LESSON MAKER PRO

# Signal or Chance?

*Compare sample gaps with their standard errors.*

**HIGH SCHOOL · S.IR.1.1**

**S.IR.1.1** "Recognize when the difference between two sample proportions or two sample means is due to random variation or if the difference is statistically significant."

NAME _____ DATE _____

## THE TWO-SE RULE

First, find the absolute difference between the two sample results. If that difference is at least twice its given standard error (SE), treat it as statistically significant. A smaller difference could be due to random sampling variation.

## WORKED EXAMPLE

Random samples from two clubs voted on an event. The SE of the difference is 5 percentage points. Is the gap significant?

**STUDENTS VOTING YES**

| Club | Sample rate |
|---|---|
| Drama | 64% |
| Debate | 50% |

1. Find the gap: 64% - 50% = 14 percentage points.
2. Double the SE: 2 × 5 = 10 percentage points.
3. Compare: 14 is greater than 10.

**Answer: Yes, the difference is statistically significant.**

## PRACTICE 4 problems

**1** Sample rates are 58% and 46%. SE = 4 percentage points. Find the gap and decide if it is significant.

**ANSWER** _____

**2** Sample rates are 41% and 35%. SE = 4 percentage points. Find the gap and decide if it is significant.

**ANSWER** _____

**3** Sample means are 18 and 24 minutes. SE = 4 minutes. Find the gap and decide if it is significant.

**ANSWER** _____

**4** Sample means are 31 and 21 points. SE = 3 points. Find the gap and decide if it is significant.

**ANSWER** _____

## APPLY IT Show your work

**1** Random samples at two schools found that 72% and 60% of students want a longer lunch. The SE of the difference is 4 percentage points. Is the difference significant?

WORK SPACE

**ANSWER** _____

**2** Two random samples of teens reported mean daily video times of 126 and 120 minutes. The SE of the difference is 4 minutes. Is the difference significant?

WORK SPACE

**ANSWER** _____

## CHALLENGE One step up

Two schools sampled students about app notifications. At which school is the difference between apps significant? Explain using both SE values.

**STUDENTS WHO TURN ON NOTIFICATIONS**

| School | App A | App B | SE (pp) |
|---|---|---|---|
| North | 68% | 59% | 3 |
| South | 76% | 67% | 6 |

WORK SPACE AND ANSWER

# Signal or Chance?



## PART 1 · PRACTICE

| # | PROBLEM | ANSWER |
|---|---|---|
| 1 | Sample rates are 58% and 46%. SE = 4 percentage points. Find the gap and decide if it is significant. | **12 percentage points; significant.** |
| 2 | Sample rates are 41% and 35%. SE = 4 percentage points. Find the gap and decide if it is significant. | **6 percentage points; not significant.** |
| 3 | Sample means are 18 and 24 minutes. SE = 4 minutes. Find the gap and decide if it is significant. | **6 minutes; not significant.** |
| 4 | Sample means are 31 and 21 points. SE = 3 points. Find the gap and decide if it is significant. | **10 points; significant.** |

## PART 2 · APPLY IT

1. **Yes, the difference is statistically significant.** The gap is 12 percentage points, which exceeds 2 × 4 = 8 percentage points.
2. **No, the difference is not statistically significant.** The gap is 6 minutes, which is less than 2 × 4 = 8 minutes.

## CHALLENGE

**North only. Both gaps are 9 percentage points. At North, 9 is greater than 2 × 3 = 6; at South, 9 is less than 2 × 6 = 12.**

Accept equivalent wording for significant and not significant. A result that is not significant does not establish that the groups have identical population values.