Example: A factory has two assembly lines. One line is older, slower and less reliable than the other.

On a given day the older assembly line assembled 8 products of which 2 were defective and six non-defective.

On the same day the newer assembly line has produced 1 defective and 9 non-defective products.

Here is a summary of what happened on this particular day.

Line	Condition	
	Defective	Non-defective
Older	2	6
Newer	1	9

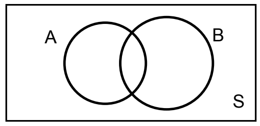
Suppose we pick one of the products produced on this day at random. Let

Let's consider some probabilities:

Suppose we know that our chosen product is defective, in other words, we know event B has occurred. What is the probability that the part is from the older line (A)?

For any two events A and B with $P(B)>0$, $P(A|B)$ is the probability of the event A given that the event B has occurred. This is called **conditional probability**.

Since we are assuming event B has occurred the sample space has changed.



Example: Newspaper columns cover three topics

- A (arts)
- B (books)
- C (cinema)

Reading habits of a population are given as

Read Regularly							
Probability							

1) What is the probability that a reader is regularly reading the Arts column among people who read the book column regularly?

2) What is the probability that a reader is regularly reading the Arts column among people who read at least on type of column?

3) What is the probability of a reader regularly reading arts and books columns given that they read the cinema column.

General multiplication rule:

Example: Four individuals with unknown blood types give blood. We know one of them has the desired 0+ blood type. What is the probability that we must test three of them to find the 0+ individual.

Let's solve this problem two ways to test out the multiplication rule.

Then $A \cap B$ is the event that the first **and** second people aren't 0+ which means that we have to test three individuals.

Let's use another method to check the mulitplication rule.

Let's look at the sample space of arrangements of people.

How about the probability that third person is 0+?

One way to solve this is:

Let C=the event that the third person is 0+

$$\begin{aligned} P(C) &= P(\text{the first person and the third person are are not 0+ and the third person is}) \\ &= P((A \cap B) \cap C) \end{aligned}$$

Which makes sense since using our other method:

Example: Three different brands of Blu-ray players are sold (let's call them brands 1,2 and 3). Each brand offers a one year warranty with their player.

Of the total number of Blu-ray players sold

- 50% are brand 1
- 30% are brand 2
- 20% are brand 3

Within the first year

- 25% of the brand 1 Blue-ray players sold need repairs
- 20% of the brand 2 Blue-ray players sold need repairs
- 10% of the brand 3 Blue-ray players sold need repairs

If a customer who purchased one of these Blue-ray players was selected at random, what is the probability that

1) the customer bought a brand 1 Blu-ray player that needs repairs?

Let's let

•

2) the customer has bought a Blu-ray player that needs repairs?

3) If a customer returns a Blu-ray player for repairs, what are the chances that it is a brand 3 Blu-ray player?