LESSON MAKER PRO

# Numbers That Matter

*Decide what a statistical result can support.*

**HIGH SCHOOL · S.IR.2**

**S.IR.2** "Evaluate practical implications of statistical significance or lack thereof. Develop and critique arguments for practical implications based on statistical significance..."

NAME _____ DATE _____

## SIGNIFICANT OR USEFUL?

Treat p < .05 as statistically significant. Subtract the percentages to find the difference in percentage points, then compare it with the stated goal for a useful difference. A significant association may have a lurking variable, while p >= .05 does not prove there is no difference.

## WORKED EXAMPLE

A school compared on-time arrivals at entrances with new and old signs. The result had p = .03. A useful difference is at least 11 percentage points. Is the difference statistically significant and useful?

### ON-TIME ARRIVALS

| Signs | Arrived on time |
|---|---|
| New | 74% |
| Old | 68% |

1. Subtract: 74% - 68% = 6 percentage points.
2. .03 < .05, so the difference is statistically significant.
3. 6 < 11, so it does not meet the goal for usefulness.

**Answer: Statistically significant, but not large enough to meet the stated goal.**

## PRACTICE 4 problems

**1** Music at lunch: 62% vs. 54%; p = .01. The goal is at least 5 percentage points. Find the difference. Is it significant and large enough?

**ANSWER** _____

**2** Optional review: 81% vs. 79%; p = .04. The goal is at least 4 percentage points. Is the difference significant and large enough?

**ANSWER** _____

**3** New bus schedule: 70% vs. 60%; p = .12. Find the difference. Does this result provide strong evidence of a difference?

**ANSWER** _____

**4** Sports club members passed a quiz at a rate of 65%, compared with 55% for nonmembers. Find the difference and name one possible lurking variable.

**ANSWER** _____

## APPLY IT Show your work

**1** Students chose whether to use a study app. The quiz results had p = .04. A useful difference is at least 5 percentage points. Find the difference, judge its significance and usefulness, and name one possible lurking variable.

**QUIZ RESULTS**

| Study app | Passed quiz |
|---|---|
| Used | 78% |
| Did not use | 70% |

**ANSWER** _____

**2** Students compared two routes to school. The on-time results had p = .08. A useful difference is at least 7 percentage points. Find the difference and explain what the result does not establish.

**ON-TIME ARRIVALS**

| Route | Arrived on time |
|---|---|
| Route A | 66% |
| Route B | 54% |

**ANSWER** _____

## CHALLENGE One step up

Students chose a quiz-prep plan. Compared with no plan, Plan A had a 3-percentage-point higher pass rate (p = .01); Plan B had an 8-percentage-point higher pass rate (p = .04). The goal is at least 5 points. Which plan meets both tests? Explain why these results alone cannot prove the plan caused the difference.

WORK SPACE AND ANSWER

# Numbers That Matter



## PART 1 · PRACTICE

| # | PROBLEM | ANSWER |
|---|---|---|
| 1 | Music at lunch: 62% vs. 54%; p = .01. The goal is at least 5 percentage points. Find the difference. Is it significant and large enough? | **8 percentage points; significant and large enough.** |
| 2 | Optional review: 81% vs. 79%; p = .04. The goal is at least 4 percentage points. Is the difference significant and large enough? | **Significant, but the 2-percentage-point difference is not large enough.** |
| 3 | New bus schedule: 70% vs. 60%; p = .12. Find the difference. Does this result provide strong evidence of a difference? | **10 percentage points; no, because p = .12 is not less than .05.** |
| 4 | Sports club members passed a quiz at a rate of 65%, compared with 55% for nonmembers. Find the difference and name one possible lurking variable. | **10 percentage points; family support could affect both club membership and quiz results.** |

## PART 2 · APPLY IT

1. **8 percentage points; statistically significant and large enough to meet the goal. Study time could be a lurking variable.** 78% - 70% = 8 percentage points, which meets the 5-point goal, and .04 < .05. Students who study more may be more likely to choose the app and pass the quiz.
2. **12 percentage points, which exceeds the goal. Since p = .08, the result does not establish a statistically significant difference; it also does not prove the routes are equally reliable.** 66% - 54% = 12 percentage points, but .08 is not less than .05. A large observed difference can still lack strong statistical evidence.

## CHALLENGE

**Plan B meets both tests: 8 is at least 5, and .04 < .05. Plan A is significant but misses the 5-point goal. Students who chose Plan B may also have spent more time studying, so the results alone do not show that the plan caused the higher pass rate.**

Accept any plausible lurking variable that could affect both the group a student joins and the outcome. In the challenge, accept other valid reasons why a comparison of self-selected groups cannot establish cause.