

Forensics

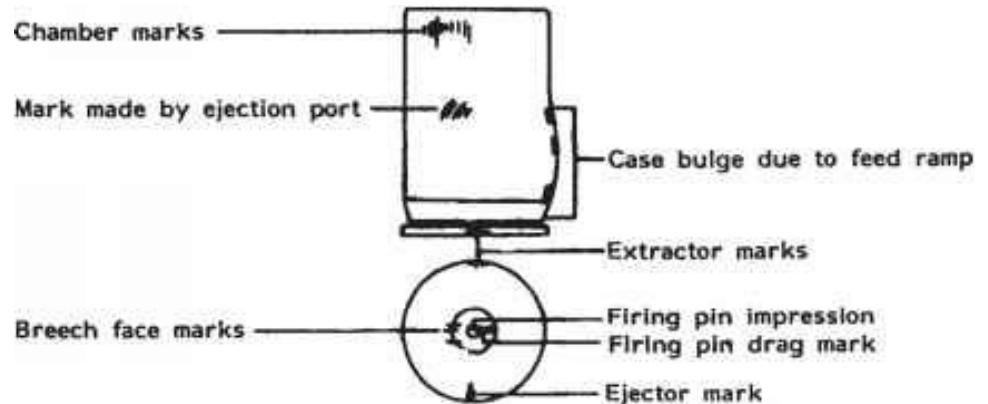
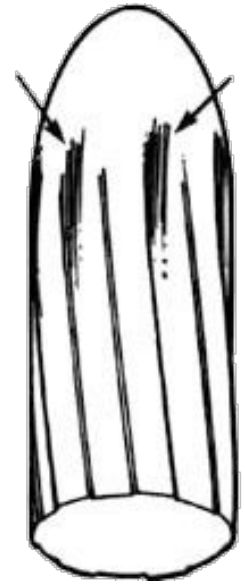
Lesson: Thursday, April 9th

Learning Target:

Students will be able to match bullets fired from the same gun and explain how they know certain bullets were not fired from that same gun.

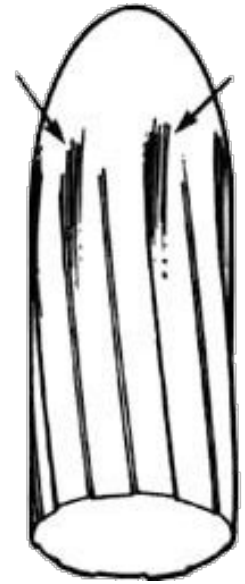
Let's Get Started:

1. What is the process that takes place inside of a firearm as a bullet is fired?
2. What markings on a bullet are considered individual evidence and which ones are class evidence?



Let's Get Started:

1. 1 The firing pin of the gun strikes and ignites the compound of the primer. 2 The primer ignites the gunpowder contained in the cartridge, which burns to create huge gas pressure. 3 The pressure thus created forces the bullet out of the barrel opening at a very high speed towards the target.
2. Striations, firing pin marks, and breechblock marks are all individual evidence. The direction of the twist, manufacturer, number of lands/grooves, caliber, etc. are all class evidence. The above three are the only individual evidence pieces.



Lesson Activity:

Directions:

1. Go to this article and read it over thoroughly to see how a court looks at matching cartridge casing marks in a statistical approach.
2. Answer the practice questions on the following slides.

Link(s): [How Good a Match is It? Putting Statistics into Forensic Firearms Identification](#)

Practice

You will use the information from the activity on slide 3 to answer the following questions.

Practice Questions



1. What did Calvin Goddard do?
2. What did his microscope allow him to do?
3. What are the advantages to the NIST approach?
4. What does the NIST method describe and estimate?
5. Why would it be better to move to a method that has less subjectivity and more objectivity when it comes to forensic ballistics?
6. Explain the process that causes the impression left on the breech face.
7. How would you explain the term “consecutively manufactured” the way it is used to describe bullets that could give a false positive match? Think about the way factories assemble products.

Answer Key

Once you have completed the practice questions check with the work.

1. Forensic scientist named Calvin Goddard linked bullets from the crime scene to Tommy guns found at the home of one of Capone's men.
2. That microscope had a split screen that allowed Goddard to compare bullets or cartridge cases, the metal cases a gun ejects after firing a bullet, side by side.
3. The advantages of the NIST approach include a low error rate in initial tests and that it is relatively easy to explain to a jury.
4. NIST method produces a numerical score that describes how similar they are. It also estimates the probability that random effects might cause a false positive match.
5. More objectivity with measurements means less error and less bias or difference from one examiner to the next.
6. The bullet explodes forward, the cartridge case explodes backward with equal force against the mechanism that absorbs the recoil, called the breech face. This stamps an impression of the breech face into the soft metal at the base of the cartridge case, which is then ejected from the gun.
7. When making the bullets, a factory has a conveyor belt of different machines making the different portions of the bullet and placing them all together. The same is true for the production of the firearms. Even though each firearm has its own unique striations, they were made so similarly by the manufacturer that they could be too minute of a difference to detect with the lab's tools.

More Practice

You will use the information from the activity on slide 3 to answer the following questions.

More Practice Questions

Directions: For help answering these questions or clarifying vocabulary words on anything in ballistics, please see pages 10-13 at this link.

Link(s): [A Simplified Guide To Firearms Examination](#)

1. Explain the CMC method referred to in the “Statistical Approach” section of the [article](#) you were reading for the first set of questions.
2. Looking at the picture, why is pair B not considered a match?
3. They are looking to create different models of the CMC for different guns and different ammunition. Why would this be necessary to lower the amount of error? Use the words breech face, firing pin marks, cartridge, striations, and comparison microscope in your answer.

Answer Key

Once you have completed the practice questions check with the work.

1. Divides one of the scanned surfaces into a grid of cells, then searches the other surface for matching cells. The greater the number of matching cells, the more similar the two surfaces, and the more likely they are to have come from the same gun.
2. In pair B, some cells find similar cells, but they are randomly distributed, and therefore, not considered matching.
3. Answers will vary, but here is an example. When comparing the test fired bullet to the evidence bullet, one should look for different markings on the bullets using a comparison microscope. The marks made on the breech face and the firing pin marks are considered unique to a singular firearm and can be treated like the personal fingerprint for that firearm. The breech face can be found on the cartridge case when examining and at the very bottom of the bullet there are firing pin marks. Lastly, the striations found inside the lands of the bullet are also unique to a specific gun and can be indexed where matches are found.



*Propellants and other gunshot residues expelled during the firing process.
(Courtesy of Jack Dillon)*

Additional Practice

Want to know more about how the smallest differences in the firearm, cartridge, bullet, residues, and more? Go to this [link](#) to see how they all play a role.