LESSON MAKER PRO

What Changed?

Compare means from randomized experiments

HIGH SCHOOL · MT.PLUS.DATA.INF.3.a

MT.PLUS.DATA.INF.3.a "Use data from a randomized experiment to test the hypothesis that two groups are equal by: Interpreting the difference or ratio between the group means as the observed effect between the groups, and"

NAME _____ DATE _____

OBSERVED EFFECTS

To compare two randomized groups, subtract their means for an observed difference or divide their means for an observed ratio. State what the result means in context. A difference other than 0 or a ratio other than 1 does not, by itself, prove a true effect.

WORKED EXAMPLE

Students are randomly assigned to two flashcard formats. Find the observed difference and ratio of the mean quiz scores, using new cards minus or divided by standard cards.

MEAN QUIZ SCORES

Group	Mean score
New cards	18
Standard cards	12

1. Difference: 18 - 12 = 6 points.
2. Ratio: 18/12 = 3/2.

Answer: The new-card group averaged 6 points more, or 3/2 times the standard-card group's mean.

PRACTICE 4 problems

1 Random groups using a review app and no app averaged 15 and 11 quiz points. Find and interpret app minus no app.

ANSWER _____

2 Random groups studying with music and silence averaged 20 and 16 correct answers. Find and interpret music/silence.

ANSWER _____

3 Random groups using a timer and no timer averaged 8 and 13 minutes to finish a task. Find and interpret timer minus no timer.

ANSWER _____

4 Random groups using a video lesson and a text lesson averaged 9 and 3 correct answers. Find and interpret video/text.

ANSWER _____

APPLY IT Show your work

1 Students were randomly assigned to use a sleep-planning app or not use it. Find the observed difference in mean hours of sleep, app minus no app, and interpret it.

MEAN SLEEP PER NIGHT

Group	Hours
App	7
No app	5

ANSWER _____

2 Students were randomly assigned a new study method or a standard method. Their mean test scores were 28 and 21 points, respectively. Find and interpret the new/standard ratio.

WORK SPACE

ANSWER _____

CHALLENGE One step up

Students were randomly assigned one of two focus routines or no routine. Which routine shows the larger observed reduction in time? Calculate both differences from control. Does this alone prove a true effect?

MEAN TIME TO FINISH

Group	Minutes
No routine	25
Routine A	20
Routine B	15

WORK SPACE AND ANSWER

ANSWER KEY # What Changed?

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Random groups using a review app and no app averaged 15 and 11 quiz points. Find and interpret app minus no app.	**15 - 11 = 4 points. The app group averaged 4 points more.**
2	Random groups studying with music and silence averaged 20 and 16 correct answers. Find and interpret music/silence.	**20/16 = 5/4. The music group's mean was 5/4 times the silence group's mean.**
3	Random groups using a timer and no timer averaged 8 and 13 minutes to finish a task. Find and interpret timer minus no timer.	**8 - 13 = -5 minutes. The timer group averaged 5 minutes less.**
4	Random groups using a video lesson and a text lesson averaged 9 and 3 correct answers. Find and interpret video/text.	**9/3 = 3. The video group's mean was 3 times the text group's mean.**

PART 2 · APPLY IT

1. **7 - 5 = 2 hours. The app group averaged 2 more hours of sleep per night.** Subtract the no-app mean from the app mean, then state the difference in hours per night.
2. **28/21 = 4/3. The new-method group's mean score was 4/3 times the standard-method group's mean.** Divide the new-method mean by the standard-method mean and simplify.

CHALLENGE

Routine A averaged 25 - 20 = 5 minutes less than control, and routine B averaged 25 - 15 = 10 minutes less, so B shows the larger observed reduction. These differences alone do not prove a true effect.

Accept equivalent ratios and signed differences when the subtraction order is clear. Interpretations must name the groups and the direction of the effect.