LESSON MAKER PRO

Who Can You Claim?

Calculate a difference, then check what the study design supports.

HIGH SCHOOL · A2S.DSP.F

A2S.DSP.F "The scope and validity of statistical inferences are dependent on the role of randomization in the study design."

NAME _____ DATE _____

TWO KINDS OF RANDOM

To compare two groups, subtract one group's success rate from the other's. Report the difference in percentage points. Random assignment supports a cause-and-effect claim, while random selection supports extending a result to the population that was sampled.

WORKED EXAMPLE

A school randomly selects 70 students and randomly assigns 35 to each puzzle-practice method. With the new method, 14 solve a puzzle. With the usual method, 7 solve it. Find the difference in success rates and state what conclusions the design supports.

1. New method: 14/35 = 40%.
2. Usual method: 7/35 = 20%.
3. Difference: 40% - 20% = 20 percentage points.
4. Random assignment supports a causal claim. Random selection supports extending the result to students at this school.

Answer: The new method's success rate is 20 percentage points higher. The design supports a causal claim about the method for students at this school.

PRACTICE 6 problems

1 A teacher randomly assigns 10 volunteers to try a study timer and 10 volunteers to study without it. Eight timer users and 5 other students finish a task. How many percentage points higher is the timer group's finish rate? Does the design support a causal claim for these volunteers?

ANSWER _____

2 A school randomly samples 24 students. Of the 12 who already listen to music while studying, 9 finish their homework. Of the 12 who do not, 6 finish it. How many percentage points higher is the music group's finish rate? Can this study show that music caused the difference?

ANSWER _____

3 Volunteers are randomly assigned to two ways of reviewing for a quiz. Use the table to find how many percentage points higher the flashcard group's pass rate is. Does the design support a causal claim for these volunteers?

QUIZ RESULTS

Review method	Passed	Total
Flashcards	9	10
Rereading	3	10

ANSWER _____

4 A school randomly samples 10 art club members and 10 robotics club members. Eight art club members and 3 robotics club members prefer a later start time. How many percentage points higher is the art club rate? Can the difference be extended to these two clubs?

ANSWER _____

5 A student asks the first 10 people at lunch table A and the first 10 at table B whether they bought a snack. Nine at table A and 6 at table B say yes. How many percentage points higher is table A's rate? Can the result be extended to all students at the school?

ANSWER _____

6 A school randomly selects 20 students, then randomly assigns 10 to use a video tutorial and 10 to use written instructions. Use the table to find how many percentage points higher the tutorial group's completion rate is. What do the two random steps allow the school to conclude?

TASK COMPLETION

Group	Completed	Total
Video tutorial	8	10
Written instructions	3	10

ANSWER _____

APPLY IT Show your work

1 A game club wants to know whether a short warm-up improves players' accuracy. It randomly assigns 16 volunteers to do the warm-up and 16 to skip it. Afterward, 12 in the warm-up group and 4 in the other group hit a target. Find the difference in hit rates. Does the result support a causal claim about the warm-up for all students at school, or only for the volunteers? Explain.

WORK SPACE

ANSWER _____

2 For a story about sleep, the school paper randomly selects 16 students who play a school sport and 16 who do not. Use the table to find how many percentage points higher the nonplayers' rested rate is. Can the paper claim that playing a sport causes students to feel less rested? Explain.

STUDENTS WHO FEEL RESTED

Group	Feel rested	Total
Play a school sport	8	16
Do not play a school sport	12	16

ANSWER _____

CHALLENGE One step up

Two studies report the results below for a homework app. In Study A, a school randomly selects 48 students. Of those selected, 24 already use the app and 24 do not. In Study B, 48 volunteers are randomly assigned to use or not use the app. Each study has the results in the table. Find the difference in homework completion rates. Then explain why the studies support different claims, even though their results match.

RESULTS IN EACH STUDY

Group	Completed homework	Total
App users	18	24
Nonusers	12	24

WORK SPACE AND ANSWER

Who Can You Claim?

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	A teacher randomly assigns 10 volunteers to try a study timer and 10 volunteers to study without it. Eight timer users and 5 other students finish a task. How many percentage points higher is the timer group's finish rate? Does the design support a causal claim for these volunteers?	**30 percentage points higher; yes, for the volunteers.**
2	A school randomly samples 24 students. Of the 12 who already listen to music while studying, 9 finish their homework. Of the 12 who do not, 6 finish it. How many percentage points higher is the music group's finish rate? Can this study show that music caused the difference?	**25 percentage points higher; no, students were not randomly assigned to study with music.**
3	Volunteers are randomly assigned to two ways of reviewing for a quiz. Use the table to find how many percentage points higher the flashcard group's pass rate is. Does the design support a causal claim for these volunteers?	**60 percentage points higher; yes, for the volunteers.**
4	A school randomly samples 10 art club members and 10 robotics club members. Eight art club members and 3 robotics club members prefer a later start time. How many percentage points higher is the art club rate? Can the difference be extended to these two clubs?	**50 percentage points higher; yes, it can be extended to the art club and robotics club at this school.**
5	A student asks the first 10 people at lunch table A and the first 10 at table B whether they bought a snack. Nine at table A and 6 at table B say yes. How many percentage points higher is table A's rate? Can the result be extended to all students at the school?	**30 percentage points higher; no, the students were not randomly selected from the school.**
6	A school randomly selects 20 students, then randomly assigns 10 to use a video tutorial and 10 to use written instructions. Use the table to find how many percentage points higher the tutorial group's completion rate is. What do the two random steps allow the school to conclude?	**50 percentage points higher. The design supports a causal claim about the tutorial for students at this school.**

PART 2 · APPLY IT

1. **The warm-up group's hit rate is 50 percentage points higher. The design supports a causal claim for the volunteers, but it does not support extending that claim to all students at school.** The rates are 12/16 = 75% and 4/16 = 25%, a difference of 50 percentage points. Random assignment supports a causal claim, but the volunteers were not randomly selected from the school.
2. **The nonplayers' rested rate is 25 percentage points higher. The paper cannot claim that playing a sport causes the difference because students were not randomly assigned to play.** The rates are 12/16 = 75% for nonplayers and 8/16 = 50% for players. Random selection supports extending the observed association to these two groups at the school, but not a causal claim.

CHALLENGE

In each study, the app group's completion rate is 25 percentage points higher: 18/24 = 75% and 12/24 = 50%. Study A supports extending an association to app users and nonusers at the school, but not a causal claim. Study B supports a causal claim for its volunteers, but not extending that claim to all students at the school.

Accept equivalent rate calculations and clear statements of the same inference limits. A difference in percentage points is not a percent increase.