11.3 Day 1

Independent vs. Dependent Events.....page #

Objectives

Determine whether events are independent or dependent.

Find the probability of independent and dependent events.

Feb 8-10:58 AM

Events are **independent events** if the occurrence of one event does not affect the probability of the other.

$$P(A \cap B) = P(A) \cdot P(B)$$

AND — mult.

Feb 8-11:00 AM

Find each probability on a standard number cube.

Ask yourself, "Is rolling a die an independent event?"

If the answer is "YES," then use multiplication rule!!!

Does the first event affect the second event?

1. P(rolling a 2, then a 3)

$\frac{1}{6} \cdot \frac{1}{6} = \frac{1}{36}$

2. P(4, then an even number)

2, 4, 6

$\frac{1}{6} \cdot \frac{3}{6} = \frac{3}{36} = \frac{1}{12}$

Feb 8-11:04 AM

A six-sided cube is labeled with the numbers 1, 2, 2, 3, 3, and 3. Four sides are colored red, one side is white, and one side is yellow. Find the probability.

Does the first event affect the second event?

3. P(Rolling a 2, then another 2)

$\frac{2}{6} \cdot \frac{2}{6} = \frac{1}{9}$

36, 3

4. P(Rolling a red side, then white, then a 1)

$\frac{2}{3} \cdot \frac{1}{6} \cdot \frac{1}{6} = \frac{2}{108} = \frac{1}{54}$

Feb 8-11:07 AM

Events are **dependent events** if the occurrence of one event affects the probability of the other.

To find the probability of dependent events, you can use **conditional probability** $P(B|A)$, the probability of event B, given that event A has occurred.

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

AND — MULT. — P of B, given that A occurred

Feb 9-10:47 AM

Together... **Ask yourself, "Is rolling a die an independent or dependent?"**

Know what rule you are going to have to use!!!

The event is rolling two standard number cubes.

5. The first die shows a 2 and the sum of the two die is < 8.

A — 3

$P(A) = \frac{6}{36}$

$P(B|A) = \frac{5}{6}$

Does the first event affect the second event?

$P(A) \cdot P(B|A) = \frac{1}{6} \cdot \frac{5}{6} = \frac{5}{36}$

6. The first die shows a multiple of 3 and their sum is 7.

A — B

$P(A) = \frac{12}{36}$

$P(B|A) = \frac{2}{12}$

$P(A) \cdot P(B|A) = \frac{1}{3} \cdot \frac{1}{6} = \frac{1}{18}$

$2/36 = 1/18$

7. The 2nd die is a multiple of 2, given the product is 6.

B — A

$P(A) = \frac{4}{36}$

$P(B|A) = \frac{2}{4}$

$P(A) \cdot P(B|A) = \frac{1}{9} \cdot \frac{1}{2} = \frac{1}{18}$

Feb 9-10:53 AM

ON OWN!!!

Two number cubes are rolled–one white and one yellow.

The white cube shows a 6 and the sum is greater than 9 .

Does the first event affect the second event?

8. $P(A) = \frac{6}{36}$

$P(B|A) = \frac{3}{6}$

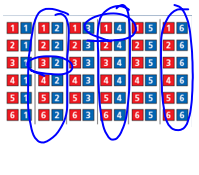
$P(A) \cdot P(B|A) = \frac{1}{6} \cdot \frac{1}{2} = \frac{1}{12}$

The yellow cube shows an even number and the sum is 5.

9. $P(A) = \frac{18}{36}$

$P(B|A) = \frac{3}{18}$

$P(A) \cdot P(B|A) = \frac{1}{2} \cdot \frac{1}{6} = \frac{1}{18}$



Feb 9-10:52 AM

Two cards are drawn from a deck of 52. Determine whether the events are independent or dependent. Find the probability.

10. P(Queen of Diamonds, replaced, then a Ace is drawn)=

I $\frac{1}{52} \cdot \frac{4}{52} =$ —

11. P(selecting two hearts with replacement)=

I $\frac{13}{52} \cdot \frac{13}{52} = \frac{1}{16}$

12. P(selecting two hearts without replacement)=

D $\frac{13}{52} \cdot \frac{12}{51} =$ —

13. P(a queen is drawn,not replaced, and then a king is drawn)=

D $\frac{4}{52} \cdot \frac{4}{51} =$

Feb 11-8:23 AM

Assignment:
p.815 (1-5, 8-13, 17-22, 43-46)

4,5 12,13

$P(A) =$

$P(B|A) =$

Feb 9-10:52 AM