Scatter Plots and Patterns in Data

Apply the skill to decisions and designs

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

QUICK REVIEW

Use scatter plots to inspect paired data such as practice hours and scores. State what each axis measures, compare typical outcomes at low and high inputs, and identify unusual cases with coordinates. A prediction inside the observed input range is interpolation; outside it is extrapolation. An observed trend supports an estimate, not a guaranteed individual outcome or a causal conclusion.

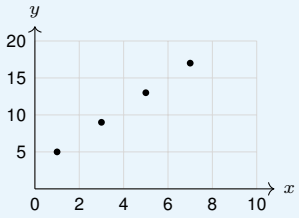
Worked example

Example for form 3: describe this trend.

1. Compare $(1, 5)$ and $(7, 17)$: 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.

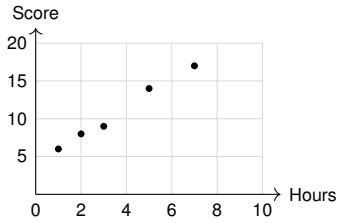
Answer: Positive, approximately linear association.



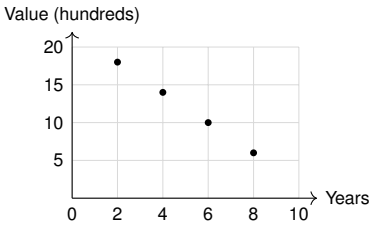
Practice Problems

Show your thinking.

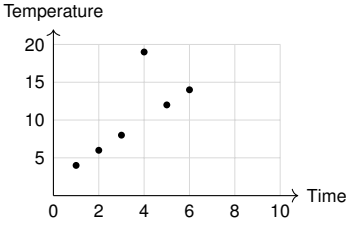
1. Practice time and score are plotted. Describe the association using the low and high observations.



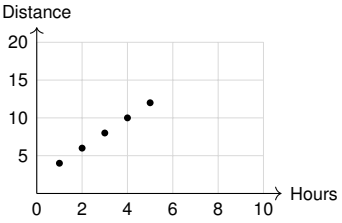
2. Age and resale value of bikes are plotted. Describe the direction and estimate the change between ages 2 and 8.



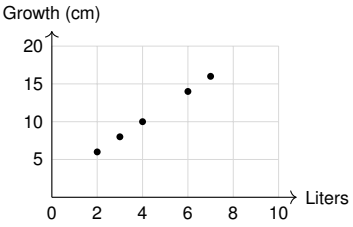
3. A sensor log mostly follows temperature=2(time)+2. Which reading should be checked as unusual?



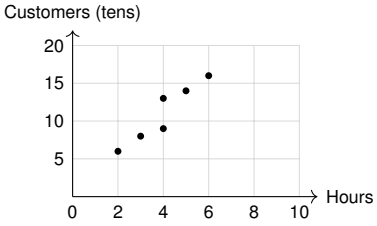
4. Design one additional point near the shown trend at input x=6. State why it fits.



5. A garden study plots water and growth. Is predicting at 5 liters interpolation? Is predicting at 9 liters?



6. Two stores record hours open and customers (tens). Read the two observations at 4 hours and explain the uncertainty of a prediction there.



Answer Key

1. Positive association: more practice tends to accompany a higher score.
2. Negative association; value falls by 12 hundred dollars.
3. At time 4, reading 19.
4. One answer: $(6, 14)$.
5. 5 liters: interpolation; 9 liters: extrapolation.
6. At 4 hours: 90 and 130 customers.

Step-by-Step Solutions

Follow each calculation, then check your own work.

Problem 1

1. At 1 hour the score is 6, while at 7 hours it is 17. The middle observations include scores 9 and 14 at 3 and 5 hours.

2. The generally rising values support positive association. They do not guarantee that every extra practice hour produces the same score increase for every student.

Problem 2

1. At age 2 the value is 18 hundred dollars; at age 8 it is 6 hundred dollars. Subtract $6 - 18 = -12$.

2. The negative change means a fall of 12 hundred dollars over six years. The other points also descend, supporting negative association.

Problem 3

1. The stated pattern predicts $2(4) + 2 = 10$ at time 4. The actual reading at that time is 19.

2. The discrepancy is $19 - 10 = 9$, while the other readings match the stated pattern. Check this unusual record rather than automatically deleting it.

Problem 4

1. The displayed outputs rise by 2 for each unit of input, following $y = 2x + 2$. At $x = 6$, this gives $2(6) + 2 = 14$.

2. An additional point $(6, 14)$ continues the central trend. A nearby value could also be reasonable because scatter-plot predictions need not be exact.

Problem 5

1. The observed water amounts range from 2 to 7 liters. The proposed input 5 lies between these endpoints: $2 < 5 < 7$.

2. Thus 5 liters is interpolation. Since $9 > 7$, the second prediction is extrapolation and extends beyond the water amounts actually studied.

Problem 6

1. The points at input 4 have outputs 9 and 13 tens of customers. Convert: $9(10) = 90$ and $13(10) = 130$.

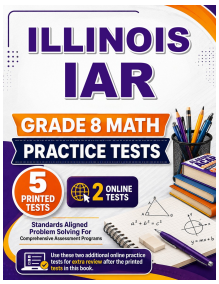
2. The same opening time has different observed customer counts. A trend-based prediction at four hours is an estimate, not a guaranteed count for each store.

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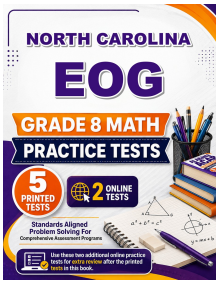
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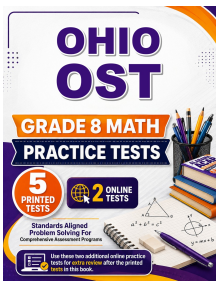
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