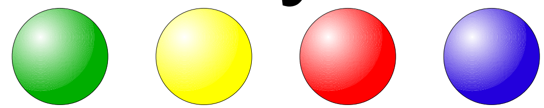
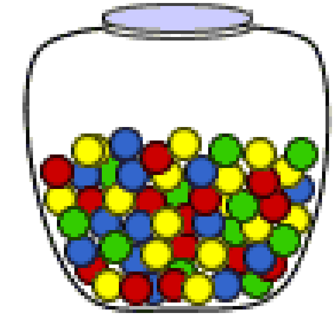
Probability Examples





- A jar contains 30 red marbles, 12 yellow marbles, 8 green marbles and 5 blue marbles

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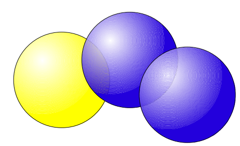
- What is the probability that you draw and replace marbles 3 times and you get NO red marbles?



  - There are 55 marbles, 25 of which are not red
  - P(getting a color other than red) = P(25/55) ≈ .455
  - Probability of this happening 3 times in a row is found by .455*.455*.455 ≈ .094

Example 2: At least 1 Red

- A jar contains 30 red marbles, 12 yellow marbles, 8 green marbles and 5 blue marbles

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- What is the probability that you draw and replace marbles 3 times and you get at least 1 Red?
  - It's easier to calculate the probability of getting NO red marbles, and subtract that from 1 (we use the complement rule : $P(A^C) = 1 – P(C)$
  - From previous example, it is 1 - .094 = .906

Example 3: The First Red

- A jar contains 30 red marbles, 12 yellow marbles, 8 green marbles and 5 blue marbles

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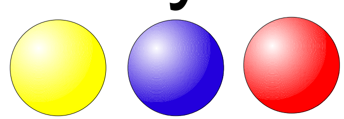
- You draw and replace marbles 3 times. What is the probability the third marble is the first red marble? 
  - This means the first two are not red. We calculated P(drawing a non-red) = .455. Therefore, P(red)=.545
  - P(non-red & non-red & Red) = P(non-red) * P(non-red) * P(red) = .455 * .455 * .545 = .113

Example 4: Red, Yellow and Blue

- A jar contains 30 red marbles, 12 yellow marbles, 8 green marbles and 5 blue marbles

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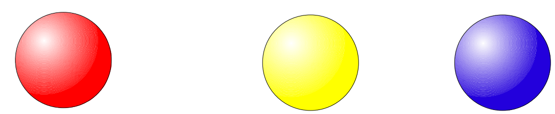
- You draw and replace marbles 3 times. What is the probability you draw 1 Red, 1 Yellow, and 1 Blue?



  - This is harder, because we are drawing marbles in an order, but we don't care about which order we get Red, Yellow and Blue, just that there is 1 of each.
  - But we can do it!

Example 4: Continued

- Let RBY = “Draw a Red, then Blue, then Yellow”
- So all disjoint events we want to consider are: RBY, RYB, YRB, YBR, BYR, BRY – there are 6 of them.
- P(RBY) = P(R)*P(B)*P(Y) = (30/55)*(5/55)*(12/55) = .0108
- But we have 6 disjoint cases. Because each one is calculated as a product of the three, and each disjoint case has the same probability (each order is equally likely), our answer is 6*.0108 = .0649