p. 56-57   Probability of Multiple Events   11.3

p. 56

When we find the probability of 2 or more events occurring, we will distinguish between

independent   and _dependent_   events.

Independent events _are not affected_ by previous events.

A coin does not "know" it landed on tails before;
A 6-sided die does not "know" that it landed on a 4 before, etc.

We can calculate the probability of 2 or more events occurring by _multiply_ the probabilities.

$$P\left(prod.\ of\ 6\right) = \frac{4}{36} = \frac{1}{9}$$

$$\cdot 6$$

$$.\overline{1} \approx 11\%$$

$$6 \cdot 1$$
$$2 \cdot 3$$
$$1 \cdot 6$$
$$3 \cdot 2$$

p. 56   Probability of Multiple Events

HH, HT, TH, TT

H T
H T

Examples:

1) What is the probability of tossing a coin
   2 times, and it landing on heads twice?

$$\frac{1}{2} \cdot \frac{1}{2} = \frac{1}{4}$$

2) What is the probability of rolling a standard die 2 times, and
   getting a "4" then a "1"?

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

Another example of **independent** events...

When selecting items from containers multiple times,
with replacement , means that each time you take
something out you put it back before selecting again.

Example

3) You have a bag containing **4 blue marbles, 6 red marbles,**
   and 8 green marbles.   total = 18

   If 2 marbles are drawn (with replacement), what is the
   probability of choosing a red then a blue marble?

$$\frac{6}{18} \cdot \frac{4}{18} = \frac{24}{324} = \frac{2}{27}$$

p 57

Dependent Events _are affected_ by previous events.
When selecting items multiple times, _without replacement_,
means that you never put the items back before selecting again.
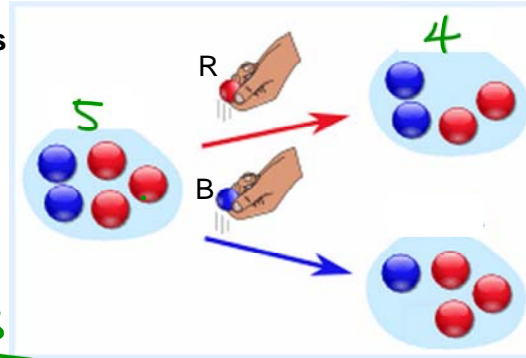
<u>Examples</u>

A bag contains 2 blue marbles and 3 red marbles. If two marbles are drawn (without replacement)...

4) What is the probability of choosing a red then a blue marble?

$$\frac{3}{5} \cdot \frac{2}{4} = \frac{6}{20} = \frac{3}{10}$$

5) What is the probability of choosing two blue marbles?

$$\frac{2}{5} \cdot \frac{1}{4} = \frac{2}{20} = \frac{1}{10}$$

6) If you draw 2 cards from a standard deck, WITHOUT REPLACEMENT, what is the probability of drawing 2 queens?

$$\frac{4}{52} \cdot \frac{}{51} = \frac{2}{652} = \frac{}{221}$$

7) A bag contains 6 yellow marbles, 4 blue marbles, and 1 orange marble. You draw 2 marbles, WITHOUT REPLACEMENT. Total = 11

a) What is the probability of choosing 2 yellow marbles?

$$\frac{6}{11} \cdot \frac{5}{10} = \frac{30}{110} = \frac{3}{11}$$

b) What is the probability of choosing a blue then orange marble?

$$\frac{4}{11} \cdot \frac{1}{10} = \frac{4}{110} = \frac{2}{55}$$

PRACTICE TIME