LESSON MAKER PRO

Chance Connections

Test independence, then find probabilities.

HIGH SCHOOL · A1P.DSP.F

A1P.DSP.F "Two events are independent if the occurrence of one event does not affect the probability of the other event. Determining whether two events are independent can be used for finding and understanding probabilities."

NAME _____ DATE _____

THE INDEPENDENCE TEST

Events A and B are independent when knowing that A happened does not change the probability of B. Test this by comparing P(B|A) with P(B). If the events are independent, P(A and B) = P(A) × P(B).

WORKED EXAMPLE

The table shows how often A and B occurred. Are the events independent?

	B	Not B
A	7	14
Not A	11	22

1. P(B|A) = 7/(7 + 14) = 7/21 = 1/3.
2. P(B) = (7 + 11)/(7 + 14 + 11 + 22) = 18/54 = 1/3.
3. The probabilities match.

Answer: Yes, A and B are independent.

PRACTICE 4 problems

1 P(A) = 1/2, P(B) = 1/5, and P(A and B) = 1/10. Are A and B independent?

ANSWER _____

2 P(A) = 1/4, P(B) = 1/2, and P(A and B) = 1/4. Are A and B independent?

ANSWER _____

3 A and B are independent. If P(A) = 2/5 and P(B) = 3/4, find P(A and B).

ANSWER _____

4 P(B) = 2/5 and P(B|A) = 1/5. Are A and B independent? Compare the probabilities.

ANSWER _____

APPLY IT Show your work

1 A gaming app awards a badge on one spin with probability 1/4 and a bonus on a separate, independent spin with probability 2/5. What is the probability of getting both?

WORK SPACE

ANSWER _____

2 The table shows cafeteria orders. Are choosing fries and choosing dessert independent? Compare P(dessert|fries) with P(dessert).

CAFETERIA ORDERS

	Dessert	No dessert
Fries	9	3
No fries	6	12

ANSWER _____

CHALLENGE One step up

A and B are independent. P(A) = 2/5 and P(A and B) = 3/20. Find P(B) and the probability that neither event occurs.

WORK SPACE AND ANSWER

Chance Connections

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	P(A) = 1/2, P(B) = 1/5, and P(A and B) = 1/10. Are A and B independent?	**Yes.**
2	P(A) = 1/4, P(B) = 1/2, and P(A and B) = 1/4. Are A and B independent?	**No.**
3	A and B are independent. If P(A) = 2/5 and P(B) = 3/4, find P(A and B).	**3/10**
4	P(B) = 2/5 and P(B|A) = 1/5. Are A and B independent? Compare the probabilities.	**No. P(B|A) = 1/5, which is not equal to P(B) = 2/5.**

PART 2 · APPLY IT

1. **1/10** Multiply the probabilities: 1/4 × 2/5 = 2/20 = 1/10.
2. **No. P(dessert|fries) = 3/4, while P(dessert) = 1/2.** P(dessert|fries) = 9/12 = 3/4, and P(dessert) = 15/30 = 1/2. The probabilities differ.

CHALLENGE

P(B) = 3/8; P(neither) = 3/8.

For independence questions, accept either a correct comparison of conditional probabilities or a correct check using P(A) × P(B). Accept equivalent fractions.