LESSON MAKER PRO

Chance Connections

Use independence to combine probabilities.

HIGH SCHOOL · MA.912.DP.4

MA.912.DP.4 "Use and interpret independence and probability."

NAME _____ DATE _____

MULTIPLY INDEPENDENT EVENTS

Events are independent when the result of one event does not change the probability of the other event. For independent events, multiply to find the probability that both events happen: P(A and B) = P(A) x P(B).

WORKED EXAMPLE

A randomizer has a probability of 11/17 for outcome A and 13/19 for outcome B. The randomizers are independent. Find P(A and B).

1. The outcomes are independent, so multiply the probabilities.
2. P(A and B) = 11/17 x 13/19.
3. P(A and B) = 143/323.

Answer: 143/323

PRACTICE 6 problems

1 A fair coin is flipped and a fair six-sided number cube is rolled. What is the probability of heads and an even number?

ANSWER _____

2 Independent events A and B have P(A) = 2/7 and P(B) = 3/10. Find P(A and B).

ANSWER _____

3 Independent events C and D have P(C) = 4/9 and P(D) = 5/6. Find P(C and not D).

ANSWER _____

4 Events A and B have P(A) = 3/8, P(B) = 4/7, and P(A and B) = 3/14. Are A and B independent?

ANSWER _____

5 Events A and B have P(A) = 2/5, P(B) = 7/12, and P(A and B) = 1/6. Are A and B independent?

ANSWER _____

6 Events A and B are independent. If P(A) = 3/4 and P(A and B) = 1/8, find P(B).

ANSWER _____

APPLY IT Show your work

1 An esports player has a 3/5 chance of winning a match. The stream has a 7/8 chance of having no lag. Assume the events are independent. What is the probability that the player wins and the stream has no lag?

WORK SPACE

ANSWER _____

2 A gaming app gives a rare item with probability 5/12. A separate online raffle selects a student as a winner with probability 1/4. Assume the events are independent. What is the probability that the student gets at least one of these outcomes?

WORK SPACE

ANSWER _____

CHALLENGE One step up

Three independent events have probabilities P(A) = 1/2, P(B) = 1/3, and P(C) = 1/4. Find the probability that exactly two of the events happen. Explain which cases you add.

WORK SPACE AND ANSWER

Chance Connections

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	A fair coin is flipped and a fair six-sided number cube is rolled. What is the probability of heads and an even number?	**1/4**
2	Independent events A and B have P(A) = 2/7 and P(B) = 3/10. Find P(A and B).	**3/35**
3	Independent events C and D have P(C) = 4/9 and P(D) = 5/6. Find P(C and not D).	**2/27**
4	Events A and B have P(A) = 3/8, P(B) = 4/7, and P(A and B) = 3/14. Are A and B independent?	**Yes, because (3/8) x (4/7) = 3/14.**
5	Events A and B have P(A) = 2/5, P(B) = 7/12, and P(A and B) = 1/6. Are A and B independent?	**No, because (2/5) x (7/12) = 7/30, not 1/6.**
6	Events A and B are independent. If P(A) = 3/4 and P(A and B) = 1/8, find P(B).	**1/6**

PART 2 · APPLY IT

1. **21/40** Multiply the probabilities for the independent events: 3/5 x 7/8 = 21/40.
2. **9/16** Find the probability of neither outcome: (7/12) x (3/4) = 7/16. Subtract from 1: 1 - 7/16 = 9/16.

CHALLENGE

1/4. Add P(A and B and not C) + P(A and C and not B) + P(B and C and not A): 1/8 + 1/12 + 1/24 = 1/4.

Accept equivalent fractions, although reduced fractions are preferred. For independence decisions, students should compare the stated intersection probability with the product of the individual probabilities.