LESSON MAKER PRO

Study Detective

Tell how data were collected and what the results can show.

HIGH SCHOOL · AII-S.IC.3

AII-S.IC.3 "Recognize the purposes of and differences among surveys, experiments, and observational studies. Explain how randomization relates to each."

NAME _____ DATE _____

CHOOSE THE RIGHT STUDY

A survey asks a sample questions to estimate what a population thinks or does. An experiment assigns treatments, so random assignment can support a cause-and-effect conclusion. An observational study records existing choices or traits, so it can show an association but not prove cause and effect.

WORKED EXAMPLE

A student council randomly assigns 18 volunteers to use either a new lunch-line app or the usual sign-in method. Identify the study type and explain the purpose of the random assignment.

1. The council chooses which method each volunteer uses.
2. Choosing treatments makes this an experiment.
3. Random assignment helps make the two groups similar on average.

Answer: Experiment. Random assignment supports a fair comparison of the two sign-in methods and can support a cause-and-effect conclusion for the volunteers.

PRACTICE 4 problems

1 A media club asks every club member which school event they like best. Identify the study type. Can the results represent the whole school? Explain.

ANSWER _____

2 A health class records each student's usual breakfast choice and first-period alertness. Identify the study type and state what it cannot prove.

ANSWER _____

3 Researchers randomly assign 24 students to watch either a review video or a nature video before a quiz. Identify the study type and explain why assignment matters.

ANSWER _____

4 In an observational study, what can be randomized to improve representation? What cannot be randomized?

ANSWER _____

APPLY IT Show your work

1 The student newspaper randomly selects 40 students and asks when they prefer school events. Use the table. The school has 600 students. Estimate how many students prefer after-school events. Name the study and explain why the random selection matters.

PREFERRED EVENT TIME

Time	Students
After school	28
Lunch	12

ANSWER _____

2 Thirty students agree to test a phone-free study routine. Researchers randomly assign 15 students to use the routine and 15 to use their usual routine. After one week, 12 phone-free students and 8 usual-routine students pass a quiz. Name the study. What conclusion is justified, and by how much did the pass rates differ?

WORK SPACE

ANSWER _____

CHALLENGE One step up

An app company wants to know whether using a focus timer causes higher homework completion for all juniors. It plans to compare juniors who already choose to use a timer with juniors who do not. Identify the planned study and its flaw. Then describe a better design that uses both kinds of randomization needed for the company's goal.

WORK SPACE AND ANSWER

ANSWER KEY # Study Detective

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	A media club asks every club member which school event they like best. Identify the study type. Can the results represent the whole school? Explain.	**Survey. No. Club members may not represent all students, and they were not randomly selected from the whole school.**
2	A health class records each student's usual breakfast choice and first-period alertness. Identify the study type and state what it cannot prove.	**Observational study. It cannot prove that breakfast choice caused the alertness level.**
3	Researchers randomly assign 24 students to watch either a review video or a nature video before a quiz. Identify the study type and explain why assignment matters.	**Experiment. Random assignment helps make the groups comparable, so score differences can be attributed to the review video.**
4	In an observational study, what can be randomized to improve representation? What cannot be randomized?	**The selection of participants can be randomized. The treatments or existing exposures cannot be assigned.**

PART 2 · APPLY IT

1. **420 students. This is a survey. Random selection makes the sample more likely to represent the school's students.** The sample proportion is 28/40 = 7/10. Multiply 7/10 by 600 to get 420.
2. **This is an experiment. The phone-free routine can be credited with a higher pass rate among these participants. The pass rates differed by 4/15, or 26 2/3 percentage points.** The pass rates are 12/15 and 8/15. Random assignment supports a causal comparison, and 12/15 - 8/15 = 4/15.

CHALLENGE

The planned study is observational. Students who choose timers may differ in other ways, so the comparison cannot prove that timers caused higher completion. Randomly select juniors from the school, then randomly assign the selected juniors to use a timer or not use one.

Accept equivalent descriptions of random selection as improving representativeness and random assignment as supporting causal conclusions. For the challenge, accept any design that randomly samples juniors and randomly assigns treatment conditions.