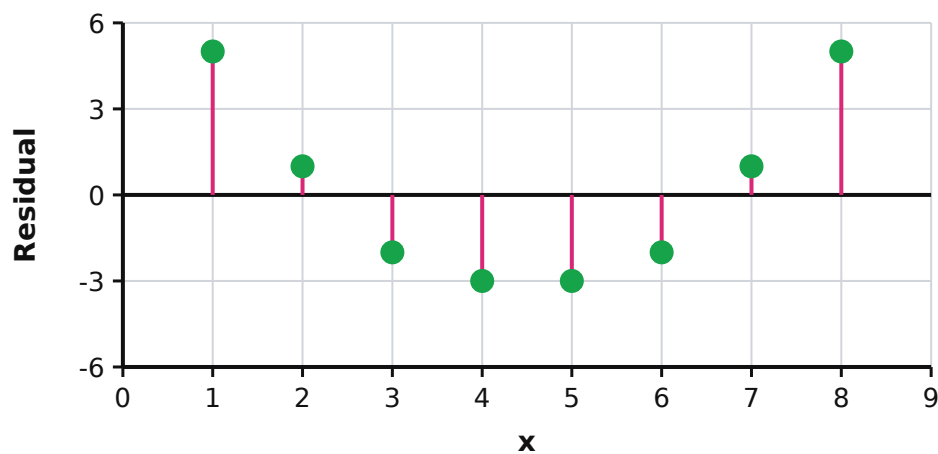
Question 6

The line $y = 6.5x + 40$ models typing speed y in words per minute after x weeks of practice (0 to 10 weeks). What does the y-intercept 40 mean?

- A. Speed rises 40 wpm each week
- B. Predicted speed before any practice is 40 wpm
- C. Students practice for 40 weeks
- D. Speed rises 6.5 wpm at the start

Question 7

The residual plot comes from a linear model. What does it show?

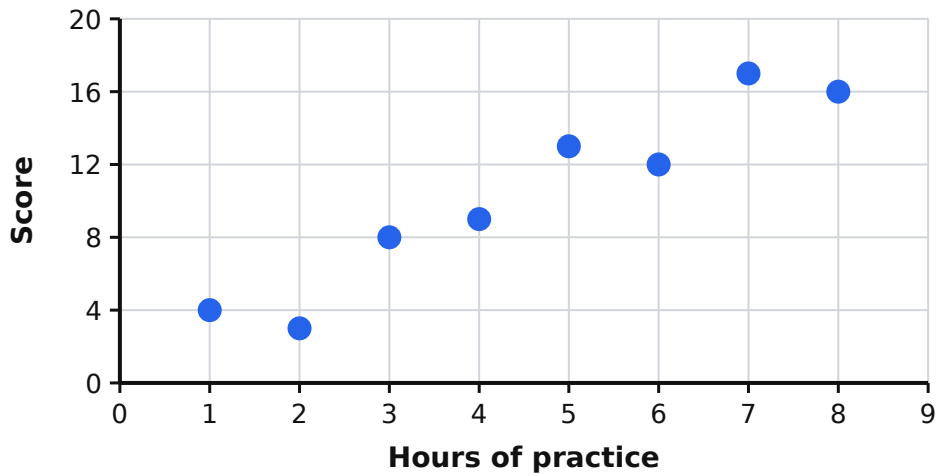


Residuals of a linear model.

- A. A line is a good fit because residuals are small
- B. The slope of the line is zero
- C. A line is a poor fit because the residuals form a U shape
- D. The data have no correlation at all

Question 8

Which value is the best estimate of the correlation coefficient for this scatter plot?



Score and practice.

- A. $r = -0.95$
- B. $r = 0.95$
- C. $r = 0.35$
- D. $r = 0.05$

Question 9

Which correlation coefficient shows the strongest linear relationship?

- A. $r = -0.91$
- B. $r = 0.85$
- C. $r = -0.50$
- D. $r = 0.30$

Question 10

A town finds a strong positive correlation between monthly ice cream sales and monthly pool visits. Which conclusion is best supported?

- A. Eating ice cream causes people to go swimming
- B. Swimming causes ice cream sales to rise
- C. Pool visits cause the weather to warm up
- D. Hot weather may raise both, so a lurking variable is likely

Answer key

1. **C** - Divide the grade 9 'Yes' count by the grade 9 total: $30 \div 50 = 0.60$. 30% is the joint frequency, 54% is the marginal frequency of 'Yes', and 56% divides by the wrong total.
2. **D** - A joint relative frequency divides the cell count by the grand total: $50 \div 200 = 0.25$. The value 62.5% divides by the band total (80), which is a conditional frequency, and 40% is the marginal frequency of band.
3. **C** - The slope is the predicted change in y for each 1-unit increase in x . The value 31 is the y-intercept, and a correlation can never exceed 1.
4. **A** - The points fall from left to right, so the association is negative, and they stay close to a line, so it is strong.
5. **B** - Residual = actual - predicted = $70 - 62 = 8$. The answer -8 reverses the subtraction, and 132 adds the two values.
6. **B** - The y-intercept is the predicted y when $x = 0$, that is, at the start of practice. The slope 6.5 is the weekly gain.
7. **C** - Residuals that follow a curve show a pattern the line misses, so a quadratic or other curve would model the data better.
8. **B** - The points rise and lie close to a line, so r is positive and near 1. The value -0.95 has the wrong sign.
9. **A** - Strength depends on the distance from 0, not on the sign. Since $|-0.91|$ is the largest absolute value, it is the strongest.
10. **D** - Correlation does not show cause. A lurking variable such as temperature can drive both quantities.

Remember:

- Joint, marginal and conditional relative frequencies come from a two-way table and are found by dividing by a grand total or by a row or column total.
- A residual equals the actual value minus the predicted value; a random residual plot means a line fits well.
- In $y = mx + b$, the slope is the predicted change in y per 1-unit change in x , and the y-intercept is the predicted y when $x = 0$.
- The correlation coefficient r ranges from -1 to 1 and measures only the strength and direction of a linear relationship.
- Correlation does not prove causation, and predictions far outside the data are unreliable.