Scatter Plots and Lines of Fit

Use this key to check answers and read the explanations.

1. A scatter plot uses x for packs opened and y for stickers collected. What does the point (3, 8) mean?

A. 8 stickers from 3 packs
B. 3 stickers from 8 packs
C. 8 stickers from 8 packs
D. 3 stickers from 3 packs

Correct answer: A. 8 stickers from 3 packs
The first coordinate gives the number of packs. The second gives the number of stickers.

2. A team records bench lengths of 2, 5 and 7 feet with corresponding seat counts of 1, 3 and 4. If x is length and y is seats, which point belongs to the 5-foot bench?

A. (5, 4)
B. (3, 5)
C. (5, 3)
D. (7, 3)

Correct answer: C. (5, 3)
Pair each length with the seat count in the same position. The second length, 5, matches the second count, 3.

3. The points (2, 3), (4, 6), (4, 9) and (6, 11) are on a scatter plot. What are the y-values for the two points directly above x = 4?

A. 3 and 6
B. 6 and 9
C. 4 and 4
D. 9 and 11

Correct answer: B. 6 and 9
Select the points whose first coordinate is 4. Their second coordinates are 6 and 9.

4. A reading group records (minutes read, pages finished) as (5, 3), (10, 6), (15, 8) and (20, 12). Which direction do these points follow?

A. A downward then upward curve
B. Negative association
C. No association
D. Positive association

Correct answer: D. Positive association
Page counts rise as the number of minutes increases. The points move upward as you read the pairs from left to right.

5. A cooling tray gives (minutes elapsed, temperature) pairs of (1, 34), (3, 29), (5, 24) and (7, 20). What association appears?

A. Positive association
B. Negative association
C. No association
D. An upward then downward curve

Correct answer: B. Negative association
The temperature falls as time increases. This produces a downward pattern from left to right.

6. A scatter plot contains (1, 2), (1, 7), (4, 2) and (4, 7). What does the plot show about direction?

A. The same two y-values occur at both x-values.
B. Every larger x-value has a larger y-value.
C. Every larger x-value has a smaller y-value.
D. The larger x-value has only one y-value.

Correct answer: A. The same two y-values occur at both x-values.
Both x = 1 and x = 4 have y-values of 2 and 7. The y-values show no overall rise or fall as x changes.

7. The points are (1, 4), (2, 7), (3, 18), (4, 13) and (5, 16). Four follow a rise of 3 in y for each step of 1 in x. Which point breaks that pattern?

A. (5, 16)
B. (2, 7)
C. (4, 13)
D. (3, 18)

Correct answer: D. (3, 18)
The values 4, 7, 13 and 16 fit $y = 3x + 1$. That pattern gives 10 at x = 3, so the observed value of 18 is unusually high.

8. Set A contains (1, 3), (2, 5), (3, 7) and (4, 9). Set B contains (1, 3), (2, 6), (3, 5) and (4, 10). Which set is more tightly aligned with an upward straight line?

A. Both sets fit an upward line exactly
B. Set B
C. Set A
D. Neither set has an upward trend

Correct answer: C. Set A
In Set A, every step of 1 in x raises y by 2. Set B rises overall but includes a drop from y = 6 to y = 5.

9. A scatter plot has points (2, 9), (4, 11), (7, 19) and (8, 20). A model uses y = 2x + 4. What y-value does it predict at x = 6?

A. 16
B. 12
C. 15
D. 20

Correct answer: A. 16
Substitute 6 for x in the model. Doubling 6 and adding 4 gives 16, a prediction within the model’s observed x-range.

10. A model uses points (4, 10), (7, 16), (9, 20) and (12, 26). Which prediction would extend beyond the observed x-values?

A. The prediction at x = 12
B. The prediction at x = 5
C. The prediction at x = 8
D. The prediction at x = 16

Correct answer: D. The prediction at x = 16
The observed x-values span 4 through 12. A prediction at 16 would extend past that span, even if the plotted points fit the model closely.

11. A model predicts y = 3x + 2. One observed point is (5, 16). What is the residual, calculated as observed minus predicted?

A. 17
B. 1
C. -1
D. -17

Correct answer: C. -1
The model predicts 17 at x = 5. The residual is 16 minus 17, or -1, because the point sits 1 unit below the line.

12. The points are (0, 10), (1, 7), (2, 6), (3, 7) and (4, 10). Which description would a single sloping line miss?

A. The values rise at every step.
B. The values fall and then rise.
C. The values fall at every step.
D. The values stay the same.

Correct answer: B. The values fall and then rise.
The y-values drop to 6 and then climb back to 10. A single straight line cannot capture that change of direction.

13. A fountain model gives y = 4x + 3, where x is minutes and y is liters collected. The fitted line contains (1, 7) and (3, 15). How much does the model add for 2 more minutes?

A. 11 liters
B. 4 liters
C. 7 liters
D. 8 liters

Correct answer: D. 8 liters
The slope adds 4 liters per minute, so two additional minutes add 8 liters. The 3-liter intercept is a starting amount.

14. The observed points are (1, 4), (3, 8) and (5, 11). For each model, add the absolute differences between observed and predicted y-values. Which model has the smallest total?

A. y = 2x + 1
B. y = 2x
C. y = 3x + 1
D. y = x + 4

Correct answer: A. y = 2x + 1
The totals are 2 for 2x + 1, 5 for 2x, 7 for 3x + 1 and 4 for x + 4. The model y = 2x + 1 predicts 3, 7 and 11, for differences of 1, 1 and 0.

15. An ice rink records (skate rentals, cocoa cups sold) on four days as (20, 8), (30, 13), (45, 20) and (60, 26). Which conclusion fits the data?

A. Each skate rental adds exactly one cup sold.
B. Renting skates makes a visitor buy cocoa.
C. Rentals and cocoa sales rise together, possibly because more people visited.
D. Cocoa sales are unrelated to rental counts in these data.

Correct answer: C. Rentals and cocoa sales rise together, possibly because more people visited.
The two counts rise together in these observations. Visitor numbers could influence both, so the paired counts alone cannot establish that one purchase causes the other.