LESSON MAKER PRO

Who Can You Trust?

Use percentages to judge survey and experiment claims.

HIGH SCHOOL · MT.PLUS.DATA.DES.2

MT.PLUS.DATA.DES.2 "Describe differences between randomly selecting samples and randomly assigning subjects to experimental treatment groups in terms of inferences drawn regarding a population versus regarding cause and effect by: Explaining the consequences..."

NAME _____ DATE _____

TWO KINDS OF RANDOM

A random sample helps you describe a population, but missing answers or biased questions can distort a survey result. Random assignment helps you test cause and effect because it makes other differences between groups less likely to explain the result. An experiment with volunteers does not automatically represent everyone.

WORKED EXAMPLE

A school randomly selects 90 students. Of those, 72 answer a survey, and 54 of the respondents favor a later start time. Find the response rate and the percent of respondents in favor. Why might that support percent misrepresent all students?

1. Response rate: 72/90 = 80%.
2. Percent in favor among respondents: 54/72 = 75%.
3. The 18 students who did not answer might have different opinions.

Answer: The response rate is 80%, and 75% of respondents favor a later start. Nonresponse could make that percentage unrepresentative of all students.

PRACTICE 6 problems

1 A school randomly selects 25 students for a survey. Only 10 answer. What is the response rate?

ANSWER _____

2 A student posts a poll on a gaming club page. Of 35 replies, 21 favor a school gaming tournament. What percent favor it? Name one reason this result may not represent all students.

ANSWER _____

3 Students choose whether to use a new study app. Use the table to find each group's improvement rate. Why can't the difference prove the app caused improvement?

STUDY APP AND QUIZ IMPROVEMENT

Choice	Students	Improved
Used app	20	12
Did not use app	10	4

ANSWER _____

4 Students volunteer for a study, then are randomly assigned to two study methods. Use the table to find the difference in improvement rates, in percentage points. Does the study support a causal claim for the volunteers, a claim about all students, or both?

RANDOMLY ASSIGNED STUDY METHODS

Method	Students	Improved
New	20	14
Usual	20	8

ANSWER _____

5 All 48 randomly selected students answer, “Don't you agree the lunch lines are too long?” Of those, 32 say yes. What percent say yes? What could bias this result?

ANSWER _____

6 To learn how all students travel to school, a school randomly selects 15 basketball team members. Of those, 9 say they bike. What percent of those selected bike? Does this sample represent all students?

ANSWER _____

APPLY IT Show your work

1 Students volunteer to test whether turning off phone notifications reduces distractions while doing homework. Researchers randomly assign them to the groups shown. Find the difference in the percent reporting fewer distractions, in percentage points. What can the study suggest about cause and effect, and can its result automatically apply to all students?

NOTIFICATION TRIAL

Notifications	Volunteers	Reported fewer distractions
Off	25	15
On	25	5

ANSWER _____

2 A student council randomly selects 100 students to ask whether the school dance should start earlier. Only 60 reply, and 42 of those favor an earlier start. What percent of respondents favor it? If every nonrespondent opposed it, what percent of the selected students would favor it? Explain why the respondent result might mislead the council.

WORK SPACE

ANSWER _____

CHALLENGE One step up

A school randomly selects 50 students to survey about a proposed club. Only 30 respond, and 21 of those favor the club. Find the lowest and highest possible percentages in favor among the 50 selected students. Explain why the percentage among respondents alone cannot settle whether most selected students favor the club.

WORK SPACE AND ANSWER

Who Can You Trust?

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	A school randomly selects 25 students for a survey. Only 10 answer. What is the response rate?	**40%**
2	A student posts a poll on a gaming club page. Of 35 replies, 21 favor a school gaming tournament. What percent favor it? Name one reason this result may not represent all students.	**60%; students who visit the gaming club page and choose to reply may be more interested in gaming than other students.**
3	Students choose whether to use a new study app. Use the table to find each group's improvement rate. Why can't the difference prove the app caused improvement?	**App users: 60%. Nonusers: 40%. Because students chose their groups, another difference, such as study habits, could explain the result.**
4	Students volunteer for a study, then are randomly assigned to two study methods. Use the table to find the difference in improvement rates, in percentage points. Does the study support a causal claim for the volunteers, a claim about all students, or both?	**The improvement rates are 70% and 40%, a difference of 30 percentage points. Random assignment supports a causal claim for the volunteers, but the volunteers may not represent all students.**
5	All 48 randomly selected students answer, "Don't you agree the lunch lines are too long?" Of those, 32 say yes. What percent say yes? What could bias this result?	**66 2/3% say yes. The leading wording could cause response bias.**
6	To learn how all students travel to school, a school randomly selects 15 basketball team members. Of those, 9 say they bike. What percent of those selected bike? Does this sample represent all students?	**60% bike. The sample may not represent all students because it excludes students who are not on the basketball team.**

PART 2 · APPLY IT

1. **The rates are 60% with notifications off and 20% with them on, a difference of 40 percentage points. Random assignment supports a causal explanation for the volunteers, but volunteers may not represent all students.** Compute 15/25 = 60% and 5/25 = 20%, then subtract. Distinguish random assignment from random selection.
2. **70% of respondents favor an earlier start. If every nonrespondent opposed it, 42% of the selected students would favor it. The students who did not reply could have different opinions from those who did.** Compute 42/60 = 70% and 42/100 = 42%. The gap shows how nonresponse could distort the reported support.

CHALLENGE

The lowest possible percentage is 21/50 = 42%, if no nonrespondents favor the club. The highest is 41/50 = 82%, if all 20 nonrespondents favor it. Because the range includes results below and above 50%, the respondent percentage cannot settle whether most selected students favor the club.

Accept equivalent fractions or decimals for percentages. For bias and inference explanations, accept specific alternatives that correctly distinguish random sampling, random assignment, and missing or influenced responses.