Inspiring Greatness

INDEPENDENCE SCHOOL DISTRICT

Math Virtual Learning

Geometry/Honors Geometry

May 20, 2020

Geometry/Honors Geometry
Lesson: May 20, 2020

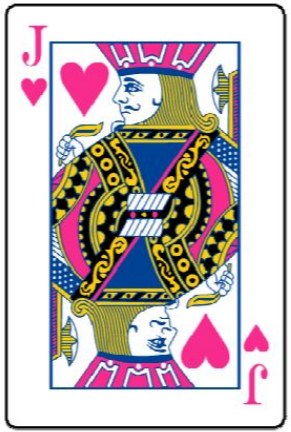
Objective/Learning Target:

Students will apply and interpret the multiplication rule for calculating probabilities.

Warm-Up:

1) A single 6-sided die is rolled. What is the probability of rolling a 1 or 6?

2) Robert is playing cards. What is probability of pulling a king or jack?



3) Mary is playing cards. What is probability randomly pulling a heart or club out of the deck?

Warm-Up Answers

Explanation#1

It can be expressed as:

$$P(1) = \frac{1}{6}$$

$$P(6) = \frac{1}{6}$$

$$P(\text{head}) + P(\text{tail})$$

$$= \frac{1}{6} + \frac{1}{6}$$

$$= \frac{2}{6}$$

Explanation#2

It can be expressed as:

$$P(\text{king}) = \frac{1}{13}$$

$$P(\text{jack}) = \frac{1}{13}$$

$$P(\text{king}) + P(\text{jack})$$

$$= \frac{1}{13} + \frac{1}{13}$$

$$= \frac{2}{13}$$

Explanation#3

It can be expressed as:

$$P(\text{heart}) = \frac{13}{52}$$

$$P(\text{club}) = \frac{13}{52}$$

$$P(\text{heart}) + P(\text{club})$$

$$= \frac{13}{52} + \frac{13}{52}$$

$$= \frac{26}{52}$$

Multiplication Rule

Independent Events

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

Dependent Events

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

1) Dena has a box with 7 blue marbles and 3 pink marbles. Two marbles are drawn without replacement from the box. What is the probability that both of the marbles are blue?

2) John is going to draw two cards from standard deck. What is the probability that the first card is a queen and the second card is a jack?

Explanation#1

Let A = the event that the first marble is blue; and let B = the event that the second marble is blue. We know the following:

In the beginning, there are 10 marbles in the box, 7 of which are blue.
Therefore, P(A) = 7/10.

After the first selection, there are 9 marbles in the box, 6 of which are blue.
Therefore, $P(B \mid A) = 6/9$.

Therefore, based on the rule of multiplication:

$P(A \cap B) = P(A)\, P(B|A)$

$P(A \cap B) = (7/10) * (6/9)$

$= 42/90$

$= 7/15$

So, the answer is 7/15.

Explanation#2

Using the multiplication rule we get

$P(\text{queen}) \times P(\text{jack}) = (4/52)(4/51)$

$= 16/2652$

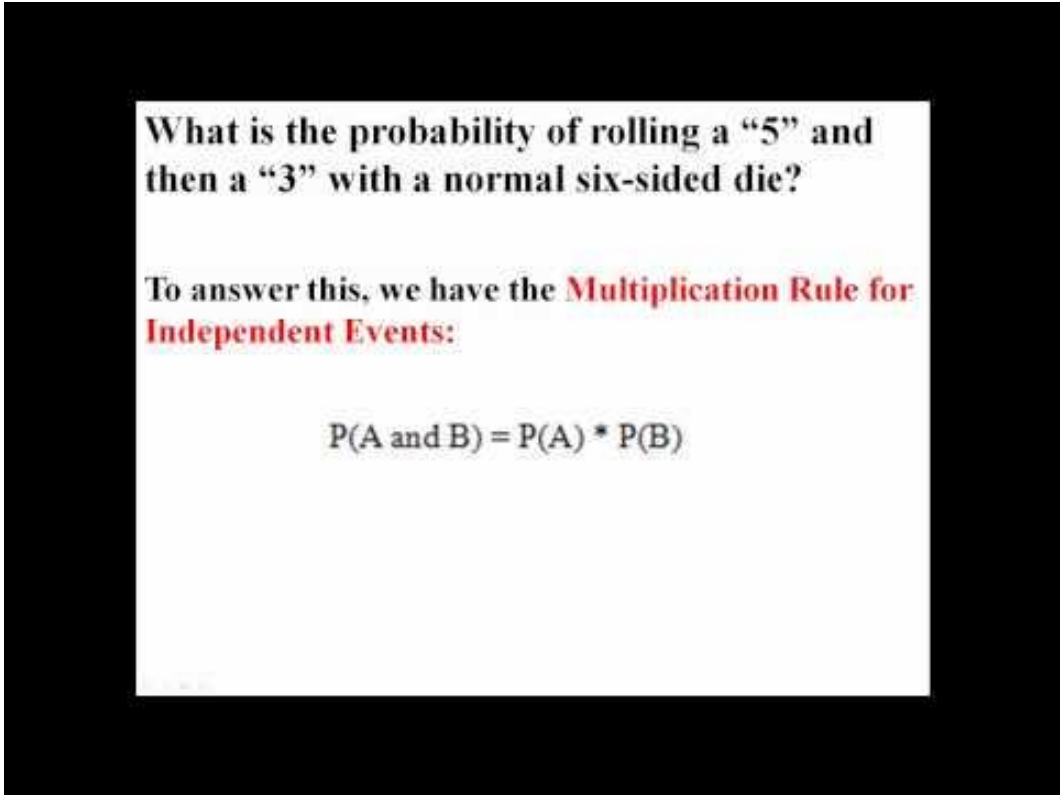
$= 4/663$

So, the answer is 4/663.

Information

Please watch the following examples:

Finding the Probability using multiplication



Christy has a bag of candies. In the bag there are 5 red colors, 3 orange colors and 8 green colors. She takes one candy, record its color and put it back in the bag. She then draws another candy. What is the probability of taking out a green candy followed by the red candy?

Explanation:

As per the conditions of multiplication rule we need to find

P(green) × P(red).

P(green) = 8/16

P(red) = 5/16

P(green/red) = (8/16)(5/16)

= 40/256

= 5/32

The events in this example were independent. Once the first candy was picked out and its color recorded, it was returned to the bag. Therefore, the probability for the second candy was not affected by what happened on the first candy.

So, the answer is 5/32.

Practice:

Events A and B are independent. Find the missing probability.

13) $P(B) = \frac{11}{20}$ $P(A \text{ and } B) = \frac{33}{80}$ $P(A) = ?$

14) $P(A) = \frac{13}{20}$ $P(B) = \frac{7}{20}$ $P(A \text{ and } B) = ?$

15) $P(A) = \frac{7}{20}$ $P(B|A) = \frac{1}{4}$ $P(B) = ?$

16) $P(A) = \frac{13}{20}$ $P(B) = \frac{7}{10}$ $P(B|A) = ?$

Answers

13) $P(B) = \frac{11}{20}$ $P(A \text{ and } B) = \frac{33}{80}$ $P(A) = ?$

$\frac{3}{4}$

14) $P(A) = \frac{13}{20}$ $P(B) = \frac{7}{20}$ $P(A \text{ and } B) = ?$

$\frac{91}{400}$

15) $P(A) = \frac{7}{20}$ $P(B|A) = \frac{1}{4}$ $P(B) = ?$

$\frac{1}{4}$

16) $P(A) = \frac{13}{20}$ $P(B) = \frac{7}{10}$ $P(B|A) = ?$

$\frac{7}{10}$

Additional Practice

Khan Academy Practice

Click on the link and practice 10 problems. Look at the explanation if you make a mistake: IXL Independent Probability