ALBERT

Name _____ Date _____

Multiplication Rule Worksheet

Geometry · Common Core 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.

Practice

Builds the skill step by step.

1. Two cards are drawn without replacement from a standard 52-card deck. What is P(both hearts)?

2. P(A) = 0.5 and P(B | A) = 0.4. What is P(A and B)?

3. A bag has 5 red and 3 blue marbles. Two are drawn without replacement. What is P(both red)?

4. Same bag (5 red, 3 blue), but the first marble is replaced before the second draw. What is P(both red)?

5. P(B) = 0.6 and P(A | B) = 0.5. What is P(A and B)?

6. Which is the general Multiplication Rule?

   A. $P(A \text{ and } B) = P(A) \times P(B \mid A)$

   B. $P(A \text{ and } B) = P(A) + P(B)$

   C. $P(A \text{ and } B) = P(A) \times P(B)$ always

   D. $P(A \text{ and } B) = P(A \mid B) + P(B)$

7. Two cards are drawn without replacement from a standard 52-card deck. What is P(both aces)?

8. A bag has 3 green and 2 yellow marbles. Two are drawn without replacement. What is P(green, then yellow)?

9. A class has 10 boys and 15 girls. Two students are chosen at random. What is P(both girls)?

10. $P(A \mid B) = 0.3$ and $P(B) = 0.5$. What is $P(A \text{ and } B)$?

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On Level

Grade-level practice.

1. Three cards are drawn without replacement from a standard 52-card deck. What is P(all spades)?

2. A bag has 4 red and 6 blue marbles. Two are drawn without replacement. What is P(red, then blue)?

3. From that bag (4 red, 6 blue), two are drawn without replacement. What is P(one of each color, in either order)?

4. The table shows 250 students' favorite subjects by grade. Use P(Grade 11) × P(science | Grade 11) to find P(Grade 11 and prefers science).

	Math	Science	English	Total
Grade 10	40	30	30	100
Grade 11	50	60	40	150
Total	90	90	70	250

5. The table shows 250 students' favorite subjects by grade. Show that P(science) × P(Grade 11 | science) gives the same P(Grade 11 and science) as P(Grade 11) × P(science | Grade 11).

	Math	Science	English	Total
Grade 10	40	30	30	100
Grade 11	50	60	40	150
Total	90	90	70	250

6. P(A and B) = 0.12 and P(A) = 0.3. What is P(B | A)?

7. Two different numbers are drawn from 1 to 10. What is P(both even)?

8. A box of 20 parts has 3 defective. Two are chosen without replacement. What is P(both defective)?

9. From that box (20 parts, 3 defective), two are chosen. What is P(neither is defective)?

10. When does P(B | A) equal P(B)?

    A. when A and B are independent

    B. when A and B are mutually exclusive

    C. always

    D. never

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Challenge

Multi-step and word problems that stretch it.

1. From that box (20 parts, 3 defective), two are chosen. What is P(at least one is defective)?

2. Two cards are dealt from a standard 52-card deck. What is P(one ace and one card worth 10: a 10, jack, queen or king), in either order?

3. A bag has 5 red and 5 blue marbles. Three are drawn without replacement. What is P(all the same color)?

4. 2% of people have a disease. A test is positive for 90% of people with it and 5% of people without it. What is P(positive)?

5. With those numbers, what is P(disease | positive)?

6. A drawer has 4 black and 6 white socks. Two are drawn without replacement. What is P(they match)?

7. $P(A) = 0.4$, $P(B) = 0.5$ and $P(A \mid B) = 0.6$. What is $P(B \mid A)$?

8. A bag has 6 red and 4 blue marbles. Two are drawn without replacement. What is P(both red)?

9. From that bag (6 red, 4 blue), two are drawn without replacement. What is P(the second marble is red)?

10. Explain why drawing without replacement makes the second draw depend on the first.