Forensics

Lesson: Wednesday, April 8th

Learning Target:

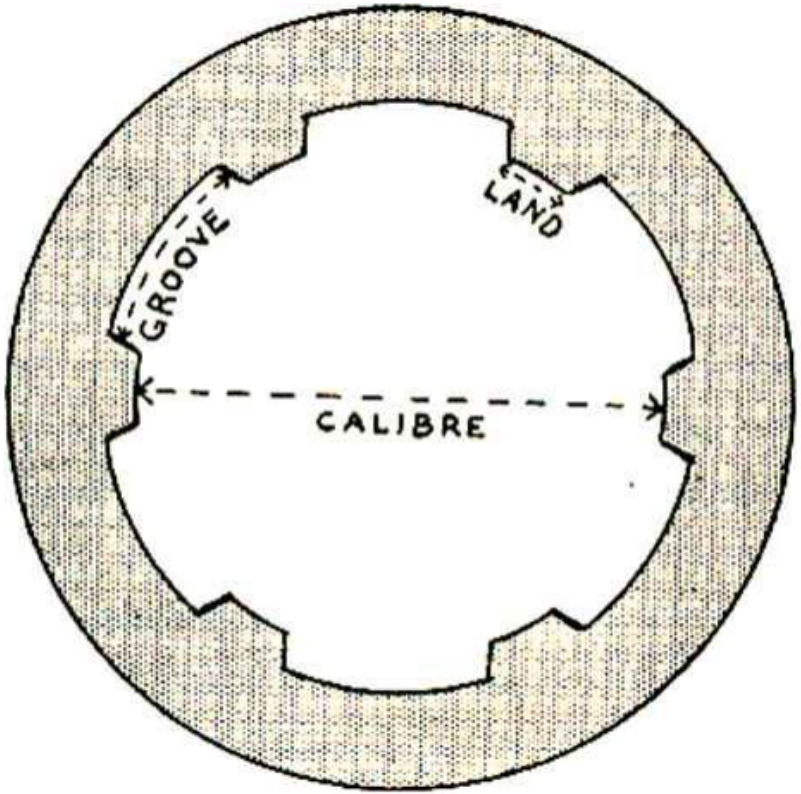
Students will be able to match bullets fired from the same gun and explain how they know certain bullets were not fired from that same gun.

Let's Get Started:

1. List 3 observations you can make about a bullet that you allow you to identify the manufacturer of a firearm that shot it.

2. Looking at the firearm barrel to the right, what is the caliber measuring? Does a groove go into the firearm or protrude out?

3. If the firearm has grooves and lands fashioned this way, what will be true about the lands and grooves of the bullet that comes out of this firearm?

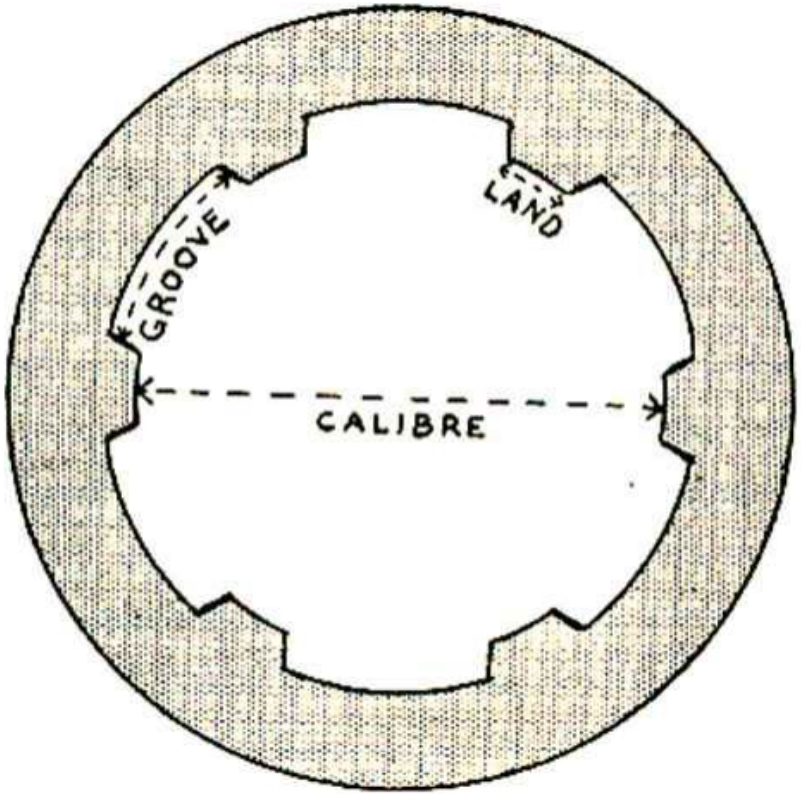


Let’s Get Started:

1. Number of grooves, number of lands, direction of twist.

2. Caliber measures diameter. Groove goes into the firearm.

3. The bullet will have lands caving in and grooves protruding out.



Lesson Activity:

Directions: Go to the following link and answer the practice questions as you forward through the slides. When you click on the link it should take you to a page with the heading “Recovered Firearm Without Related Evidence.” You will use the tab at the bottom of the page that says “Next Page” to move on to the “Comparison Process.” You will continue to answer questions and forward to the next page until you get to the heading “Case Linkage.” There will be no questions for this lesson on the “Case Linkage” page.

Link(s): Recovered Firearm Without Related Evidence

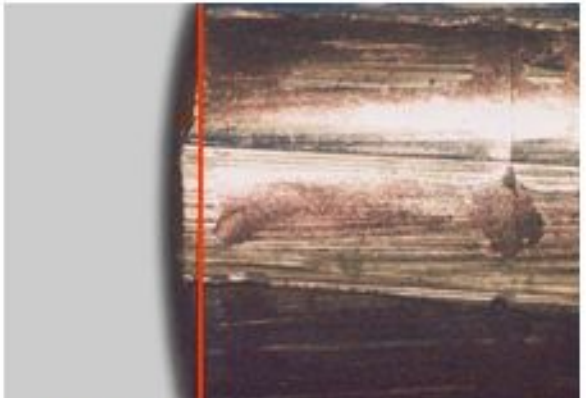
Practice

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

Practice Questions

1. The bullets fired from a test fire in the laboratory will be examined for what 3 things?
2. What two microscopes are used to analyze the bullet?
3. In step 6 of the comparison process, what is being examined and on what magnification?
4. Looking at step 8 of the comparison process, what should a higher magnification be used to examine?
5. What does it mean to have the bullet “in phase”?

Practice Questions



6. What should be done if an identification cannot be made?

7. Looking at the picture at the top of the “Recovered Firearm with Related Evidence” section, what is an area of correspondence?

8. What should be placed in the center of the viewing area on the comparison microscope?

9. What are the two steps of the Elimination process when the widths of the observed impressions are not significantly different?

Answer Key

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

1. 1 To determine if the firearm reliably reproduces microscopic marks on test fired bullets that are suitable for comparison purposes. 2 To allow the examiner to assess the quality of marks produced by the firearm. 3 To retain physical samples of bullets fired from all firearms entering the laboratory
2. Stereomicroscope and comparison microscope
3. Examine the entire bearing surface of the test bullet using low magnification (10x-20x) to determine the best area of individual characteristics.
4. Higher magnifications should be used to verify the correspondence of finer striations.
5. This means that the edges of the land and groove impressions of both bullets align with each other and the relationship of the other land and groove impressions in the viewing area is the same.
6. If an identification cannot be made between the test bullets (there is not sufficient agreement), then more test bullets should be fired and compared. If an identification still cannot be made, the examiner may reach the conclusion that the barrel of the firearm in question does not consistently produce sufficient individual marks to warrant an identification.
7. Two test bullets with land and groove impressions aligned, showing an area of correspondence.
8. Rotate the test bullet, placing the previously marked index area in the center of the viewing area.
9. Align a land impression (or a groove impression) on the recovered evidence bullet with the indexed area on the test bullet. Confirm whether or not the widths of the observed impression are the same for both bullets. Rotate the recovered evidence bullet to search for individual characteristics similar to those found on the previously indexed area of the test bullet. If these are found, compare all undamaged bearing surfaces of the recovered evidence bullet with the corresponding areas on the test bullet.

More Practice

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

More Practice Questions

10. Looking at the “Identification” portion of the “Recovered Firearm with Related Evidence” section, what should be done if the recovered evidence bullet does not have the area indexed on the test bullet?

11. What are three reasons we would end up with an inconclusive result?

12. What are the 3 things you should do before deciding it is an inconclusive result?

13. Looking at the “Evidence without Related Firearm” section, why would we do an intercomparison?

14. Why would we end up with an inconclusive result in the case of having no related firearm?

Answer Key

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

10. If the recovered evidence bullet is missing the area indexed on the test bullet, the best area for comparison on the recovered evidence bullet should be indexed with a different color. The test bullet must be indexed again at the area of agreement and with the same color as used on the recovered evidence bullet.

11. 1 The recovered evidence bullet and the test bullet were fired from different firearms. 2 Damage occurred to the recovered evidence bullet that caused distortion, deformation, or eradication of microscopic detail. 3 The type of test ammunition was different from the recovered evidence bullet. 4 The barrel contains metal deposits (leading). 5 Corroded deposits were dislodged from the barrel during firing, causing significant changes in the barrel. 6 The firearm was damaged during the time interval between firing the recovered evidence bullet and the test bullet. 7 Some or all chambers in a revolver are misaligned, causing differences in the microscopic marks found on bullets fired from different chambers.

12. Before deciding upon an inconclusive result, the following potential remedies should be explored: 1 Remount both bullets on their respective bullet mounts and reexamine.2 Clean the barrel of the evidence firearm and obtain new test bullets. Bullets tested before and after cleaning must be retained.3 Use magnesium smoke to enhance detail (smoking).

13. When no firearm was recovered, this can link several bullets to a single firearm or link several crime scenes together.

14. Reasons for an inconclusive result may include the following:1 The bullets were fired from different firearms.2 Damage occurred to the bullets that caused distortion, deformation, or elimination of microscopic detail.3 The firearm was damaged between firing the two bullets.

Additional Practice

Directions:

Follow the link to an in depth study on striation comparisons.

Link(s):

Bullet Castings: Recovery of Striations

Number of Striations				
		Fired Bullet	Wax Bullet	% Recovery
Land	1	92	79	86%
	2	100	85	85%
	3	95	79	83%
	4	99	74	75%
	5	80	81	101%
	6	89	72	81%
Groove	1	22	21	95%
	2	30	16	53%
	3	29	23	79%
	4	27	25	93%
	5	46	42	91%
	6	46	37	80%

Table 1. Striations counted on each land and groove of a 9mm bullet and its jeweler's wax cast

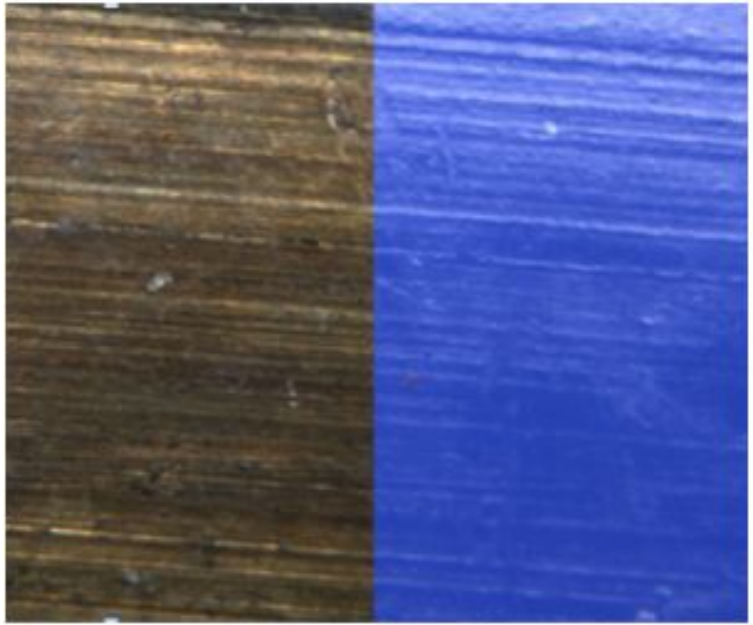


Figure 6. Matched lands of 9 mm fired bullet and 9mm fired bullet jeweler's wax cast