

Scatter Plots

Name: _____ Date: _____ Score: _____ / 24

Q 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 $1 \rightarrow 2 \rightarrow 3 \rightarrow 4 \rightarrow 5$, the y -values go $3 \rightarrow 5 \rightarrow 6 \rightarrow 8 \rightarrow 9$ — 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.

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|----------------------------------------------------|-------------------------------------------------------|
| 1. $(1, 2), (2, 4), (3, 6), (4, 8)$ _____ | 11. $(0, 0), (1, 4), (2, 8), (3, 12), (4, 16)$ _____ |
| 2. $(1, 10), (2, 8), (3, 6), (4, 4)$ _____ | 12. $(10, 1), (8, 2), (6, 3), (4, 4), (2, 5)$ _____ |
| 3. $(1, 5), (2, 5), (3, 5), (4, 5)$ _____ | 13. $(1, 3), (2, 3), (3, 4), (4, 12), (5, 5)$ _____ |
| 4. $(1, 1), (2, 3), (3, 2), (4, 9), (5, 4)$ _____ | 14. $(1, 20), (2, 15), (3, 11), (4, 8), (5, 6)$ _____ |
| 5. $(0, 3), (1, 5), (2, 7), (3, 9)$ _____ | 15. $(3, 6), (5, 10), (7, 14), (9, 18)$ _____ |
| 6. $(0, 12), (2, 9), (4, 6), (6, 3)$ _____ | 16. $(1, 8), (2, 6), (3, 7), (4, 5), (5, 6)$ _____ |
| 7. $(1, 2), (2, 8), (3, 18), (4, 32)$ _____ | 17. $(0, 5), (1, 5), (2, 6), (3, 5), (4, 6)$ _____ |
| 8. $(1, 7), (2, 7), (3, 8), (4, 7), (20, 7)$ _____ | 18. $(2, 1), (4, 4), (6, 9), (8, 16)$ _____ |
| 9. $(2, 4), (3, 5), (4, 6), (5, 7), (6, 8)$ _____ | 19. $(1, 14), (2, 11), (3, 8), (4, 5), (5, 2)$ _____ |
| 10. $(1, 9), (2, 9), (3, 1), (4, 8), (5, 2)$ _____ | 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

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| <ol style="list-style-type: none"> 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 | <ol style="list-style-type: none"> 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 |
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Step-by-Step Explanations

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| <ol style="list-style-type: none"> 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 <i>decreases</i> 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 <i>increases</i> y decreases — a negative, linear association. 13. The point $(4, 12)$ jumps far above the others, which sit near $y = 3$ to 5, so | <p>$(4, 12)$ is an outlier.</p> <ol style="list-style-type: none"> 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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