LESSON MAKER PRO

Chance Chain

Multiply linked probabilities.

HIGH SCHOOL · HSS-CP.B.8

CCSS.Math.Content.HSS-CP.B.8 "(+) Apply the general Multiplication Rule in a uniform probability model, P(A and B) = P(A)P(B|A) = P(B)P(A|B), and interpret the answer in terms of the model."

NAME _____ DATE _____

THE MULTIPLICATION RULE

For a uniform model, multiply the chance of A by the chance of B after A happens: P(A and B) = P(A)P(B|A). You can begin with either event, as long as the second probability matches the first event.

WORKED EXAMPLE

A box has 31 tickets, including 11 winning tickets. Two tickets are drawn without replacement. Find P(both are winning).

1. P(first winning) = 11/31
2. P(second winning | first winning) = 10/30
3. P(both winning) = (11/31)(10/30) = 110/930

Answer: 11/93

PRACTICE 5 problems

1 A fair 8-sided die is rolled twice. Find P(first roll is 7 and second roll is even).

ANSWER _____

2 A playlist has 18 tracks, including 6 explicit tracks. Two tracks are chosen without replacement. Find P(both are explicit).

ANSWER _____

3 A raffle has 21 tickets, including 7 gold tickets. Two tickets are drawn without replacement. Find P(first is gold and second is not gold).

ANSWER _____

4 In a group of 24 students, 9 wear glasses. A president and vice president are chosen at random. Find P(both wear glasses).

ANSWER _____

5 One card is drawn from a standard 52-card deck. Find P(the card is red and a queen).

ANSWER _____

APPLY IT Show your work

1 An esports club has 28 members, including 7 seniors. A captain and co-captain are chosen at random. What is the probability that both are seniors?

WORK SPACE

ANSWER _____

2 At a school festival, 27 raffle tickets are sold. Nine tickets win backstage passes. Two tickets are drawn without replacement. What is the probability that both tickets win backstage passes?

WORK SPACE

ANSWER _____

CHALLENGE One step up

In a survey of 36 students, 15 play a sport, 9 are in band, and 6 do both. Use the multiplication rule two ways to find P(plays a sport and is in band). Then explain what the probability means.

WORK SPACE AND ANSWER

ANSWER KEY

Chance Chain

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	A fair 8-sided die is rolled twice. Find P(first roll is 7 and second roll is even).	**1/16**
2	A playlist has 18 tracks, including 6 explicit tracks. Two tracks are chosen without replacement. Find P(both are explicit).	**5/51**
3	A raffle has 21 tickets, including 7 gold tickets. Two tickets are drawn without replacement. Find P(first is gold and second is not gold).	**7/30**
4	In a group of 24 students, 9 wear glasses. A president and vice president are chosen at random. Find P(both wear glasses).	**3/23**
5	One card is drawn from a standard 52-card deck. Find P(the card is red and a queen).	**1/26**

PART 2 · APPLY IT

1. **1/18** Multiply 7/28 by 6/27. A probability of 1/18 means both leaders are seniors in 1 out of 18 equally likely selections.
2. **4/39** Multiply 9/27 by 8/26. The result represents the chance that both drawn tickets are winning tickets.

CHALLENGE

(15/36)(6/15) = 1/6 and (9/36)(6/9) = 1/6. It means 1/6 of the students are in both groups.

Accept equivalent fractions and correct unsimplified products. Students should use a conditional probability that reflects whether the first selection changes the second selection.