May 5, 2015

1st
2nd

Get out your homework

Nouveau

5/5 Independent and Dependent Events

What are some everyday uses of either of these words?

Ind/Dep Variables
in science

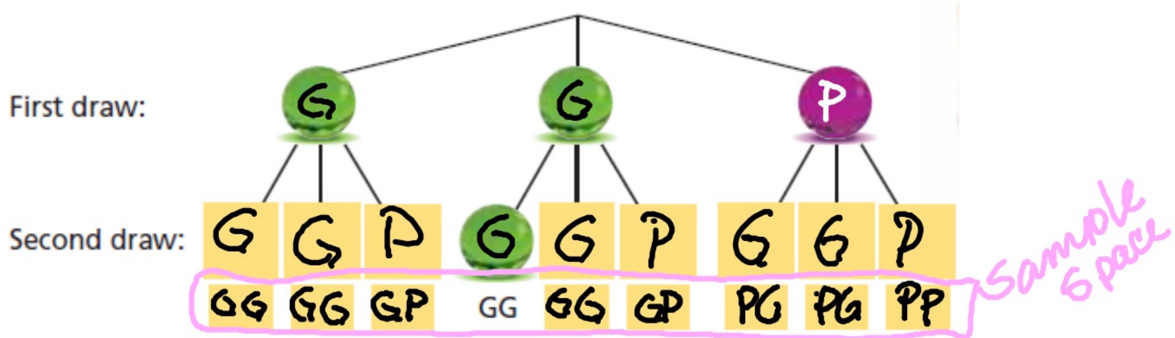
Indepence Day

Going to the store
by yourself.

Dependepent
on your parents
for $, food, ...
on teachers for
new concepts
on co-workers

You have three marbles in a bag - 2 greens and 1 purple. Randomly draw a marble from the bag, put it back, then draw a second one.

Draw a tree diagram of the possible outcomes.



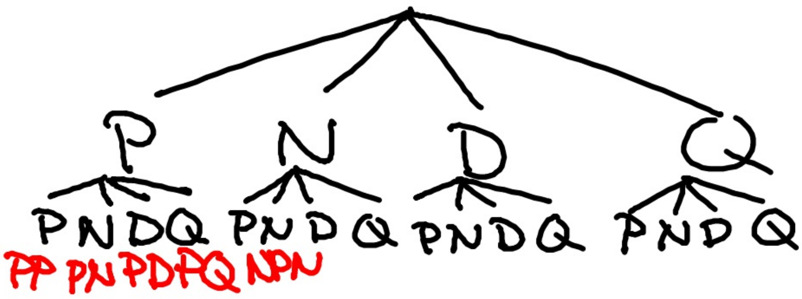
What is the probability that both marbles are green? $\frac{4}{9}$

Does the probability of getting a green marble on the second draw *depend* on the color of the first marble? Explain.

No, you start over again.

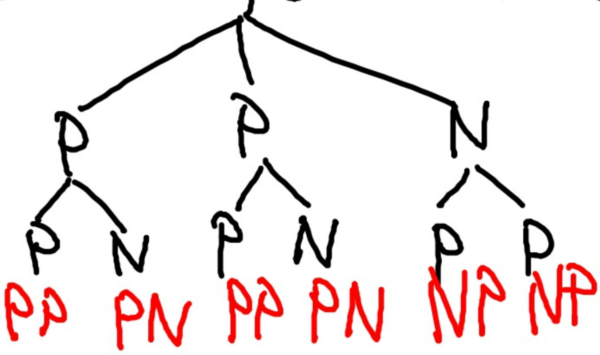
P
N
D
Q

Draw one, replace it, draw another.



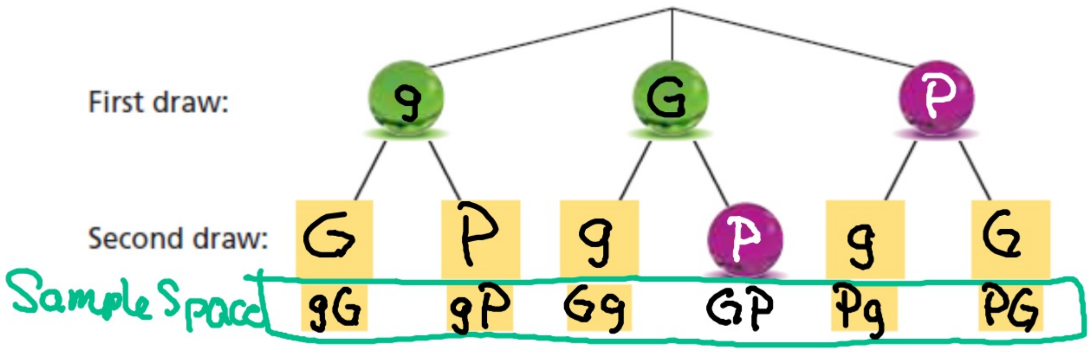
P
P
N

Draw one, do not replace it, draw another.



Now, do the same experiement but instead of drawing one, replacing it and then another, draw BOTH marbles before replacing them.

Draw a tree diagram to show all of the possible outcomes.



What is the probability that both marbles are green? $\frac{2}{6} = \frac{1}{3}$

Does the probability of getting a green marble on the second draw *depend* on the color of the first marble? Explain.

<u>DEPENDENT events</u>:
The first event will affect the next event.

**The items you have to choose from will be different the 2nd time.

<u>INDEPENDENT events</u>:
The first event will not affect the next event.

**The items you have to choose from will be the same every time.

Tell whether these events are *independent* or *dependent.* Explain your reasoning.

You roll a 5 on a number cube and spin blue on a spinner.

Your teacher chooses one student to lead a group, and then chooses another student to lead another group.

You spin red on one spinner and green on another spinner.

Probability of Independent Events

Words The probability of two or more independent events is the product of the probabilities of the events.

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

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

Find the probabilities of the following events.

P(5, heads)= $\frac{1}{5} \cdot \frac{1}{2} = \frac{1}{10}$

P(odd, tails)= $\frac{3}{5} \cdot \frac{1}{2} = \frac{3}{10}$

P(less than 4, heads)= $\frac{3}{5} \cdot \frac{1}{2} = \frac{3}{10}$

P(greater than 1, tails)= $\frac{4}{5} \cdot \frac{1}{2} = \frac{4}{10} = \frac{2}{5}$

Probability of Dependent Events

Words The probability of two dependent events A and B is the probability of A times the probability of B after A occurs.

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

People are randomly chosen to be game show contestants from an audience of 100 people. You are with 5 of your relatives and 6 other friends. What is the probability that one of your relatives is chosen first, and then one of your friends is chosen second?

Choosing an audience member changes the number of audience members left. So, the events are dependent.

$$\frac{\overset{1}{\cancel{5}}}{\underset{\underset{10}{\cancel{20}}}{\cancel{100}}} \cdot \frac{\cancel{6}^{\overset{1}{\cancel{2}}}}{\underset{33}{\cancel{99}}} = \frac{1}{330}$$

A student randomly guesses the answer for each of the multiple-choice questions. What is the probability of answering all three questions correctly?

1. In what year did the United States gain independence from Britain?
   A. 1492 **B.** 1776 **C.** 1788 **D.** 1795 **E.** 2000
2. Which amendment to the Constitution grants citizenship to all persons born in the United States and guarantees them equal protection under the law?
   A. 1st **B.** 5th **C.** 12th **D.** 13th **E.** 14th
3. In what year did the Boston Tea Party occur?
   A. 1607 **B.** 1773 **C.** 1776 **D.** 1780 **E.** 1812

Choosing the answer for one question does not affect the choice for the other questions. So, the events are independent.

$$\frac{1}{5} \cdot \frac{1}{5} \cdot \frac{1}{5} = \frac{1}{125}$$

$$\frac{1}{4} \cdot \frac{1}{4} \cdot \frac{1}{4} \cdots = \frac{1}{1{,}048{,}576}$$

Homework

Gold WS 7

Due Thursday