Cause or Coincidence?

Use study design to judge a claim.

S.DC.1.5 "Determine when a cause-and-effect inference can be drawn from an association, based on how the data were collected."

NAME _____ DATE _____

CAUSE SUPPORTED

When researchers randomly assign subjects to different treatments, a difference in outcomes can support a cause-and-effect conclusion for the subjects studied.

A lottery assigns seedlings to receive extra light or ordinary light. The extra-light seedlings grow taller.

CAUSE NOT ESTABLISHED

When subjects choose their own treatment, or researchers only observe existing groups, an association does not establish cause and effect. Randomly selecting subjects is not the same as randomly assigning treatments.

Customers who choose reusable bags spend more than customers who choose paper bags.

1 SORT

8 items

For each study, circle SUPPORTED or UNPROVEN, then choose two items and explain how the assignment method led to each choice.

1.	A coin flip assigns students to use flash cards or reread notes. Flash-card users score higher on a quiz.	SUPPORTED	UNPROVEN
2.	A lottery assigns runners to stretch or rest before a sprint. Stretchers finish faster.	SUPPORTED	UNPROVEN
3.	Students choose whether to drink coffee before a test. Coffee drinkers earn higher scores.	SUPPORTED	UNPROVEN
4.	Researchers randomly assign patients to receive a new bandage or a standard one. New-bandage patients heal faster.	SUPPORTED	UNPROVEN
5.	A survey finds that teens who play chess more often have higher math grades.	SUPPORTED	UNPROVEN
6.	A coach puts the fastest swimmers in extra practice. Those swimmers later win more races than others.	SUPPORTED	UNPROVEN
7.	A coin toss assigns workers to sit or stand at work. Standers report less back pain.	SUPPORTED	UNPROVEN
8.	Researchers randomly assign apartments to use one of two air filters. Residents using filter A report fewer allergy symptoms.	SUPPORTED	UNPROVEN

2 PROVE IT

Explain your thinking

Pick two items from Part 1. For each one, tell how you knew where it belonged.

ITEM # _____ **HOW I KNEW** _____

ITEM # _____ **HOW I KNEW** _____

3 MAKE YOUR OWN

One of each

Write one new study with a result that supports a cause-and-effect conclusion and one new study with a result that does not establish cause and effect.

SUPPORTED

UNPROVEN

CHALLENGE

A researcher randomly selects 100 students, then asks whether they own a pet and records their stress levels. Pet owners report less stress. Can the researcher conclude that owning a pet reduces stress? Explain how random selection differs from random assignment.

ANSWER KEY

Cause or Coincidence?

HIGH SCHOOL · S.DC.1.5

PART 1 · SORT

#	ITEM	CATEGORY	WHY
1	A coin flip assigns students to use flash cards or reread notes. Flash-card users score higher on a quiz.	**SUPPORTED**	A coin flip randomly assigned the study methods.
2	A lottery assigns runners to stretch or rest before a sprint. Stretchers finish faster.	**SUPPORTED**	A lottery randomly assigned the warm-up methods.
3	Students choose whether to drink coffee before a test. Coffee drinkers earn higher scores.	**UNPROVEN**	Students chose whether to drink coffee.
4	Researchers randomly assign patients to receive a new bandage or a standard one. New-bandage patients heal faster.	**SUPPORTED**	Researchers randomly assigned the bandages.
5	A survey finds that teens who play chess more often have higher math grades.	**UNPROVEN**	The survey observes an association without assigning chess play.
6	A coach puts the fastest swimmers in extra practice. Those swimmers later win more races than others.	**UNPROVEN**	The coach assigned practice based on swimming ability, not at random.
7	A coin toss assigns workers to sit or stand at work. Standers report less back pain.	**SUPPORTED**	A coin toss randomly assigned the work positions.
8	Researchers randomly assign apartments to use one of two air filters. Residents using filter A report fewer allergy symptoms.	**SUPPORTED**	Researchers randomly assigned the filters.

PART 2 · PROVE IT

Accept any explanation that names the deciding feature from the rule box for the chosen item.

PART 3 · MAKE YOUR OWN (SAMPLE ANSWERS)

- **SUPPORTED**: A random draw assigns volunteers to use a blue screen or a plain screen for a typing task. The blue-screen group types more words in five minutes.
- **UNPROVEN**: People who choose to bike to school arrive earlier than people who choose to walk.

Challenge: No. The researcher randomly selected students but did not randomly assign pet ownership, so other differences could explain the stress gap.

For Part 2, accept explanations that identify whether the treatment was randomly assigned. Random selection alone does not support a cause-and-effect conclusion.