

Table Talk

Use two-way tables to find conditional probabilities and test independence.

HIGH SCHOOL • HSS-CP.A.4

CCSS.Math.Content.HSS-CP.A.4 "Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the two-way table as a sample space to decide if events are independent and to approximate conditional..."

NAME _____

DATE _____

READ WITHIN A GROUP

For $P(A | B)$, use only the B group as the total. Events are independent when $P(A | B)$ equals $P(A)$, as long as the B group is not empty.

WORKED EXAMPLE

Music | Sport | Total Group A: 21 | 11 | 32 Group B: 8 | 14 | 22 Total: 29 | 25 | 54 Find $P(\text{Music} | \text{Group A})$. Are music choice and group independent?

1. Use the Group A total, 32.
2. $P(\text{Music} | \text{Group A}) = 21/32$.
3. Compare $21/32$ with $P(\text{Music}) = 29/54$.

Answer: 21/32; no, the events are not independent.

PRACTICE 5 problems

- 1** Passed | Not Passed | Total Online: 16 | 4 | 20 In Person: 10 | 5 | 15 Total: 26 | 9 | 35 Find $P(\text{Passed} | \text{Online})$.

ANSWER _____

- 2** Streams | Music Only | Total Athletes: 15 | 5 | 20 Not Athletes: 13 | 7 | 20 Total: 28 | 12 | 40 Are streaming and being an athlete independent?

ANSWER _____

- 3** Thirty students were surveyed. There are 17 juniors and 13 seniors. Seven juniors and 10 seniors ride the bus. Complete the table.

ANSWER _____

- 4** Art | Theater | Total Morning: 9 | 6 | 15 Afternoon: 3 | 12 | 15 Total: 12 | 18 | 30 Find $P(\text{Afternoon} | \text{Theater})$.

ANSWER _____

- 5** In a two-way table, $P(A) = 2/5$ and $P(A | B) = 2/5$. The B group is not empty. Are A and B independent?

ANSWER _____

APPLY IT Show your work

- 1** A commute survey includes 58 students. Eighteen have a part-time job and 40 do not. Of students with jobs, 12 use public transit. Of students without jobs, 16 use public transit. Construct a table and find $P(\text{Job} \mid \text{Public Transit})$.

WORK SPACE

ANSWER _____

- 2** Of 60 students, 24 follow esports and 36 do not. Eighteen students who follow esports watch live streams, and 12 students who do not follow esports watch live streams. Find $P(\text{Follows Esports} \mid \text{Watches Live Streams})$. Then decide whether following esports and watching live streams are independent.

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

At a music festival, 72 students attend. Thirty are seniors. Of the seniors, 18 choose the concert stage. Of the non-seniors, 24 choose the concert stage. Construct a two-way table. Are grade level and concert-stage choice independent? Explain with probabilities.

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	Passed Not Passed Total Online: 16 4 20 In Person: 10 5 15 Total: 26 9 35 Find $P(\text{Passed} \text{Online})$.	4/5
2	Streams Music Only Total Athletes: 15 5 20 Not Athletes: 13 7 20 Total: 28 12 40 Are streaming and being an athlete independent?	No; $P(\text{Streams} \text{Athlete}) = 3/4$, but $P(\text{Streams}) = 7/10$.
3	Thirty students were surveyed. There are 17 juniors and 13 seniors. Seven juniors and 10 seniors ride the bus. Complete the table.	Bus Not Bus Total Juniors: 7 10 17 Seniors: 10 3 13 Total: 17 13 30
4	Art Theater Total Morning: 9 6 15 Afternoon: 3 12 15 Total: 12 18 30 Find $P(\text{Afternoon} \text{Theater})$.	2/3
5	In a two-way table, $P(A) = 2/5$ and $P(A B) = 2/5$. The B group is not empty. Are A and B independent?	Yes.

PART 2 • APPLY IT

- Transit | Other | Total Job: 12 | 6 | 18 No Job: 16 | 24 | 40 Total: 28 | 30 | 58 $P(\text{Job} | \text{Public Transit}) = 3/7$.** Use the 28 students who use public transit as the conditional total. Twelve of those students have jobs.
- $P(\text{Follows Esports} | \text{Watches Live Streams}) = 3/5$; not independent.** There are 30 live-stream viewers, and 18 follow esports, so the conditional probability is $18/30$. Also, $P(\text{Watches} | \text{Follows}) = 18/24 = 3/4$, while $P(\text{Watches}) = 30/60 = 1/2$.

CHALLENGE

Concert | Other Stage | Total Seniors: 18 | 12 | 30 Non-Seniors: 24 | 18 | 42 Total: 42 | 30 | 72 Not independent, because $P(\text{Concert} | \text{Senior}) = 3/5$ and $P(\text{Concert}) = 7/12$.

Accept equivalent fractions. For independence explanations, accept any correct comparison of a conditional probability to the matching overall probability.