

Algebra 1 - Scatter Plots, Lines of Fit and Two-Way Tables - Answer Key

Common Core S-ID.B.5, S-ID.B.6, S-ID.C.7, S-ID.C.8, S-ID.C.9 · maths-pdf.fr/en/

Use this key to check your work on the scatter plots worksheet. Every solution shows the steps, and the final answer appears in bold. If your answer differs, find the first line where your work and the key disagree, then redo the problem from there without looking.

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

Exercise 1 - Positive association

As x increases, y increases.

Positive association

Exercise 2 - Negative association

As x increases, y decreases.

Negative association

Exercise 3 - No association

There is no pattern: y does not change in a predictable way as x changes.

No association

Exercise 4 - Equation of a line of fit

Slope: $\frac{34-10}{8-2} = 4$. Then $10 = 4(2) + b$, so $b = 2$.

$y = 4x + 2$. At $x = 5$: $4(5) + 2 = 22$.

$y = 4x + 2$; **22**

Exercise 5 - Interpret the slope and intercept

The slope 2.5: each additional hour studied is associated with a 2.5-point increase in the predicted score.

The y-intercept 40: the predicted score for a student who studies 0 hours.

2.5 points per hour; 40 points at 0 hours

Exercise 6 - Predict from the line

$$y = -3(7) + 50 = 29.$$

Solve $-3x + 50 = 17$: $-3x = -33$, so $x = 11$.

29; 11

Exercise 7 - Compute a residual

Residual = actual - predicted = $31 - 28.4 = 2.6$.

The point is above the line.

2.6

Exercise 8 - Residual from an equation

Predicted: $1.5(6) + 4 = 13$. Residual: $11 - 13 = -2$.

The point is below the line.

Predicted 13; residual -2

Exercise 9 - Residuals for three points

Predicted values: 4, 6, 8.

Residuals (actual - predicted): $5 - 4 = 1$, $6 - 6 = 0$, $10 - 8 = 2$.

1, 0, 2

Exercise 10 - Interpret correlation

(a) Close to 1: a strong positive linear relationship. (b) Negative but closer to 0 than to -1: a weak negative relationship. (c) Near 0: essentially no linear relationship.

strong positive; weak negative; no linear relationship

Exercise 11 - Correlation and causation

No. Both increase when the weather is hot and sunny. Hot weather is a lurking variable that explains the association.

No; the weather is a lurking variable

Exercise 12 - Interpolation and extrapolation

At $x = 25$, inside the data range (interpolation): $0.8(25) + 12 = 32$. This is reasonable.

At $x = 100$, far outside the range (extrapolation): the trend may not continue.

$x = 25$ is reasonable (32); $x = 100$ is unreliable

Exercise 13 - Complete a two-way table

	Walk	Bike	Total
Grade 7	30	20	50
Grade 8	10	40	50
Total	40	60	100

A two-way table counts how many people fall in each pair of categories.

Completed table.

Row totals: $30 + 20 = 50$ and $10 + 40 = 50$. Column totals: $30 + 10 = 40$ and $20 + 40 = 60$. Grand total: $50 + 50 = 100$.

Totals 50, 50, 40, 60; grand total 100

Exercise 14 - Joint and marginal frequencies

Joint: $\frac{40}{100} = 40\%$.

Marginal for walkers: $\frac{40}{100} = 40\%$.

40% and 40%

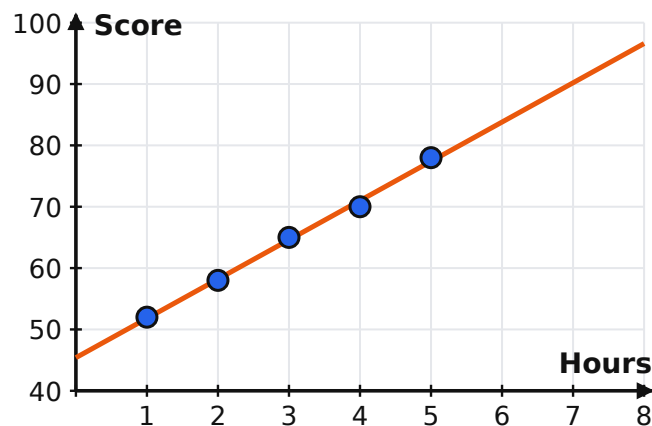
Exercise 15 - Conditional frequency

Grade 7 students who walk: $\frac{30}{50} = 60\%$.

Walkers in grade 7: $\frac{30}{40} = 75\%$.

60%; 75%

Exercise 16 - Least-squares line



Line of best fit and residuals.

Predict: $6.4(4.5) + 45.4 = 28.8 + 45.4 = 74.2$.

Since $r \approx 0.999$ is very close to 1, the linear relationship is very strong and positive.

About 74.2 points; very strong positive

Exercise 17 - Line of fit in context

Slope: $\frac{75-35}{10-0} = 2$. Then $35 = 2(10) + b$, so $b = 15$.

$y = 2x + 15$. The seedling grows about 2 cm per day. At day 20: $2(20) + 15 = 55$ cm.

$y = 2x + 15$; **2 cm per day; 55 cm**

Exercise 18 - Used car values

Slope -1500 : the car loses about \$1,500 in value each year. Intercept 22,000: the value when new.

At 4 years: $-1500(4) + 22000 = 16000$. For \$10,000: $-1500x + 22000 = 10000$, so $x = 8$.

\$1,500 per year; \$22,000 new; \$16,000; 8 years

Exercise 19 - Residual plot

A residual plot with no pattern supports a linear model. A U-shaped pattern means the points curve away from the line (positive, then negative, then positive residuals).

No; a curved model would fit better

Exercise 20 - Breakfast and scores

No. The study shows association, not causation. Families with more time, sleep, or resources may both serve breakfast and support learning.

No; for example, sleep or family resources