

# 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

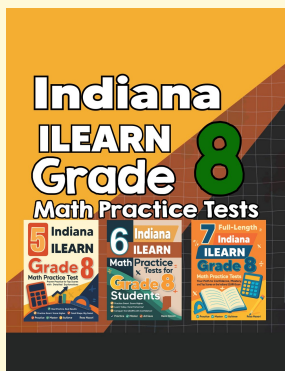
- |   |   |
|---|---|
| <ol style="list-style-type: none"> <li>1. positive, linear</li> <li>2. negative, linear</li> <li>3. no association</li> <li>4. no clear association</li> <li>5. positive, linear</li> <li>6. negative, linear</li> <li>7. positive, nonlinear</li> <li>8. outlier at <math>x = 20</math></li> <li>9. positive, linear, strong</li> <li>10. weak / no association</li> <li>11. positive, linear, strong</li> <li>12. negative, linear</li> </ol> | <ol style="list-style-type: none"> <li>13. outlier at <math>(4, 12)</math></li> <li>14. negative, nonlinear</li> <li>15. positive, linear, strong</li> <li>16. weak negative</li> <li>17. no / very weak association</li> <li>18. positive, nonlinear</li> <li>19. negative, linear, strong</li> <li>20. no association</li> <li>21. positive, linear, strong; more practice tends to mean more free throws</li> <li>22. negative, roughly linear; higher price is linked to fewer sales</li> <li>23. no association; shoe size and test score are unrelated</li> <li>24. outlier at <math>(5, 30)</math>; the first four points are positive and linear</li> </ol> |
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### Step-by-Step Explanations

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|---|---|
| <ol style="list-style-type: none"> <li>1. Each time <math>x</math> goes up by 1, <math>y</math> goes up by 2, so <math>y</math> rises with <math>x</math> along a straight line — a positive, linear association.</li> <li>2. As <math>x</math> increases, <math>y</math> steadily <i>decreases</i> by 2 each step, so this is a negative, linear association.</li> <li>3. The <math>y</math>-values never change as <math>x</math> changes, so there is no upward or downward trend — no association.</li> <li>4. The <math>y</math>-values jump around with no steady up or down pattern, so there is no clear association.</li> <li>5. <math>y</math> climbs by 2 for every step in <math>x</math>, a steady straight-line rise — positive and linear.</li> <li>6. <math>y</math> drops by 3 each time <math>x</math> goes up by 2, so <math>y</math> falls steadily as <math>x</math> grows — a negative, linear association.</li> <li>7. <math>y</math> rises as <math>x</math> rises (positive), but the jumps 6, 10, 14 keep getting bigger, so the form is a curve — nonlinear.</li> <li>8. Most points cluster near <math>x = 1</math> to 4; the point <math>(20, 7)</math> sits far away from the rest, so it is an outlier.</li> <li>9. <math>y</math> goes up by exactly 1 each step, so the points lie right on a line — a strong, positive, linear association.</li> <li>10. The <math>y</math>-values scatter with no steady direction, so the relationship is weak — essentially no association.</li> <li>11. Every step of 1 in <math>x</math> adds exactly 4 to <math>y</math>, so the points form a perfect straight line rising — strong and positive.</li> <li>12. As <math>x</math> decreases the <math>y</math> increases, which means as <math>x</math> <i>increases</i> <math>y</math> decreases — a negative, linear association.</li> <li>13. The point <math>(4, 12)</math> jumps far above the others, which sit near <math>y = 3</math> to 5, so</li> </ol> | <p><math>(4, 12)</math> is an outlier.</p> <ol style="list-style-type: none"> <li>14. <math>y</math> falls as <math>x</math> rises (negative), but the drops 5, 4, 3, 2 shrink, so the form curves — nonlinear.</li> <li>15. Here <math>y</math> is always double <math>x</math>, so the points sit exactly on a line — a strong, positive, linear association.</li> <li>16. <math>y</math> generally drifts downward as <math>x</math> rises, but not perfectly, so the association is negative but weak.</li> <li>17. The <math>y</math>-values barely change and show no clear trend, so there is essentially no association.</li> <li>18. <math>y</math> increases with <math>x</math>, but the gaps 3, 5, 7 grow, so the points bend into a curve — positive and nonlinear.</li> <li>19. <math>y</math> drops by exactly 3 each step, lining the points up perfectly — a strong, negative, linear association.</li> <li>20. <math>x</math> never changes while <math>y</math> varies, so there is no relationship between the two quantities.</li> <li>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.</li> <li>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.</li> <li>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.</li> <li>24. The first four points rise by 3 each week — a positive, linear pattern. The point <math>(5, 30)</math> jumps far above that trend, so it is an outlier (maybe a measurement error).</li> </ol> |
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