Accel Precalc   Notes: Conditional Probability   Name _____
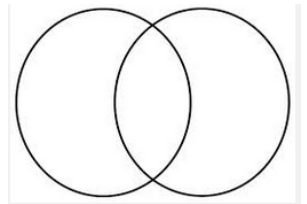
Unit 1: Statistics and Probability

EQ:

Ex.1 The band a Villesdale High School has 50 members, and the student council has 20 members. Five student council members are also in the band. Suppose that a student is randomly selected from these two groups. Find the probability that the student is a member of the band of you know that he or she is on the student council.

❖ **Conditional Probability** - probability that a _____ will happen _____ that a _____ happened

$P(B|A)=$ Therefore $P(A\,and\,B)=$

Ex. 2 A bag contains 9 red marbles and 3 green marbles. For each case below, find the probability of randomly selecting a red marble on the first draw and a green marble on the second draw.

a) the first marble is replaced   b) the first marble is not replaced

_____ Events   _____ Events

Ex.3 In a school contest, a class (sophomore, junior, or senior) will be selected according to the probabilities listed at the right. Then a student from that class will be randomly selected. The distribution of the possible contest winners is shown in the table. Find the probability that a girl is selected. $P(\text{sophomore}) = \frac{1}{4}$

$P(\text{junior}) = \frac{1}{4}$

$P(\text{senior}) = \frac{1}{2}$

	Girls	Boys	Total
Sophomores	10	13	23
Juniors	7	4	11
Seniors	9	5	14

❖ $P(B|A) =$

If and only if A and B are _____ events.   WHY?

If _____ whether _____, then A and B must be independent events.

Ex. 4 The ELISA test is used to screen donated blood for the presence of HIV antibodies. When HIV antibodies are present in the blood tested, ELISA gives a positive result 98% of the time. When HIV antibodies are not present in the blood tested, ELISA gives a positive result 7% of the time, which is called a _____ _____. Suppose 1 out of every 1000 units of donated blood actually contains HIV antibodies.

_____ x _____ = _____

a) What is the probability the test
   was accurate?

b) What is the probability the antibodies were
   present, given the ELISA test was positive?
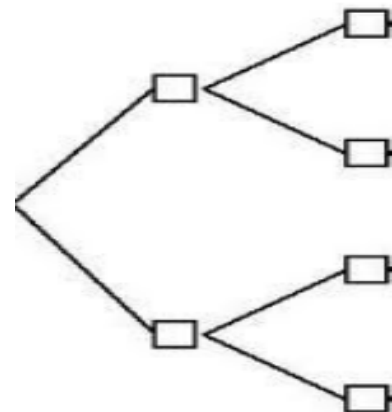
❖ In Class Problems:

1. The Wilmont High School honor society has 20 members, and the school's debate team has 18 members. Twelve members of the debate team are also in the honor society. Suppose that a student is randomly selected from these two groups. Find the probability that the student is a member of the debate team if it is known that he or she is a member of the honor society.

2. A bag contains a 5 blue and 8 yellow marbles. Find the probability of randomly selecting a blue marble on the first draw and a yellow on the second draw if a) the first marble is relaced b) the first marble is not replaced.

3 In a school contest, a class (sophomore, junior, or senior) will be selected according to the probabilities listed at the right. Then a student from that class will be randomly selected. The distribution of the possible contest winners is shown in the table. Find the probability that a boy is selected.

$P(\text{sophomore}) = \frac{1}{6}$

$P(\text{junior}) = \frac{1}{3}$

$P(\text{senior}) = \frac{1}{2}$

	Girls	Boys	Total
Sophomores	10	13	23
Juniors	7	4	11
Seniors	9	5	14

4. The *ELISA* test is used to screen donated blood for the presence of HIV antibodies. When HIV antibodies are present in the blood tested, *ELISA* gives a positive result 98% of the time. When HIV antibodies are not present in the blood tested, *ELISA* gives a positive result 7% of the time. Suppose 75 out of every 1000 units of donated blood actually contains HIV antibodies.
   a) What is the probability that a randomly selected person who tests positive for HIV has the disease?
   b) What is the probability the test is accurate?

➢ Assignment: Worksheet #9, 13, 19, 20b, 20c, 21b, 21c, 24, 26, 32, 36, 38 - 40