Sets & Steps
Math Practice & Worked Solutions

Algebra 1

Correlation vs Causation

Correlation vs Causation | A1-U10-P09

96 problems · Four activity formats

Topic focus

Across 96 tasks this topic asks for direction-by-direction timing assessment, comparative causal support and scoped conclusion, selected evidence with rival-specific predictions, classification with decisive language and scope, two explicit arrows and qualified rival explanation and evidence-limited rewrite and named overreach.

8 PDFs and a README; 57 buyer pages.

The following pages use the same questions, given data, and notation as the final files. Question/card serial numbers and internal IDs are omitted in this preview only. Table values and matching responses are retained. Full answer keys are not included.

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Name: _____ **Date:** _____ **Class:** _____

Answer each question and record the matching bank letter. Give exact values. Give the whole requested response, including any reasoning the question asks for.

Fictional study summary: In one sample, taller plants also had wider leaves. Statement: “Taller sampled plants tended to have wider leaves.” Classify the statement as descriptive association, prediction, or causation, and identify the exact words or logical move that determine the class. Do not add a mechanism. Bank label: _____	Fictional study summary: Two variables were observed at one time. Statement: “Increasing light causes leaf width to grow.” Classify the statement as descriptive association, prediction, or causation, and identify the exact words or logical move that determine the class. Focus on the verb. Bank label: _____
Fictional study summary: Fictional towns with more parks reported more walking. Statement: “Park count is associated with reported walking.” Classify the statement as descriptive association, prediction, or causation, and identify the exact words or logical move that determine the class. Classify. Bank label: _____	Fictional study summary: Students chose their own study times. Statement: “More study time leads to higher scores.” Classify the statement as descriptive association, prediction, or causation, and identify the exact words or logical move that determine the class. Classify logical content. Bank label: _____
Fictional study summary: A score is used to forecast a later fictional rating. Statement: “The first score helps predict the later rating.” Classify the statement as descriptive association, prediction, or causation, and identify the exact words or logical move that determine the class. Separate forecasting from intervention. Bank label: _____	Fictional study summary: Device settings and heat were merely recorded. Statement: “Turning the setting down reduces heat.” Classify the statement as descriptive association, prediction, or causation, and identify the exact words or logical move that determine the class. Classify. Bank label: _____
Fictional study summary: Two observed groups had different means. Statement: “Group A was higher on average than Group *B*.” Classify the statement as descriptive association, prediction, or causation, and identify the exact words or logical move that determine the class. Do not infer why. Bank label: _____	Fictional study summary: A fitted rule forecasts fictional sales from temperature. Statement: “If tomorrow is warmer, the model predicts more sales.” Classify the statement as descriptive association, prediction, or causation, and identify the exact words or logical move that determine the class. Classify model language. Bank label: _____

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Answer each question and show your reasoning in the workspace. Give exact values rather than decimals unless the question supplies a decimal. Give the whole requested response, including any reasoning the question asks for.

Fictional study summary: Users selected whether to enable a fictional filter. Statement: "The filter prevents errors." Classify the statement as descriptive association, prediction, or causation, and identify the exact words or logical move that determine the class. Classify.	Fictional study summary: Two trends rose over calendar time. Statement: "Trend X is responsible for Trend Y." Classify the statement as descriptive association, prediction, or causation, and identify the exact words or logical move that determine the class. Classify.
Fictional study summary: An observational chart is shown. Statement: "X explains the increase in Y." Classify the statement as descriptive association, prediction, or causation, and identify the exact words or logical move that determine the class. Interpret "explains" here.	Fictional study summary: Two fictional rates peak in the same weeks. Statement: "High X coincides with high Y." Classify the statement as descriptive association, prediction, or causation, and identify the exact words or logical move that determine the class. Classify.
Fictional study summary: Participants self-selected exposure. Statement: "Exposure raises the probability of outcome Y." Classify the statement as descriptive association, prediction, or causation, and identify the exact words or logical move that determine the class. Classify.	Fictional study summary: Two values are correlated. Statement: "Y is high because X is high." Classify the statement as descriptive association, prediction, or causation, and identify the exact words or logical move that determine the class. Classify.

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Begin at START. Answer the card, then find the matching final answer at the top of another card. Use the recording sheet for your reasoning. Visit each card once and continue to FINISH.

Incoming: common cause: job-role composition; path to x: place more technical roles in remote arrangements.; path to y: give those roles higher pay bands.; rival explanation: role mix can shift both department averages.; status: plausible alternative, not established fact

Observed fictional association: step count is negatively associated with resting pulse Supplied third factor: baseline health and mobility. Explain a coherent common-cause alternative by stating how the factor could affect each measured variable. Do not claim this alternative is proven. State why measuring health would help.

Your response: _____

Incoming: common cause: team size; path to x: require more storage capacity.; path to y: produce more files through more members.; rival explanation: team size can explain the association.; status: plausible alternative, not established fact

Observed fictional association: departments with more remote hours have higher mean pay Supplied third factor: job-role composition. Explain a coherent common-cause alternative by stating how the factor could affect each measured variable. Do not claim this alternative is proven. Explain aggregation.

Your response: _____

Incoming: common cause: storm severity; path to x: increase needed repairs and spending.; path to y: increase the number of claims.; rival explanation: storm severity can drive both totals.; status: plausible alternative, not established fact

Fictional evidence: Earlier X predicts later Y and earlier Y predicts later X in separate comparisons. Candidate directions are $X \to Y$ and $Y \to X$. Assess which directions the timing excludes, permits, or supports, while keeping possibility separate from proof. Avoid declaring feedback proved.

Your response: _____

Incoming: classification: descriptive association; decisive feature: "Scores were higher after the event" describes a before-after temporal pattern, without saying that the event caused the difference.; supported scope: Concurrent changes could explain the difference.

Observed fictional association: fictional children with greater height read more pages Supplied third factor: age. Explain a coherent common-cause alternative by stating how the factor could affect each measured variable. Do not claim this alternative is proven. Do not say height causes reading.

Your response: _____

Incoming: limitation: r does not summarize the curve.; overreach: Zero linear correlation is called no relationship.; rewrite: The sample has zero linear correlation but a visible U-shaped relationship.

Fictional study: In a fictional simulation, agents selecting option X had lower Y. Headline: "Option X cures high Y." Rewrite the headline to preserve the observed result while removing unsupported causation or universality. Name the specific limitation. Keep scenario fictional and neutral.

Your response: _____

Incoming: limitation: Sampling concerns representation, not isolation of the exposure effect. No outcome direction or size was supplied.; overreach: Random sampling is confused with random assignment.; rewrite: A random-sample observational study examines self-selected X and Y; it does not establish that X causes Y.

Fictional study: An assigned package changes X, resources, and schedule together. Headline: "X alone caused Y." Rewrite the headline using only the supplied design facts, removing the unsupported attribution to X alone. Name the specific component-scope limitation. No outcome result or control comparison is supplied.

Your response: _____

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Evaluate the supplied statement or method. Say whether it is correct, repair it if it is not, and verify the result exactly. Not every prompt contains an error.

Study A: participants chose condition X or control. Study B: participants were randomly assigned to X or control; procedures otherwise matched. Compare their support for the causal claim "X changes Y." by checking assignment, control, and concurrent differences. Choose stronger support.

Study A: a random sample chose its own condition. Study B: a convenience sample was randomly assigned to conditions. Compare their support for the causal claim "the condition causes Y in study participants." by checking assignment, control, and concurrent differences. Distinguish the two uses of random.

Study A: volunteers selected a high-effort program. Study B: eligible volunteers were randomly assigned high-effort or comparison conditions. Compare their support for the causal claim "the program raises scores." by checking assignment, control, and concurrent differences. Use motivation.

Study A: this year's X group is compared with last year's records. Study B: current X and control groups run simultaneously. Compare their support for the causal claim "X changes Y." by checking assignment, control, and concurrent differences. Use calendar effects.

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Full Worked Solutions - excerpt

Worked example

Problem. Fictional study: Observational $r = -0.80$. Headline: "More X prevents Y." Rewrite the headline to preserve the observed result while removing unsupported causation or universality. Name the specific limitation. Keep sign.

Answer. limitation: The design does not show that increasing X reduces Y.; overreach: Negative association is called prevention.; rewrite: Higher X was associated with lower Y in the sample.

Explanation and check.

Overreach: Negative association is called prevention. Rewrite: Higher X was associated with lower Y in the sample. Limitation: The design does not show that increasing X reduces Y.

Worked example

Problem. Fictional study summary: In one sample, taller plants also had wider leaves. Statement: "Taller sampled plants tended to have wider leaves." Classify the statement as descriptive association, prediction, or causation, and identify the exact words or logical move that determine the class. Do not add a mechanism.

Answer. classification: descriptive association; decisive feature: "Tended to" reports *co*-variation only.; supported scope: It is limited to the sampled plants.

Explanation and check.

descriptive association. "Tended to" reports *co*-variation only. It is limited to the sampled plants.