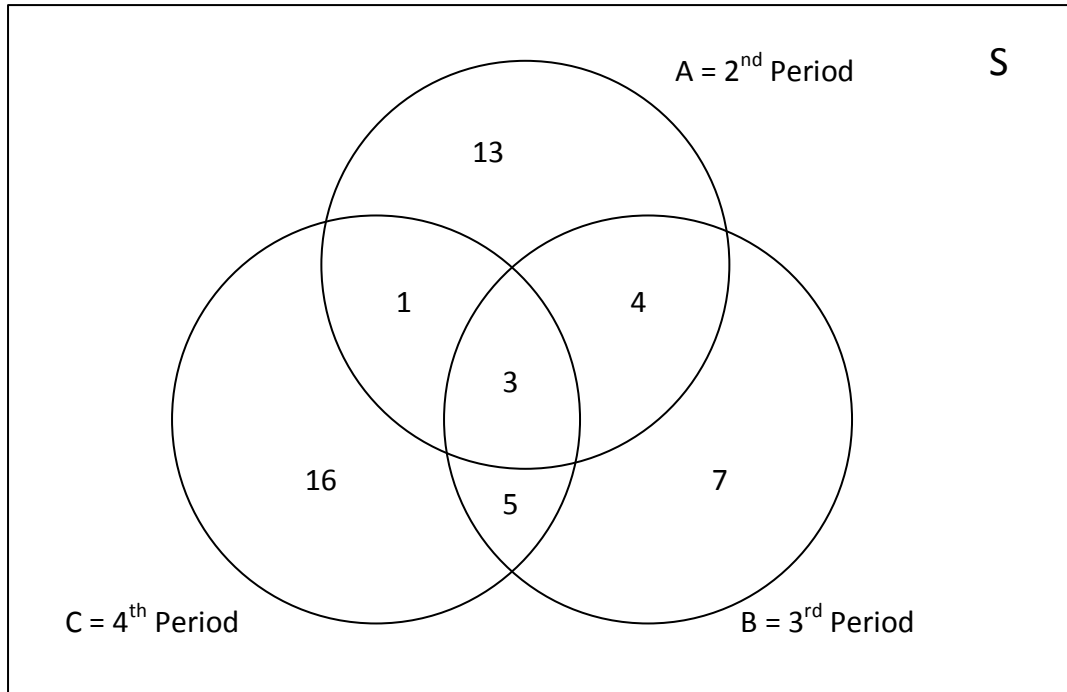


## 1.3 Conditional Probability

Let's take those Venn Diagrams one step further... let's find a probability of a probability (probability inception). Don't worry it's not as confusing as it sounds...

Let's look at the 49 student's in Mr. Notten's classes again...



- a) What is the probability that a student is in Mr. Notten's third period class?
- b) What is the probability that a student is in Mr. Notten's third period class **given that they are already in his second period class**?
- c) What is the probability that a student is in Mr. Notten's fourth period class given that they are already in his second period class?
- d) What is the probability that a student all three of Mr. Notten's classes given that they are already in his second period class?
- e) What is the probability that a student is in Mr. Notten's third period class given that they are already in his first **and** second classes?

**A. Conditional Probability**

This is the mathematical way we write express conditional probability:

$$P(B|A) = \frac{P(A \cap B)}{P(A)}$$

Where  $P(B|A)$  = The probability of B given A has already occurred.  
Basically, you're finding the probability of **one part** of a Venn Diagram.

Note: It can also be arranged like this:  $P(A \cap B) = P(A|B) \times P(A)$

**Example 1:** In New York State, 48% of all teenagers own a skateboard and 39% of all teenagers own a skateboard and roller blades. What is the probability that a teenager owns roller blades given that the teenager owns a skateboard?

**Example 2:** At a middle school, 18% of all students play football and basketball and 32% of all students play football. What is the probability that a student plays basketball given that the student plays football?

**Example 3:** What is the probability that a day will rain given that it is a cloudy day? The probability it will be both cloudy and rainy is 25%. 50% of all days are cloudy.

Draw a Venn diagram of the situation in Example 3:

**Example 4:** What is the probability of drawing 2 aces in a row from a well-shuffled deck of cards. The first card drawn is not replaced.

**Example 5:** You roll two dice. The first die shows a ONE and the other die rolls under the table and you cannot see it. **Now**, what is the probability that both die show ONE?

**Homework:** Textbook Pg 235-236 #1-11, 13-14, if you're daring try 16