LESSON MAKER PRO

Probability Focus

Use conditions to narrow the sample space.

HIGH SCHOOL · HSS-CP.A.3

CCSS.Math.Content.HSS-CP.A.3 "Understand the conditional probability of A given B as P (A and B)/ P (B), and interpret independence of A and B as saying that the conditional probability of A given B is the same as the probability of A..."

NAME _____ DATE _____

CONDITIONAL PROBABILITY

When you find P(A given B), look only at outcomes in B. Use P(A given B) = P(A and B) / P(B), as long as P(B) is not zero. Events are independent when knowing one event happened does not change the probability of the other event.

WORKED EXAMPLE

In a student club with 77 members, 49 members take photos for the club website. Of those members, 28 also write articles. Find P(writes articles given takes photos).

1. Let A = writes articles and P = takes photos.
2. P(A given P) = P(A and P) / P(P) = (28/77) / (49/77).
3. (28/77) / (49/77) = 28/49.
4. 28/49 = 4/7.

Answer: 4/7

PRACTICE 6 problems

1 Eighteen students take art. Six of those students also take coding. Find P(coding given art).

ANSWER _____

2 P(A and B) = 5/18 and P(B) = 5/6. Find P(A given B).

ANSWER _____

3 P(M) = 2/9 and P(M given N) = 2/9. Are M and N independent?

ANSWER _____

4 P(A) = 5/12 and P(A given B) = 1/3. Are A and B independent?

ANSWER _____

5 P(G) = 3/5, P(H) = 1/2, and P(G and H) = 3/10. Are G and H independent? Show a conditional probability comparison.

ANSWER _____

6 Events J and K are independent. If P(K) = 3/8, find P(K given J).

ANSWER _____

APPLY IT Show your work

1 At a school esports event, 30 students compete in a tournament. Six of the competitors also host part of the livestream. If one competitor is chosen at random, find P(hosts the livestream given competes).

WORK SPACE

ANSWER _____

2 A survey of 48 students shows that 16 use a study playlist while doing homework. Of the 24 students who play a sport after school, 8 use a study playlist while doing homework. Are using a study playlist and playing a sport after school independent?

WORK SPACE

ANSWER _____

CHALLENGE One step up

A survey of 90 students found that 30 ride public transit to school and 27 listen to podcasts on the way to school. Let x be the number who do both. If the two events are independent, find x. Then calculate P(podcasts given transit) and P(transit given podcasts) to verify independence.

WORK SPACE AND ANSWER

Probability Focus

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Eighteen students take art. Six of those students also take coding. Find P(coding given art).	**1/3**
2	P(A and B) = 5/18 and P(B) = 5/6. Find P(A given B).	**1/3**
3	P(M) = 2/9 and P(M given N) = 2/9. Are M and N independent?	**Yes, M and N are independent.**
4	P(A) = 5/12 and P(A given B) = 1/3. Are A and B independent?	**No, A and B are not independent.**
5	P(G) = 3/5, P(H) = 1/2, and P(G and H) = 3/10. Are G and H independent? Show a conditional probability comparison.	**Yes. P(G given H) = (3/10) / (1/2) = 3/5, which equals P(G).**
6	Events J and K are independent. If P(K) = 3/8, find P(K given J).	**3/8**

PART 2 · APPLY IT

1. **1/5** Use the competitors as the conditional group. P(hosts given competes) = 6/30 = 1/5.
2. **Yes, the events are independent.** P(playlist) = 16/48 = 1/3, and P(playlist given sport) = 8/24 = 1/3. Since these probabilities match, the events are independent.

CHALLENGE

x = 9. P(podcasts given transit) = 9/30 = 3/10, which equals P(podcasts) = 27/90. P(transit given podcasts) = 9/27 = 1/3, which equals P(transit) = 30/90.

Accept equivalent fractions. For an independence conclusion, accept a correct comparison of a conditional probability with its matching overall probability; the challenge should include both requested conditional comparisons.