LESSON MAKER PRO

Chance Connections

Use conditions to find probabilities and test independence.

HIGH SCHOOL · MA.912.DP.4.6

MA.912.DP.4.6 "Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations."

NAME _____ DATE _____

THE BIG IDEA

Conditional probability narrows the group to outcomes that meet a condition. Events are independent when knowing one happened does not change the chance of the other.

WORKED EXAMPLE

At a dance, 27 students wear sneakers. Of them, 9 carry a backpack. Find P(carries a backpack | wears sneakers).

1. Use the 27 students who wear sneakers as the total.
2. Of those students, 9 carry backpacks.
3. P(backpack | sneakers) = 9/27 = 1/3.

Answer: 1/3

PRACTICE 5 problems

1 A jar has 14 black beads, 6 white beads, and 5 gold beads. Given that a bead is not gold, find P(black).

ANSWER _____

2 Of 32 students on a team, 20 attend Friday practice, and 8 of those also lift weights. Find P(lifts weights | attends Friday practice).

ANSWER _____

3 For events A and B, P(A) = 4/7, P(B) = 5/8, and P(A and B) = 5/14. Are A and B independent?

ANSWER _____

4 A coin is flipped and a six-sided number cube is rolled. Are getting heads and rolling a 4 independent?

ANSWER _____

5 Among 46 students at a library workshop, 14 use a laptop and 8 of those also borrow a charger. Find P(borrows a charger | uses a laptop).

ANSWER _____

APPLY IT Show your work

1 At a concert, 50 students buy merchandise. Of these, 22 buy a hoodie, and 10 buy both a hoodie and a poster. Given that a student bought a hoodie, what is the probability that the student also bought a poster?

WORK SPACE

ANSWER _____

2 In a survey of 56 students, 14 have a part-time job, 16 play on a school team, and 4 do both. Are having a part-time job and playing on a school team independent?

WORK SPACE

ANSWER _____

CHALLENGE One step up

A report gives P(A) = 2/7, P(B) = 5/6, and P(A | B) = 2/7. Are A and B independent? Explain in a sentence.

WORK SPACE AND ANSWER

ANSWER KEY

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	A jar has 14 black beads, 6 white beads, and 5 gold beads. Given that a bead is not gold, find P(black).	**7/10**
2	Of 32 students on a team, 20 attend Friday practice, and 8 of those also lift weights. Find P(lifts weights | attends Friday practice).	**2/5**
3	For events A and B, P(A) = 4/7, P(B) = 5/8, and P(A and B) = 5/14. Are A and B independent?	**Yes, independent.**
4	A coin is flipped and a six-sided number cube is rolled. Are getting heads and rolling a 4 independent?	**Yes, independent.**
5	Among 46 students at a library workshop, 14 use a laptop and 8 of those also borrow a charger. Find P(borrows a charger | uses a laptop).	**4/7**

PART 2 · APPLY IT

1. **5/11** Use the 22 hoodie buyers as the conditional total. The probability is 10/22, which simplifies to 5/11.
2. **Yes, independent.** P(job) x P(team) = (14/56)(16/56) = 4/56. This equals P(job and team), so the events are independent.

CHALLENGE

Yes, they are independent because learning that B happened leaves the probability of A at 2/7.

Accept equivalent fractions. For independence, accept reasoning that compares a conditional probability to the original probability or compares P(A and B) to P(A) x P(B).