Sampling with and without Replacement

Our textbook defines this as:
Sampling is the process of selecting an object from a large group of objects and inspecting it, noting its feature(s). The object is then put back [the "replacement"] or NOT put back [the "without replacement".

OUR INSPIRATION!

From Wikipedia:

The Replacements

The Replacements in 1985, left to right: Paul Westerberg, Chris Mars, Bob Stinson, and Tommy Stinson

Let's try a few problems

Consider problem #4 on page 488.

Alix has a bag of "sweets" which are all identical in shape. The bag contains 6 orange drops and 4 lemon drops. She selects one sweet at random, eats it and then takes another, also at random. Determine the probability that:

(A) both sweets were orange drops $P(OO) = \left(\frac{6}{10}\right)\left(\frac{5}{9}\right) = \frac{30}{90} = \frac{1}{3}$

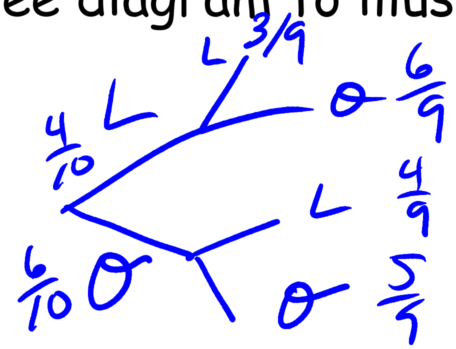
(B) both sweets were lemon drops $P(LL) = \left(\frac{4}{10}\right)\left(\frac{3}{9}\right) = \frac{12}{90}$

(C) the first was an orange drop and the second was a lemon drop $P(OL) = \left(\frac{6}{10}\right)\left(\frac{4}{9}\right) = \frac{24}{90}$

(D) the first was a lemon drop and the second was an orange drop $P(LO) = \left(\frac{4}{10}\right)\left(\frac{6}{9}\right) = \frac{24}{90}$

Add your answers to a, b, c, and d. $1 = \frac{30}{90} + \frac{24}{90} + \frac{24}{90} + \frac{12}{90}$

Let's draw a tree diagram to illustrate our sample space.



P(Or Or)

P(LL) $= \frac{30}{90}$

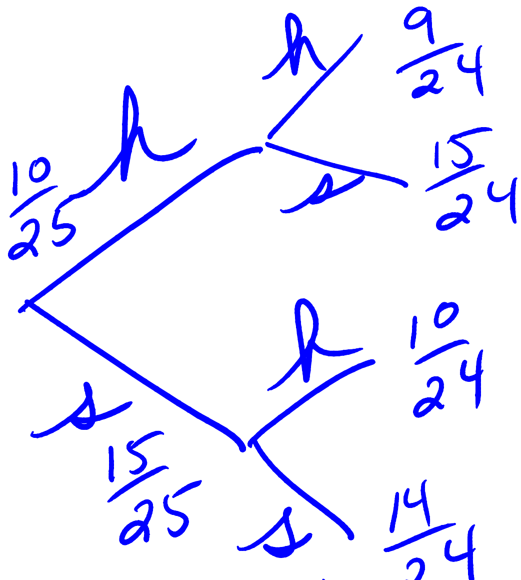
P(OrL) $= \frac{12}{90}$

P(LOr) $= \frac{24}{90}$

$= \frac{24}{90}$

P(OrOr)+P(LL)+P(OrL)+P(LOr)= 1

Now you try #6 on page 489



P(hh)= $\left(\frac{10}{25}\right)\left(\frac{9}{24}\right)$

P(ss)= $\left(\frac{15}{25}\right)\left(\frac{14}{24}\right)$

If time, do the “Sampling Simulation” on page 490 [Need to open up the cd to Chapter 19, set speed to “fast”]

Homework: pages 488, 489 #1, 3, 5, 7 [please draw a tree diagram for each problem]