LESSON MAKER PRO

Probability Match-Up

Use products to test independent events.

HIGH SCHOOL · HSS-CP.A.2

CCSS.Math.Content.HSS-CP.A.2 "Understand that two events A and B are independent if the probability of A and B occurring together is the product of their probabilities, and use this characterization to determine if they are independent."

NAME _____ **DATE** _____

THE PRODUCT TEST

Two events are independent when P(A and B) = P(A) x P(B). Multiply the two individual probabilities, then compare that product to the probability that both events happen.

WORKED EXAMPLE

Events R and S have P(R) = 4/9, P(S) = 5/11, and P(R and S) = 20/99. Are R and S independent?

1. Multiply: (4/9) x (5/11) = 20/99.
2. Compare 20/99 with P(R and S), which is 20/99.
3. The probabilities match, so the events are independent.

Answer: Yes, R and S are independent.

PRACTICE 6 problems

1 P(A) = 1/2, P(B) = 1/3, and P(A and B) = 1/6. Are A and B independent?

ANSWER _____

2 P(C) = 3/7, P(D) = 2/13, and P(C and D) = 1/13. Are C and D independent?

ANSWER _____

3 P(E) = 0.2, P(F) = 0.6, and P(E and F) = 0.12. Are E and F independent?

ANSWER _____

4 P(G) = 3/8, P(H) = 1/12, and P(G and H) = 1/32. Are G and H independent?

ANSWER _____

5 P(J) = 7/10, P(K) = 3/13, and P(J and K) = 21/130. Are J and K independent?

ANSWER _____

6 Events L and M are independent. P(M) = 6/17 and P(L and M) = 3/17. Find P(L).

ANSWER _____

APPLY IT Show your work

1 At a music festival, the probability that a randomly selected attendee streams a local band's song is 7/12. The probability that the attendee posts a concert clip is 2/13. The probability that the attendee does both is 7/78. Are the two events independent?

WORK SPACE

ANSWER _____

2 At a school esports event, the probability that a randomly selected student watches the final match is 3/8. The probability that the student buys team merchandise is 1/6. The probability that the student does both is 1/18. Are the two events independent?

WORK SPACE

ANSWER _____

CHALLENGE One step up

Events A and B have P(A) = x/18, P(B) = 3/8, and P(A and B) = 1/16. Find x. Then use the product test to explain why A and B are independent.

WORK SPACE AND ANSWER

ANSWER KEY # Probability Match-Up

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	P(A) = 1/2, P(B) = 1/3, and P(A and B) = 1/6. Are A and B independent?	**Yes. (1/2) x (1/3) = 1/6.**
2	P(C) = 3/7, P(D) = 2/13, and P(C and D) = 1/13. Are C and D independent?	**No. (3/7) x (2/13) = 6/91, not 1/13.**
3	P(E) = 0.2, P(F) = 0.6, and P(E and F) = 0.12. Are E and F independent?	**Yes. 0.2 x 0.6 = 0.12.**
4	P(G) = 3/8, P(H) = 1/12, and P(G and H) = 1/32. Are G and H independent?	**Yes. (3/8) x (1/12) = 1/32.**
5	P(J) = 7/10, P(K) = 3/13, and P(J and K) = 21/130. Are J and K independent?	**Yes. (7/10) x (3/13) = 21/130.**
6	Events L and M are independent. P(M) = 6/17 and P(L and M) = 3/17. Find P(L).	**P(L) = 1/2.**

PART 2 · APPLY IT

1. **Yes, the events are independent.** Multiply: (7/12) x (2/13) = 14/156 = 7/78. This equals the probability of both events.
2. **No, the events are not independent.** Multiply: (3/8) x (1/6) = 1/16. Since 1/16 does not equal 1/18, the events are not independent.

CHALLENGE

x = 3. Then P(A) = 3/18 = 1/6, and (1/6) x (3/8) = 1/16, which equals P(A and B), so the events are independent.

Accept equivalent fractions and correct decimal forms where appropriate. For independence decisions, students should show or clearly state that the product does or does not equal the given joint probability.