LESSON MAKER PRO

Correlation Clues

Use spreadsheet results to measure linear association.

HIGH SCHOOL · S.DA.4.4

S.DA.4.4 "Using technology, compute and interpret the correlation coefficient."

NAME _____ DATE _____

FROM SPREADSHEET TO R

A spreadsheet can calculate Sxx, Syy, and Sxy from paired data. Find the correlation coefficient with r = Sxy / √(Sxx × Syy). A positive r means the variables tend to increase together, while a negative r means one tends to decrease as the other increases. Values closer to 1 or -1 show a stronger linear association.

WORKED EXAMPLE

A spreadsheet reports Sxx = 49, Syy = 64, and Sxy = 28. Find r and state its direction.

1. Substitute: r = 28 / √(49 × 64).
2. Multiply: 49 × 64 = 3136.
3. Simplify: √3136 = 56, so r = 28/56 = 1/2.

Answer: r = 1/2. The linear association is positive.

PRACTICE 6 problems

1 A spreadsheet reports Sxx = 4, Syy = 9, and Sxy = 6. Find r.

ANSWER _____

2 A spreadsheet reports Sxx = 9, Syy = 16, and Sxy = -12. Find r.

ANSWER _____

3 A spreadsheet reports Sxx = 16, Syy = 9, and Sxy = 0. Find r and interpret what it says about a linear association.

ANSWER _____

4 A spreadsheet reports Sxx = 16, Syy = 16, and Sxy = 12. Find r.

ANSWER _____

5 A spreadsheet reports Sxx = 100, Syy = 100, and Sxy = -80. Find r and state its direction.

ANSWER _____

6 The table shows spreadsheet results for two data sets. Find r for each set. Which has the stronger linear association?

SPREADSHEET RESULTS

Data set	Sxx	Syy	Sxy
A	4	4	3
B	9	9	-6

ANSWER _____

APPLY IT Show your work

1 Five students recorded their daily screen time and hours of sleep. A spreadsheet reports Sxx = 10, Syy = 10, and Sxy = -7. Find r. What does its sign suggest about screen time and sleep in this group?

SCREEN TIME AND SLEEP

Student	Screen time (hours)	Sleep (hours)
A	1	8
B	2	7
C	3	9
D	4	6
E	5	5

ANSWER _____

2 Five players tracked their daily practice time and scores on a game challenge. A spreadsheet reports Sxx = 1000, Syy = 10, and Sxy = 60. Find r and interpret its direction.

PRACTICE TIME AND GAME SCORES

Player	Practice (minutes)	Score
A	10	7
B	20	8
C	30	6
D	40	10
E	50	9

ANSWER _____

CHALLENGE One step up

A student changes the x-values in a data set from hours to minutes. The table shows the spreadsheet results before and after the change. Find r both ways. Did the linear association get stronger? Explain.

RESULTS IN TWO UNITS

Unit for x	Sxx	Syy	Sxy
Hours	9	9	6
Minutes	32400	9	360

WORK SPACE AND ANSWER

Correlation Clues

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	A spreadsheet reports Sxx = 4, Syy = 9, and Sxy = 6. Find r.	**r = 1**
2	A spreadsheet reports Sxx = 9, Syy = 16, and Sxy = -12. Find r.	**r = -1**
3	A spreadsheet reports Sxx = 16, Syy = 9, and Sxy = 0. Find r and interpret what it says about a linear association.	**r = 0. There is no linear association.**
4	A spreadsheet reports Sxx = 16, Syy = 16, and Sxy = 12. Find r.	**r = 3/4**
5	A spreadsheet reports Sxx = 100, Syy = 100, and Sxy = -80. Find r and state its direction.	**r = -4/5. The linear association is negative.**
6	The table shows spreadsheet results for two data sets. Find r for each set. Which has the stronger linear association?	**A: r = 3/4. B: r = -2/3. A has the stronger linear association because 3/4 > 2/3.**

PART 2 · APPLY IT

1. **r = -7/10. In this group, more screen time tends to go with less sleep.** Use the spreadsheet results: r = -7 / √(10 × 10) = -7/10. The negative sign gives the direction.
2. **r = 3/5. In this group, more practice time tends to go with a higher score.** Calculate r = 60 / √(1000 × 10) = 60/100 = 3/5. Its positive sign shows the direction.

CHALLENGE

Hours: r = 6 / √(9 × 9) = 2/3. Minutes: r = 360 / √(32400 × 9) = 360/540 = 2/3. The association did not get stronger. Changing the unit changed the spreadsheet values but not r.

Accept equivalent fractions or exact decimals. For interpretations, accept wording that describes a tendency rather than claiming one variable causes the other.