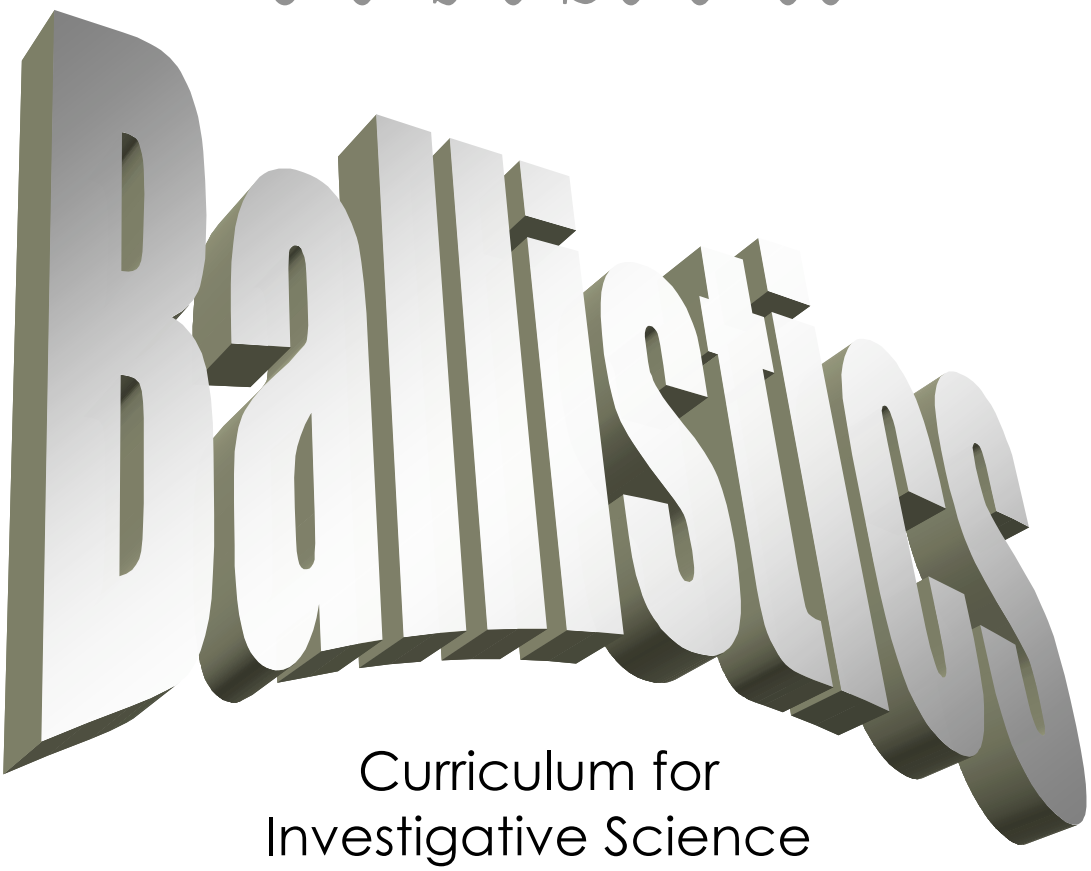
Forensic science



Curriculum for
Investigative Science

Created/compiled by:
Merle Hunsaker
Renee Wootten
Tecumseh High School
Tecumseh, Oklahoma

Research Experience for Teachers 2005
Department of Physics & Astronomy
University of Oklahoma
Norman, Oklahoma

Collaborations

Special collaborators:

- ✓ Dr. David Von Minden, Forensics Chair, University of Central Oklahoma
- ✓ Frank Pasierb, Norman Police Department, Oklahoma
- ✓ Braden Parmer, student, Tecumseh High School, Oklahoma
- ✓ Aaron Hennen, student, Tecumseh High School, Oklahoma
- ✓ Greg Schader, student, Norman High School, Oklahoma

University of Oklahoma collaborators:

- ✓ Caroline Hall, Project Manager
- ✓ Mark Curtis, Graduate Assistant
- ✓ Tuan Nguyen, Student Technician
- ✓ Kieran Mullen, Associate Professor of Physics
- ✓ Eric Abraham, Assistant Professor of Physics
- ✓ Matt Johnson, Associate Professor of Physics
- ✓ Lloyd Bumm, Assistant Professor of Physics

RET Program University of Arkansas
Department of Physics•Fayetteville, Arkansas

_______ ____, 20____

Dear Parent/Guardian,

Beginning ________________ our class will be working on a Forensic Science unit. This unit will last approximately _____ days. We will be studying **firearm ballistics.** We will investigate this area of forensics using a computer based virtual tutorial and no actual firearms will be used.

If you have any questions, feel free to contact me at ________________ during my planning period __________ to __________. If you have any objection to your child participating in this forensic unit, please contact me and/or complete the information below. If such is the case, your child will complete an alternative study in the library.

Sincerely,

- -

I would prefer that my child ________________________________ not be involved in the forensics unit. I understand that an alternative unit will be presented in the library.

________________________________ ________________

Signature Date

Forensic Science Unit
Firearm Ballistics Lesson Plans

I. Rationale

Firearms evidence is common at many crime scenes. Crimes against persons, such as aggravated assault and homicides, are often sources of firearms evidence. Many of these types of evidence may offer additional clues to the identity of the shooter, because they may reveal a fingerprint or have blood, hair, or fibers adhering to them. Investigators should become familiar with different types of firearms. It is important for the crime scene technician to understand proper morphology when describing and analyzing weapons and ammunition.

Since it would be nearly impossible and impractical to actually perform firearms ballistics tests, this lesson has been designed as a Virtual Lesson to study these techniques. This Virtual Lesson requires only one day in a computer lab setting, but could be expanded with extension and application activities.

II. Objectives

a. Cognitive Objectives

Upon completion of the lesson, the student will be able to:

- Identify fundamental ballistics vocabulary.
- Recognize differences in ballistic and casing tool marks.
- Understand the importance of ballistics analysis in forensic science.

b. Skills and Performance Objectives

Upon completion of this lesson, the student will be able to:

- Utilize technology to understand the fundamental concepts of forensic ballistics.
- Use the virtual comparison microscope to match casings and projectiles.

III. Materials

- Computers and internet access
- Vocabulary puzzle
- Instructional handout

IV. Instructional Procedure

A. Before lesson:

- Go to www.firearmid.com.
- In the right hand column under Login, click on Register. This will allow you to register yourself into the site.
- After registering, go to Classroom Registration. This will allow your students to access the site and you to monitor their activities.

B. Opening
- Discussion Questions:
  1) What is ballistics?
  2) Why do investigators pick up casings at a crime scene?
  3) If you find a projectile used in a crime, why is it important to find the gun?
  4) What information do investigators gain from these objects?

C. Middle
- Distribute the instructional handout with the information for the virtual tutorials.
- Distribute the vocabulary crossword puzzle for the students to complete during the virtual tutorials.
- Students will need to access the internet (www.firearmsid.com)
- Suggestion: instruct the students to check the bulleted boxes next to each step upon completion and take any necessary notes.

D. Closing
- When the students have finished, check their certificates.
- Suggestion: allow them to go to the shooting galleries, giving others time to complete their work or challenge them to complete another VCM test.

V. Activities
- Read tutorials over firearm fundamentals.
- Complete terminology puzzle.
- Apply knowledge about ballistics comparison with a simulated macroscope.
- Gain experience and increase skills using technology and the internet.

Name _____ Date _____

Firearm Ballistics
Virtual Laboratory

Purpose/Objectives: the student will …

- Recognize differences in ballistic and casing tool marks.
- Use the virtual comparison microscope to match casings and projectiles.
- Understand the importance of ballistics analysis in forensic science.

Instructions:

- ☐ Go to www.firearmsid.com
- ☐ Go to "classroom: Student Login" (right column)
  - Instructor will provide log-in key
- ☐ Return to "Home"
- ☐ Under "Firearms ID", select "Firearm identification" (left column)
- ☐ Under "Related Pages", read: (Use "Related Pages" Menu to navigate)
  - firearm id fundamentals
  - Bullet Identification
  - Caliber
  - Rifling
  - Rifling Impressions
  - Cartridge Case ID
  - Striated Action Marks
  - Impressed Action Marks

- ☐ After reading, return to "Home"
- ☐ Under the "Resource Area", select "Graphic Libraries" (right column)
- ☐ Locate "Photo Illustrations"
- ☐ Read and examine
  - Firearms
  - Bullets
  - Bullet Comparisons
  - Cartridge Case Comparisons
  - Gunshot Residue
- ☐ Return to "Home"
- ☐ Under the "Resource Area", select "BID-VCM" OR "CCID-VCM" (right column)
  - Take Tests: 1, 2, 3, 4, or 5 (your choice)
  - Upon completion, show instructor award
- ☐ With instructor permission, you may enter the "Virtual Shooting Galleries"

Firearm Ballistics

Teacher's Suggestions:

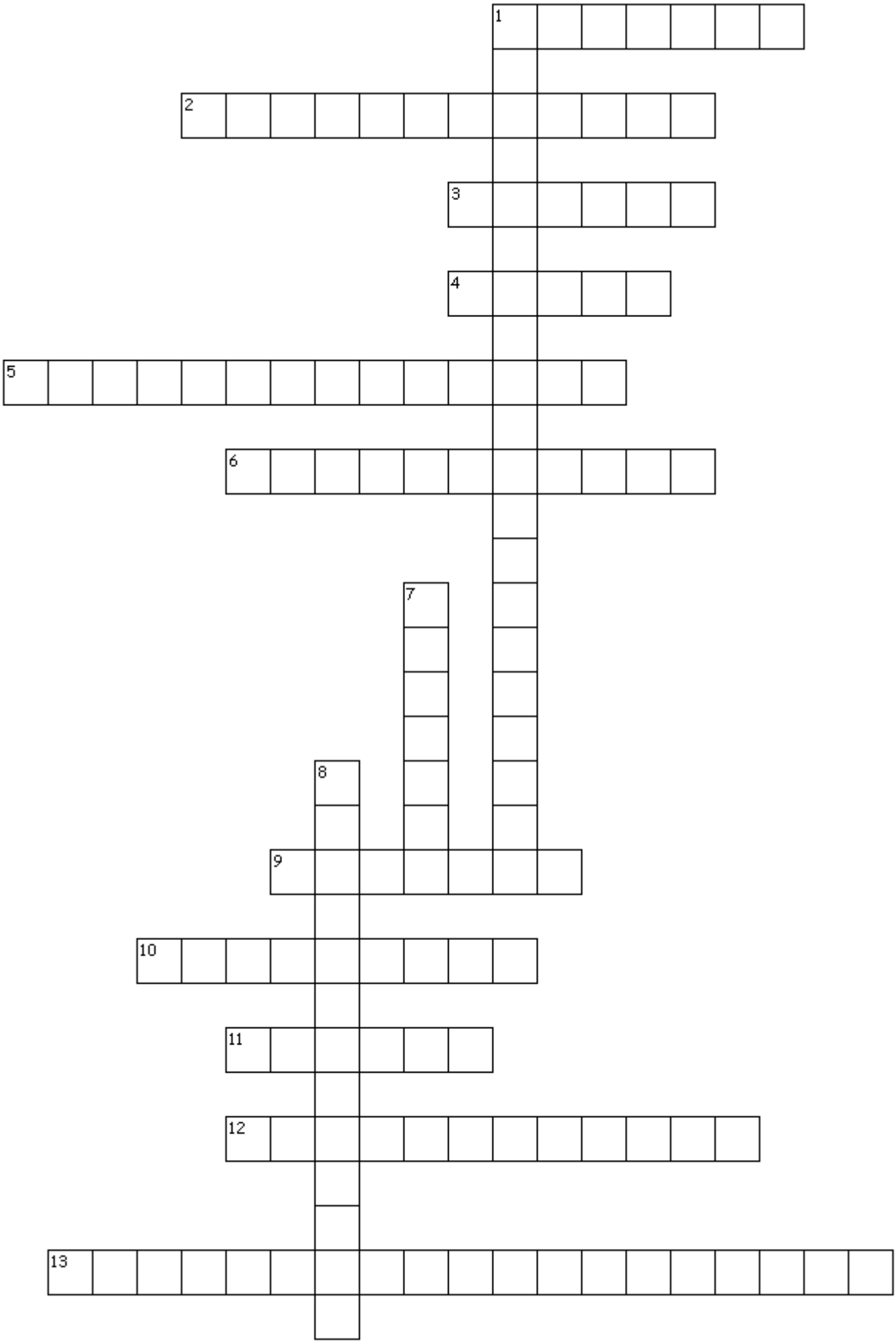
Since it would be nearly impossible to actually perform firearms/ballistics tests, you can use a Virtual Lesson to study these techniques.

- If the font on the website is too small, hold down the control button and use the scroll button on the mouse to scroll up or down. This will increase/decrease font size.
- Offer bonus points for successful completion of both the BID and CCID VCM exams.

Instructions:

- Go to www.firearmsid.com.
- In the right hand column under Login, click on Register. This will allow you to register yourself into the site.
- After registering, go to Classroom Registration. This will allow your students to access the site and you to monitor their activities.
- Hand out the vocabulary crossword puzzle for the students to complete during the virtual tutorials.
- You might instruct the students to check the bulleted boxes next to each step and take whatever notes are necessary.
- When the students have finished, check their certificates. You may allow them to go to the shooting galleries, giving others time to complete their work.

Firearm Ballistics



OUT

Firearm Ballistics

Across

1. size of the bullet
2. impressions made when bullet is released
3. where the bullet enters after firing and directs the projectile
4. allows aiming of the gun
5. marks left on the base of the cartridge after firing
6. created when the bullet enters the firing chamber
9. controls the action of the firing pin
10. this strikes the cartridge causing a small explosion to ignite the powder
11. the opposite force on a gun caused by firing
12. created by the expansion of the cartridge in the chamber
13. scratches made as the cartridge moves in firing chamber

Down

1. used to match bullets and casings
7. groove pattern on the interior of a barrel
8. where the explosion occurs to propel the bullet