Scatter Plots

Name: _____	Date: _____	Score: _____ / 24

Quick Review

A **scatter plot** graphs paired data as points (x, y) so you can *see* how two quantities are related. Look for the **direction** of the cloud of points: if y tends to rise as x rises, that is a **positive association**; if y tends to fall as x rises, that is a **negative association**; if the points show no pattern, there is **no association**. Also notice the **form** (roughly a straight line is *linear*, a curve is *nonlinear*) and any **outliers** — points that sit far from the rest. A tight cloud means a *strong* relationship; a loose, spread-out cloud means a *weak* one.

◇ **Example:** Describe the association for the data set $(1, 3),\ (2, 5),\ (3, 6),\ (4, 8),\ (5, 9)$.
⇒ Let's walk through the points from left to right. As x goes $1 \to 2 \to 3 \to 4 \to 5$, the y-values go $3 \to 5 \to 6 \to 8 \to 9$ — they keep climbing. Since y rises as x rises, the association is **positive**. The jumps in y are all close to 2, so the points lie almost on a straight line, which means the form is **linear** and the relationship is **strong**. No point breaks the pattern, so there are no outliers.

Answer: positive, linear, strong association; no outliers

PRACTICE

Describe each scatter plot's association from the listed coordinate pairs.

1. $(1, 2),\ (2, 4),\ (3, 6),\ (4, 8)$ _____

2. $(1, 10),\ (2, 8),\ (3, 6),\ (4, 4)$ _____

3. $(1, 5),\ (2, 5),\ (3, 5),\ (4, 5)$ _____

4. $(1, 1),\ (2, 3),\ (3, 2),\ (4, 9),\ (5, 4)$ _____

5. $(0, 3),\ (1, 5),\ (2, 7),\ (3, 9)$ _____

6. $(0, 12),\ (2, 9),\ (4, 6),\ (6, 3)$ _____

7. $(1, 2),\ (2, 8),\ (3, 18),\ (4, 32)$ _____

8. $(1, 7),\ (2, 7),\ (3, 8),\ (4, 7),\ (20, 7)$ _____

9. $(2, 4),\ (3, 5),\ (4, 6),\ (5, 7),\ (6, 8)$ _____

10. $(1, 9),\ (2, 9),\ (3, 1),\ (4, 8),\ (5, 2)$ _____

11. $(0, 0),\ (1, 4),\ (2, 8),\ (3, 12),\ (4, 16)$ _____

12. $(10, 1),\ (8, 2),\ (6, 3),\ (4, 4),\ (2, 5)$ _____

13. $(1, 3),\ (2, 3),\ (3, 4),\ (4, 12),\ (5, 5)$ _____

14. $(1, 20),\ (2, 15),\ (3, 11),\ (4, 8),\ (5, 6)$ _____

15. $(3, 6),\ (5, 10),\ (7, 14),\ (9, 18)$ _____

16. $(1, 8),\ (2, 6),\ (3, 7),\ (4, 5),\ (5, 6)$ _____

17. $(0, 5),\ (1, 5),\ (2, 6),\ (3, 5),\ (4, 6)$ _____

18. $(2, 1),\ (4, 4),\ (6, 9),\ (8, 16)$ _____

19. $(1, 14),\ (2, 11),\ (3, 8),\ (4, 5),\ (5, 2)$ _____

20. $(5, 5),\ (5, 9),\ (5, 2),\ (5, 7)$ _____

Word Problems

21. A coach records hours practiced and free throws made: $(1, 4),\ (2, 7),\ (3, 9),\ (4, 12),\ (5, 14)$. Describe the association and what it means for the players. _____

22. A store tracks the price of a jacket and how many sell each week: $(20, 50),\ (30, 38),\ (40, 27),\ (50, 15)$. Describe the association. _____

23. A student plots shoe size against math test score: $(6, 88),\ (7, 72),\ (8, 95),\ (9, 60),\ (10, 81)$. Describe the association. _____

24. A scientist records plant height each week: $(1, 2),\ (2, 5),\ (3, 8),\ (4, 11),\ (5, 30)$. Identify any outlier and describe the rest of the data. _____

Answer Keys

1. positive, linear
2. negative, linear
3. no association
4. no clear association
5. positive, linear
6. negative, linear
7. positive, nonlinear
8. outlier at $x = 20$
9. positive, linear, strong
10. weak / no association
11. positive, linear, strong
12. negative, linear
13. outlier at $(4, 12)$
14. negative, nonlinear
15. positive, linear, strong
16. weak negative
17. no / very weak association
18. positive, nonlinear
19. negative, linear, strong
20. no association
21. positive, linear, strong; more practice tends to mean more free throws
22. negative, roughly linear; higher price is linked to fewer sales
23. no association; shoe size and test score are unrelated
24. outlier at $(5, 30)$; the first four points are positive and linear

Step-by-Step Explanations

1. Each time x goes up by 1, y goes up by 2, so y rises with x along a straight line — a positive, linear association.

2. As x increases, y steadily *decreases* by 2 each step, so this is a negative, linear association.

3. The y-values never change as x changes, so there is no upward or downward trend — no association.

4. The y-values jump around with no steady up or down pattern, so there is no clear association.

5. y climbs by 2 for every step in x, a steady straight-line rise — positive and linear.

6. y drops by 3 each time x goes up by 2, so y falls steadily as x grows — a negative, linear association.

7. y rises as x rises (positive), but the jumps $6, 10, 14$ keep getting bigger, so the form is a curve — nonlinear.

8. Most points cluster near $x = 1$ to 4; the point $(20, 7)$ sits far away from the rest, so it is an outlier.

9. y goes up by exactly 1 each step, so the points lie right on a line — a strong, positive, linear association.

10. The y-values scatter with no steady direction, so the relationship is weak — essentially no association.

11. Every step of 1 in x adds exactly 4 to y, so the points form a perfect straight line rising — strong and positive.

12. As x decreases the y increases, which means as x *increases* y decreases — a negative, linear association.

13. The point $(4, 12)$ jumps far above the others, which sit near $y = 3$ to 5, so $(4, 12)$ is an outlier.

14. y falls as x rises (negative), but the drops $5, 4, 3, 2$ shrink, so the form curves — nonlinear.

15. Here y is always double x, so the points sit exactly on a line — a strong, positive, linear association.

16. y generally drifts downward as x rises, but not perfectly, so the association is negative but weak.

17. The y-values barely change and show no clear trend, so there is essentially no association.

18. y increases with x, but the gaps $3, 5, 7$ grow, so the points bend into a curve — positive and nonlinear.

19. y drops by exactly 3 each step, lining the points up perfectly — a strong, negative, linear association.

20. x never changes while y varies, so there is no relationship between the two quantities.

21. As practice hours rise, free throws made rise too, in steady jumps of about 2 to 3, so the association is positive, linear, and strong — practicing more is linked to scoring more.

22. As the price goes up, the number sold goes steadily down, so the association is negative and close to linear — raising the price tends to lower sales.

23. The test scores jump around with no upward or downward trend as shoe size grows, so there is no association — shoe size does not predict test score.

24. The first four points rise by 3 each week — a positive, linear pattern. The point $(5, 30)$ jumps far above that trend, so it is an outlier (maybe a measurement error).

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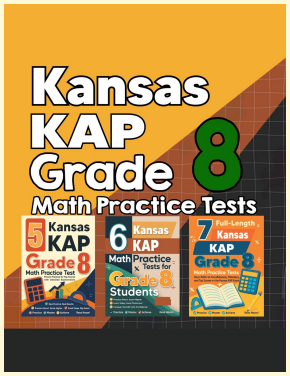

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