LESSON MAKER PRO

Probability Connections

Use conditional probability and independence to analyze events.

HIGH SCHOOL · HSS-CP.A

CCSS.Math.Content.HSS-CP.A "Understand independence and conditional probability and use them to interpret data"

NAME _____ DATE _____

THE BIG IDEA

Conditional probability changes the total to match the event after the word "given." Use P(A | B) = P(A and B) / P(B). Events A and B are independent when P(A and B) = P(A) x P(B), so knowing one event happened does not change the probability of the other.

WORKED EXAMPLE

In a survey, 26 students are in the photography club, and 11 of them also write for the school paper. Find P(write for paper | photography club).

1. The given event is being in photography club, so the total is 26.
2. There are 11 students who write for the paper and are in photography club.
3. P(write for paper | photography club) = 11/26.

Answer: 11/26

PRACTICE 6 problems

1 Events A and B are independent. If P(A) = 4/9 and P(B) = 5/8, find P(A and B).

ANSWER _____

2 In a group of 36 students, 9 wear glasses. Of the students who wear glasses, 6 play soccer. Find P(play soccer | wear glasses).

ANSWER _____

3 Events U and V have P(U) = 2/3, P(V) = 3/10, and P(U and V) = 1/5. Are U and V independent?

ANSWER _____

4 In a group of 25 students, 10 take art. Of those students, 4 also take drama. Find P(drama | art).

ANSWER _____

5 Events M and N have P(M) = 1/2, P(N) = 2/7, and P(M and N) = 1/8. Are M and N independent?

ANSWER _____

6 If P(A and B) = 7/18 and P(B) = 7/9, find P(A | B).

ANSWER _____

APPLY IT Show your work

1 A gaming club has 45 members. Twenty members play strategy games, 15 members stream games, and 8 members do both. If a randomly selected member is known to stream games, what is the probability that the member plays strategy games?

WORK SPACE

ANSWER _____

2 At a school basketball game, 50 student fans are surveyed. Thirty are in the spirit club, 20 bought a snack, and 12 are in the spirit club and bought a snack. Are being in the spirit club and buying a snack independent? Explain using probabilities.

WORK SPACE

ANSWER _____

CHALLENGE One step up

At a school, 60 students are surveyed. Twenty-four students are in film club, and 15 students have part-time jobs. Let x be the number of students who are in film club and have part-time jobs. What value of x would make these events independent? Explain your reasoning.

WORK SPACE AND ANSWER

ANSWER KEY

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Events A and B are independent. If P(A) = 4/9 and P(B) = 5/8, find P(A and B).	**5/18**
2	In a group of 36 students, 9 wear glasses. Of the students who wear glasses, 6 play soccer. Find P(play soccer | wear glasses).	**2/3**
3	Events U and V have P(U) = 2/3, P(V) = 3/10, and P(U and V) = 1/5. Are U and V independent?	**Yes, because (2/3) x (3/10) = 1/5 = P(U and V).**
4	In a group of 25 students, 10 take art. Of those students, 4 also take drama. Find P(drama | art).	**2/5**
5	Events M and N have P(M) = 1/2, P(N) = 2/7, and P(M and N) = 1/8. Are M and N independent?	**No, because (1/2) x (2/7) = 1/7, which is not 1/8.**
6	If P(A and B) = 7/18 and P(B) = 7/9, find P(A | B).	**1/2**

PART 2 · APPLY IT

1. **8/15** Use the 15 members who stream games as the conditional total. Of those members, 8 also play strategy games, so P(strategy | stream) = 8/15.
2. **Yes.** P(spirit club) x P(snack) = (30/50) x (20/50) = 6/25, and P(spirit club and snack) = 12/50 = 6/25. Compare the product of the individual probabilities with the intersection probability. Since both equal 6/25, the events are independent.

CHALLENGE

x = 6, because P(film club) x P(part-time job) = (24/60) x (15/60) = 1/10. Therefore P(film club and part-time job) must be 1/10, so x/60 = 1/10 and x = 6.

Accept equivalent fractions in simplified or unsimplified form. For independence questions, accept any correct comparison showing that P(A and B) does or does not equal P(A) x P(B).