

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

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: _____

This 45-minute test has nine questions worth 20 points. It covers two-way tables, scatter plots, lines of fit, residuals, the correlation coefficient and the difference between correlation and causation. Show your work and write answers in complete sentences where a question asks you to explain or interpret.

Test information

- **Grade:** Algebra 1
- **Chapter:** Two-Way Tables, Scatter Plots and Correlation
- **Common Core:** S-ID.B.5, S-ID.B.6, S-ID.C.7, S-ID.C.8, S-ID.C.9
- **Time:** 45 minutes
- **Total:** 20 points (Question 1: 2 pts; Question 2: 3 pts; Question 3: 2 pts; Question 4: 3 pts; Question 5: 3 pts; Question 6: 2 pts; Question 7: 2 pts; Question 8: 2 pts; Question 9: 1 pt)

Question 1: Complete a two-way table (2 points)

A coach surveyed 120 students about playing soccer.

Sport	Grade		
	Grade 9	Grade 10	Total
Soccer	18	12	?
No soccer	42	48	?
Total	?	?	?

Soccer participation by grade.

a. Complete the row and column totals. (1 point)

- b. Find the marginal relative frequency of students who play soccer. (1 point)

Question 2: Compare conditional frequencies (3 points)

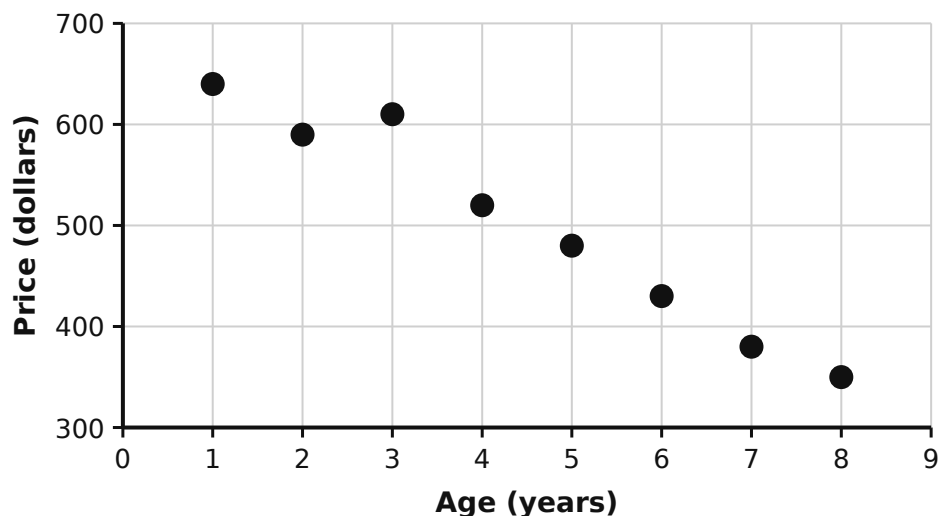
The principal recorded how 200 students arrived and whether they were late.

	Late	On time	Total
Rides the bus	9	81	90
Does not ride the bus	22	88	110
Total	31	169	200

- Find the joint relative frequency of riding the bus and being late. (1 point)
- Find the conditional relative frequency of being late for bus riders and for students who do not ride the bus. (1 point)
- Does the data suggest an association between riding the bus and being late? Justify the answer. (1 point)

Question 3: Describe a scatter plot (2 points)

The scatter plot shows the asking price of eight used laptops of different ages.

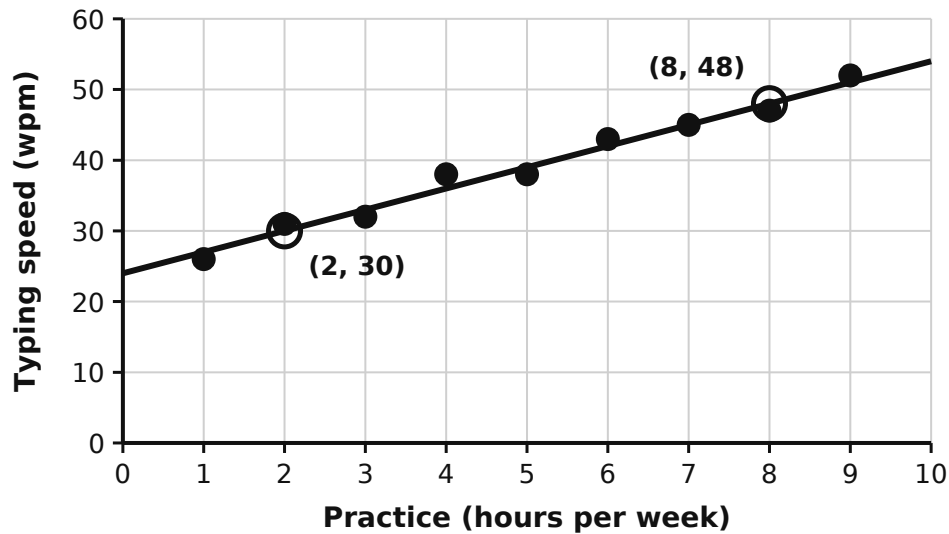


Price and age of eight used laptops.

- Describe the direction, strength and form of the association. (1 point)
- Which value is most likely the correlation coefficient: 0.98, 0.20, -0.20 or -0.98 ? (1 point)

Question 4: Line of fit and prediction (3 points)

A typing class recorded weekly practice time and typing speed for nine students. The line drawn on the scatter plot passes through (2, 30) and (8, 48).



Typing speed and weekly practice.

- Write an equation of the line. (1 point)
- Interpret the slope in context. (1 point)
- Predict the typing speed after 10 hours of weekly practice. (1 point)

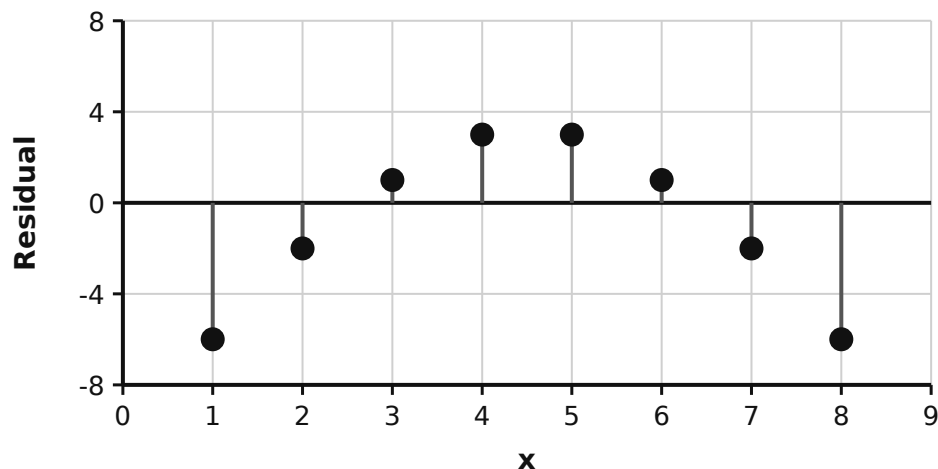
Question 5: Compute residuals (3 points)

The line $y = 2.5x + 8$ is used to model four data points: (2, 15), (4, 17), (6, 26) and (8, 27).

- Find the predicted value for each point. (1 point)
- Find the residual for each point. (1 point)
- Which point lies farthest above the line? (1 point)

Question 6: Interpret a residual plot (2 points)

A student fit a line to a data set and graphed the residuals.



Residual plot for the linear model.

- a. Is a linear model appropriate for this data? Explain. (1 point)
- b. Describe how the residual plot would look if the line were a good fit. (1 point)

Question 7: Interpret the correlation coefficient (2 points)

A study of students found $r = -0.84$ between weekly hours of video games and grade point average.

- a. Describe the direction and strength of the relationship. (1 point)
- b. A second study found $r = 0.31$ between hours of sleep and grade point average. Which study shows the stronger linear relationship? Explain. (1 point)

Question 8: Correlation and causation (2 points)

A fire department finds $r = 0.90$ between the number of fire trucks sent to a fire and the dollar damage the fire causes.

- a. Does this show that sending more fire trucks causes more damage? Explain. (1 point)
- b. Name a lurking variable that could explain the correlation. (1 point)

Question 9: Extrapolation (1 point)

Using readings from the first 6 hours, a line $y = -14x + 100$ models a phone's battery percent y after x hours of use. Predict the battery percent after 10 hours and decide whether the prediction is reasonable.