Scatter Plots and Patterns in Data

Spot mistakes, reason, and work backward

Name _____ **Date** _____ **Score** _____ / 6

QUICK REVIEW

Check a scatter-plot claim against several points, not one unusual observation. A point far from the main pattern may be an outlier. A curved pattern can be strong without being linear. Read each axis scale independently: a horizontal tick of 2 and a vertical tick of 5 represent different changes. Association alone cannot establish cause and effect.

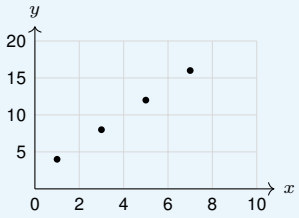
Worked example

Example for form 2: describe this trend.

1. Compare $(1, 4)$ and $(7, 16)$: the input increases by 6 and the output by 12. The endpoint rate is $12/6 = 2$.

2. The middle points follow the same upward band. Thus the association is positive and approximately linear; the paired observations do not by themselves prove causation.

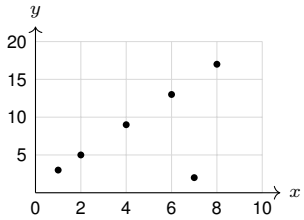
Answer: Positive, approximately linear association.



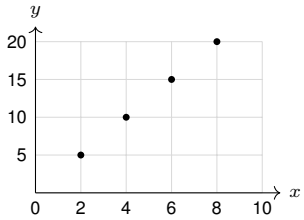
Practice Problems

Show your thinking.

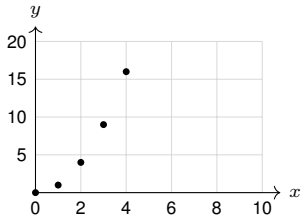
1. A learner calls this negative because one point is low. Correct the overall description.



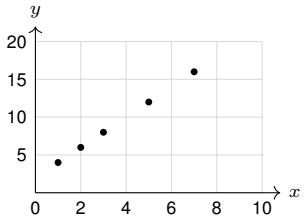
2. The axes count by 2 horizontally and 5 vertically. A learner reads the top-right point as (4,4). Correct it.



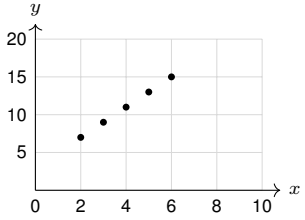
3. A learner says strong patterns must be straight. Use consecutive rises to assess this pattern.



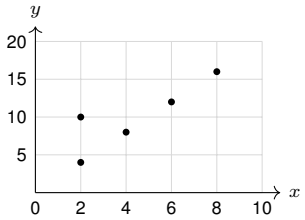
4. A learner infers that increasing x causes y to rise. What can this plot actually establish?



5. A learner calls x=9 interpolation. Use the observed range to correct the claim.



6. Does connecting these points in x-order turn the measurements into a continuous function? Explain.



Answer Key

1. Overall positive, with low outlier $(7, 2)$.
2. $(8, 20)$
3. Strong curved pattern; not linear.
4. Positive association, not causation.
5. $x = 9$ is extrapolation.
6. No; two outputs are observed at $x = 2$.

Step-by-Step Solutions

Follow each calculation, then check your own work.

Problem 1

1. Five points rise along $y = 2x + 1$, from $(1, 3)$ to $(8, 17)$. At $x = 7$, that pattern would suggest 15.

2. The point $(7, 2)$ lies $15 - 2 = 13$ below the pattern. One outlier does not reverse the positive association of the main group.

Problem 2

1. The rightmost point is at horizontal value 8, which is four intervals of size 2, not the number 4.

2. Its height is 20, four intervals of size 5. Therefore the observation is $(8, 20)$; count the scale values, not the tick positions.

Problem 3

1. The rises from input 0 through 4 are $1 - 0 = 1$, $4 - 1 = 3$, $9 - 4 = 5$, and $16 - 9 = 7$.

2. These systematic increasing rises show a clear curved pattern. Strength concerns how tightly points follow a pattern; it does not require the pattern to be a line.

Problem 4

1. The observed pairs include $(1, 4)$ and $(7, 16)$; larger inputs tend to have larger outputs, with a rise of $16 - 4 = 12$.

2. The plot shows paired observations only. It provides no controlled comparison, so positive association does not establish that changing x causes the change in y.

Problem 5

1. The smallest observed input is 2 and the largest is 6, so the measured range is $2 \leq x \leq 6$.

2. Since $9 > 6$, predicting at $x = 9$ extends beyond the data. That is extrapolation, which is less supported than prediction inside the observed range.

Problem 6

1. The plot includes both $(2, 4)$ and $(2, 10)$. They are two separate measurements at input 2, with outputs differing by $10 - 4 = 6$.

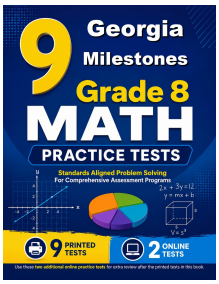
2. Connecting observations would add unmeasured values and would not remove the conflicting outputs. A scatter plot need not itself be a function of x.

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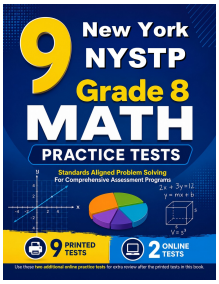
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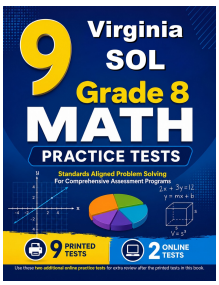
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