Monday, June 1, 2020

Probability of Multiple Events

Independent Events:
When the outcome of the first event does NOT affect the outcome of the second event.

P(A and B) = P(A) • P(B)

Dependent Events:
When the outcome of the first event DOES affect the outcome of the second event.

P(A and B) = P(A) • P(BafterA)

Is each pair of event *Dependent* or *Independent* ?

1. Spinning a spinner and pulling a number out of a hat.

   These are Independent because the outcome of the spinner doesn't affect the outcome of what you pull out of the hat.

2. You open the refrigerator and randomly grab a drink and finish it. You then reach in and randomly grab another drink and finish that one.

   These are Dependent because after you finish the first drink there will be fewer drinks in the refrigerator to choose from for the second drink.

3. Having your i-pod randomly play two songs, one after the other.

   - If songs CAN repeat then these two probabilities are Independent.
   - If songs CAN'T repeat then these are Dependent.

4. You take a can of spray paint from the shelf use it up then take another can and use it up.

   These are Dependent because after you use up the first can then there will be fewer cans to choose from for the second can.

You flip a coin then roll a die. Find this probability as a fraction:

P(Flip Heads and then roll a 5)

This is an example of Independent Events:
The outcome of the first event does not affect the outcome of the second event.

P(A and B) = P(A)• P(B)

P(Flip Heads and then roll a 5):
- P(A) = P(flip Heads) = $\frac{1}{2}$
- P(B) = P(roll a 5) = $\frac{1}{6}$

P(Flip Heads and then roll a 5) = $\frac{1}{2} \cdot \frac{1}{6} = \boxed{\frac{1}{12}}$

In a jar are following flavors of suckers: 4 grape and 6 cherry.

1. You reach in and randomly grab a sucker, look at it and decide that you don't want that flavor so you toss it back in and then randomly grab another one.

This is an example of Independent events since you return the first one before taking the second one, thus having the same total number of choices both times.

Find the following probability as a fraction without reducing.

Total # suckers = 4+6=10

P(Cherry and Grape) = P(Cherry)• P(Grape) = $\frac{6}{10} \cdot \frac{4}{10} = \boxed{\frac{24}{100}}$

In a jar are following flavors of suckers: 4 grape and 6 cherry.

2. You randomly grab a sucker, eat it and then randomly grab another one.

This is an example of Dependent events because there is one less sucker to choose from the second time.

Find the following probability as a fraction without reducing.

Total # suckers = 4+6=10

P(Cherry and Grape) → P(A and B) = P(A)• P(BafterA)

P(A) = P(Cherry) = $\frac{6}{10}$ P(B after A) = P(Grape after taking Cherry) = $\frac{4}{9}$

P(Cherry and Grape) = $\frac{6}{10} \cdot \frac{4}{9} = \boxed{\frac{24}{90}}$

In a jar are following flavors of suckers: 4 grape and 6 cherry.

3. You randomly grab a sucker, eat it and then randomly grab another one.

Dependent events.

Find the following probability as a fraction without reducing.

Total # suckers = 4+6=10

P(Grape and Grape) → P(A and B) = P(A)• P(BafterA)

P(A) = P(Grape) = $\frac{4}{10}$ P(B after A) = P(Grape after taking Grape) = $\frac{3}{9}$

P(Grape and Grape) = $\frac{4}{10} \cdot \frac{3}{9} = \boxed{\frac{12}{90}}$

In the refrigerator there are the following drinks:

5 Cokes, 7 Gatorades, 3 Waters.

You reach in and randomly grab a drink. You look at it, decide that's not what you want so you put it back in and randomly grab another drink.

Find each probability as a fraction:

These are Independent events

Total # drinks = 5+7+3 = 15

1. P(water and then Coke) = $\frac{3}{15} \cdot \frac{5}{15} = \boxed{\frac{15}{225}}$

2. P(Gatorade and Gatorade and Coke) = $\frac{7}{15} \cdot \frac{7}{15} \cdot \frac{5}{15} = \boxed{\frac{245}{3375}}$

In your sock drawer are 14 white socks, 6 black socks, and 7 blue socks.

You wake up and don't turn on the lights and randomly grab a sock and put it on. You then randomly grab another sock and put it on your other foot.
Find each probability as a fraction.

These are Dependent events

Total # socks = 14+6+7 = 27

1. P(Blue and White) = $\frac{7}{27} \cdot \frac{14}{26} = \boxed{\frac{98}{702}}$

2. P(Black and Black) = $\frac{6}{27} \cdot \frac{5}{26} = \boxed{\frac{30}{702}}$

You still have the following Halloween candy left in a bag:
5 Snickers bars, 3 pieces of gum, and 4 Milky Way bars.

Total # pieces of candy = 5+3+4 = 12

1. You randomly grab one eat it then randomly grab another and eat it. Find this probability as a fraction:

These are Dependent events

P(Gum and Gum) = $\frac{3}{12} \cdot \frac{2}{11} = \boxed{\frac{6}{132}}$

2. You grab one at random, decide it's not one you want so you throw it back in and grab another. Find this probability as a fraction:

These are Independent events

P(Snicker and Milky Way) = $\frac{5}{12} \cdot \frac{4}{12} = \boxed{\frac{20}{144}}$

Using the information from Friday's lesson and today's lesson you can now do the first three problems of Practice #30.

We'll continue this material tomorrow.

Practice #30 will be due on Sunday, June 7 by 10:00 pm