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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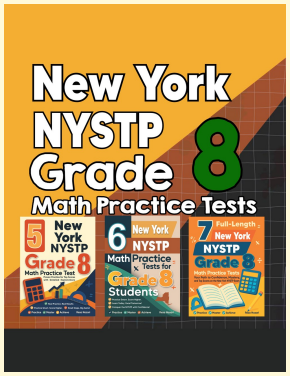

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