A **CARTRIDGE** is the piece of ammunition placed in a firearm. It is composed of a bullet (the part that is fired through the barrel of the gun) and the cartridge case (the part that holds the gunpowder).

The construction of a typical cartridge looks something like this:

1. The cartridge is loaded in the firing chamber of the firearm.
2. Pull the trigger and the firearm's **FIRING PIN** (a small, pin-like, metal cylinder) is forced rapidly forward and strikes the bottom of the cartridge (usually in the middle of the Headstamp). See Picture “A” and “B” to the right.
3. The Firing Pin dents in the bottom of the cartridge and compresses the small amount of firing powder in the Primer.
4. The firing powder ignites when compressed and a spark occurs in the primer.
5. The spark passes up through the Flash Hole to the gunpowder.
6. The gunpowder ignites and the explosion pushes the bullet through the barrel of the firearm.
A semi-automatic weapon will automatically eject the fired cartridge case out of the weapon and load the next cartridge in the firing chamber ready to fire again. Ejected cartridge cases usually fall to the ground and are often left behind at a crime scene. These fired cartridge cases can be important evidence! Each firearm’s Firing Pin is unique. This means that each firearm leaves its own unique Firing Pin mark on the cartridge cases it fires – just like a fingerprint. Firing Pin marks can be used as Individual Evidence to identify the gun that fired a cartridge. See some examples of Firing Pin marks on cartridge cases below:

When the gunpowder in a cartridge explodes the bullet is fired forward. At the same time, however, the explosion forces the cartridge case backwards against the back wall of the gun’s firing chamber (this back wall is called the BREECHBLOCK). Each firearm has its own unique scratches and marks on its Breechblock – and these unique marks are pressed into the Headstamp of the cartridge case when the gun is fired. Breechblock marks can be used as Individual Evidence to identify the gun that fired a cartridge. See some examples of Breechblock marks on cartridge cases below:
Small caliber firearms, like the .22 caliber, are usually **RIM FIRE** weapons. This means that the Firing Pin is made to strike the EDGE of the Headstamp to fire these weapons. **CENTER FIRE** weapons are usually more powerful and have a larger caliber. As you have seen, the Firing Pin is made to strike the CENTER of the Headstamp when firing these weapons. See below for a comparison of recovered Rim Fire versus Center Fire cartridge cases.

![Cartridge Case from a Rim Fire Weapon](image1)

![Cartridge Case from a Center Fire weapon](image2)

Various cartridge cases of different calibers. The longer cartridge cases can hold more gunpowder and are usually more powerful.
You discover a cartridge case at a crime scene. You also have two suspects in custody – both with a gun. How can you find out if the evidence cartridge case came from your suspect’s gun?

Step #1 – Fire a test bullet from your suspect’s guns and collect the empty cartridge cases.
Step #2 – Use a stereomicroscope to magnify and observe the Headstamps of the Known and Evidence cartridge cases.
Step #3 – Compare the Firing Pin marks and Breechblock marks to see if there is a perfect match between any Known and Evidence cartridge cases.
Step #4 – If an obvious match is visible you can assume the Evidence cartridge case was fired from that suspect’s gun.

Suspect #2’s gun was fired at the crime scene. The Firing Pin Mark on this Known Cartridge Case perfectly matches the Firing Pin Mark on the Evidence Cartridge Case.
**QUESTIONS – FIREARMS AND BALLISTICS: BARREL AND BULLET STRIATIONS**

NAME______________________________

1. Why is a Flash Hole necessary for a cartridge to work properly?

2. What is the likely caliber of the cartridge case shown at right?

   ________________________________

   Describe how you knew the cartridge caliber?

3. Describe TWO Class Evidence characteristics and ONE Individual Evidence characteristic of the cartridge seen at right.

   Class Evidence #1

   Class Evidence #2

   Individual Evidence #1

4. Which region of a cartridge case appears to be the most important when using the cartridge case as evidence?

5. Why is a firing pin necessary to fire a bullet from a cartridge?
6. How do Breechblock marks get on a cartridge case?

7. Why are Breechblock marks on a cartridge case considered to be Individual Evidence?

Use the following information to answer Questions #8 - #11.
A single cartridge case was recovered as evidence at a shooting. The magnified Headstamp of the evidence cartridge case is shown at right. Four suspects are being questioned in the case. A gun from each suspect has been test fired and the collected Known Cartridge Cases are available below for your analysis.
8. Which suspect fired the cartridge case that was found at the crime scene? ____________________________

9. List SEVERAL observations you made that helped you determine the suspect that fired their weapon at the crime scene.

10. What caliber was the gun that was fired at the crime scene? ____________________________

11. Explain exactly what the caliber from Question #10 means.