LESSON MAKER PRO

Connected or Coincidence?

Use two-way tables to compare probabilities.

HIGH SCHOOL · MT.CORE.DATA.PROB.2

MT.CORE.DATA.PROB.2 "Understand the concepts of conditional probability and independence in context. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities by: Determining whether two events, A and B..."

NAME _____ DATE _____

THE BIG IDEA

To find P(A|B), look only at the people in group B. Divide the number who are in both A and B by the total in B. If P(A|B) equals P(A), the events are independent.

WORKED EXAMPLE

At a school movie night, A means a student chose popcorn and B means the student sat in front. Find P(A|B). Are A and B independent?

SCHOOL MOVIE NIGHT

	Front (B)	Other seats	Total
Popcorn (A)	17	34	51
No popcorn	23	46	69
Total	40	80	120

1. Of the 40 students in front, 17 chose popcorn.
2. P(A|B) = 17/40.
3. Of all 120 students, 51 chose popcorn, so P(A) = 51/120 = 17/40.
4. The probabilities match, so A and B are independent.

Answer: P(A|B) = 17/40. Choosing popcorn and sitting in front are independent in this group.

PRACTICE 6 problems

1 At a maker fair, A means a student got a sticker and B means the student tried coding. Find P(A|B).

MAKER FAIR

	Tried coding (B)	Did not try coding
Sticker (A)	6	4
No sticker	2	8

ANSWER _____

2 At a school dance, A means a student voted on the playlist and B means the student requested a song. Find P(did not vote | requested a song).

SCHOOL DANCE

	Requested a song (B)	Did not request
Voted (A)	4	6
Did not vote	6	4

ANSWER _____

3 At a school event, A means a student brought a reusable bottle and B means the student rode a bike. Find P(B|A).

TRAVEL AND BOTTLES

	Rode a bike (B)	Other travel
Brought a bottle (A)	2	8
Did not bring one	6	4

ANSWER _____

4 A means a student joined the art club and B means the student walked to school. Are A and B independent? Compare P(A|B) with P(A).

ART CLUB AND TRAVEL

	Walked (B)	Other travel
Art club (A)	2	6
Not art club	3	9

ANSWER _____

5 A means a student downloaded an event app and B means the student attended a game. Are A and B independent? Compare P(A|B) with P(A).

GAME AND EVENT APP

	Attended (B)	Did not attend
Downloaded app (A)	9	3
Did not download	3	5

ANSWER _____

6 A means a student signed up to paint a mural and B means the student chose a morning shift. Find P(A|B), then decide whether A and B are independent.

MURAL SIGN-UPS

	Morning (B)	Afternoon
Signed up (A)	1	4
Did not sign up	3	2

ANSWER _____

APPLY IT Show your work

1 At a school showcase featuring work by Montana Indigenous artists, students could watch an artist interview and join an art discussion. If a student watched the interview, what is the probability they joined the discussion? Explain what your answer means for these students.

ART SHOWCASE

	Watched interview	Did not watch
Joined discussion	15	9
Did not join	5	11

ANSWER _____

2 At a Montana school fundraiser supporting a community-led Indigenous language class, student volunteers made digital or paper posters and chose a setup or cleanup shift. Find P(digital poster | setup shift). Is making a digital poster independent of choosing a setup shift? Explain in context.

FUNDRAISER VOLUNTEERS

	Setup shift	Cleanup shift
Digital poster	14	6
Paper poster	7	3

ANSWER _____

CHALLENGE One step up

In this table, A means a student joined a film club and B means the student entered a video contest. Find the nonnegative whole number x that makes A and B independent. Explain using P(A|B) and P(A).

FILM CLUB AND CONTEST

	Entered contest (B)	Did not enter
Film club (A)	6	4
Not film club	x	8

WORK SPACE AND ANSWER

Connected or Coincidence?

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	At a maker fair, A means a student got a sticker and B means the student tried coding. Find P(A|B).	**3/4**
2	At a school dance, A means a student voted on the playlist and B means the student requested a song. Find P(did not vote | requested a song).	**3/5**
3	At a school event, A means a student brought a reusable bottle and B means the student rode a bike. Find P(B|A).	**1/5**
4	A means a student joined the art club and B means the student walked to school. Are A and B independent? Compare P(A|B) with P(A).	**Yes. P(A|B) = 2/5 and P(A) = 8/20 = 2/5.**
5	A means a student downloaded an event app and B means the student attended a game. Are A and B independent? Compare P(A|B) with P(A).	**No. P(A|B) = 9/12 = 3/4, but P(A) = 12/20 = 3/5.**
6	A means a student signed up to paint a mural and B means the student chose a morning shift. Find P(A|B), then decide whether A and B are independent.	**P(A|B) = 1/4. No, they are not independent because P(A) = 5/10 = 1/2.**

PART 2 · APPLY IT

1. **3/4. Of the students who watched the interview, 3 out of every 4 joined the discussion.** Use the 20 students who watched the interview as the group. Of those students, 15 joined the discussion, so the probability is 15/20 = 3/4.
2. **P(digital poster | setup shift) = 2/3. The choices are independent in this group because 2/3 of setup volunteers made digital posters, the same fraction as among all volunteers.** There are 21 setup volunteers, so the conditional probability is 14/21 = 2/3. Overall, 20 of 30 volunteers made digital posters, and 20/30 = 2/3.

CHALLENGE

x = 12. Then P(A|B) = 6/18 = 1/3 and P(A) = 10/30 = 1/3, so A and B are independent.

Accept equivalent fractions and clear statements that compare the correct conditional probability with the overall probability. For the challenge, x = 12 is the only nonnegative whole-number solution.