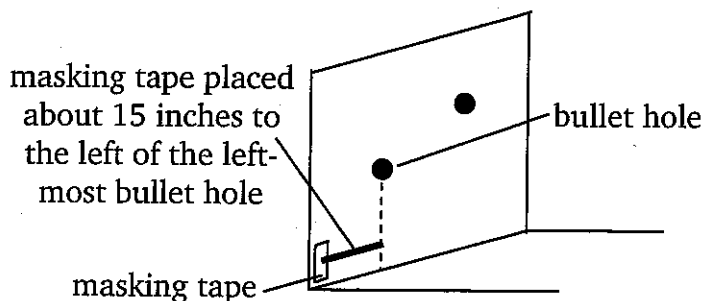


## TEACHER NOTES

### Lab/Activity: Training Lab – Firearms and Ballistics: Using Bullet Trajectory To Determine The Position Of A Close Range Shooter

#### Equipment To Prepare:

- 1 bullet trajectory kit/group – same kits used in the previous Training Lab
- 2 bullet holes /group – use bullet holes constructed for the previous Training Lab.  
Bullet holes with various bullet hole angles should be made available for students to choose from.
- 1 meter stick, yard stick, or measuring tape that measures in inches/group – (measuring tape of some kind usually works the best)
- small millimeter ruler (clear works best)/group
- 1 roll of masking tape – you will need to place a small piece of masking tape next to each group's crime scene to represent an electrical outlet on the wall. Place the tape on the wall, near the floor, about 15 inches to the left (as you look at the wall) of each group's left-most bullet hole. Each group will need this Reference Object to make their measurements correctly. (see example below)



- 1 roll of masking tape – you will use a piece of masking tape to number each crime scene (#1, #2, etc.). Place a piece of tape on the wall near each crime scene and number the tape so each crime scene can be identified by number. Make sure students record the numbers of the crime scenes they work with on their Data Pages (both the Key To The Crime Scene Data Page and Unknown Crime Scene Data Page).

#### Comments/Problems:

This lab usually takes 2 days to complete. Day 1- complete Part 1. Groups set up crime scenes, take measurements, then remove everything except bullet holes. Each group then moves to another group's crime scene and "solves" it (uses the bullet holes and trajectory rods to locate the shooter's position), takes measurements, and cleans up. Day 2 – complete Part 2. Groups use their measurements to sketch the crime scenes they set up (the Key To The Crime Scene Sketch), sketch the crime scenes of the crime they solved (the Unknown Crime Scene Sketch), and answer the Training Lab Questions.

You will need to run off a "Shooter Location Data Page – KEY To The Crime Scene" for each student and a "Shooter Location Data Page – UNKNOWN Crime Scene" for each student.

DO NOT duplex these pages front to back – they need to be separate from each other. However, you can duplex the “UNKNOWN Crime Scene” data page with the Training Lab Questions.

Don't forget to place a piece of masking tape about 15 inches to the “left” of each crime scene for students to use as Reference Objects (see “Equipment To Prepare” for more details).

Don't forget to place a piece of numbered masking tape at each crime scene for identification purposes (see “Equipment To Prepare” for more details).

Students must complete all of Part 1 in one day. Students typically need more time to set up their original crime scene bullet holes and take measurements and will use less time to solve their UNKNOWN crimes. The Training Lab tells students they must set up their original crime and measure it in 25 minutes. If students take too much time setting up their original crime there may not be enough time left over for students to switch and solve each other's crimes. This won't be a problem, however, if you have a location where students can leave their bullet holes taped to the walls overnight. Our students always manage to complete Part 1 in a 50-minute class period.

Walk around and check to make sure each group's bullet holes are taped securely to the wall. A group may have to start over if one of their bullet holes falls off the wall.

### **Typical Results:**

Groups usually do an excellent job of measuring and drawing their crime scenes. Most group's “UNKNOWN Crime Scene Sketches” end up looking very similar to the matching “KEY To The Crime Scene Sketches”.

An example of what a typical completed “KEY To the Crime Scene” Data Page looks like can be found following these Teacher Notes.

**Shooter Location Data Page - KEY To The Crime Scene**

Name \_\_\_\_\_

**KEY**

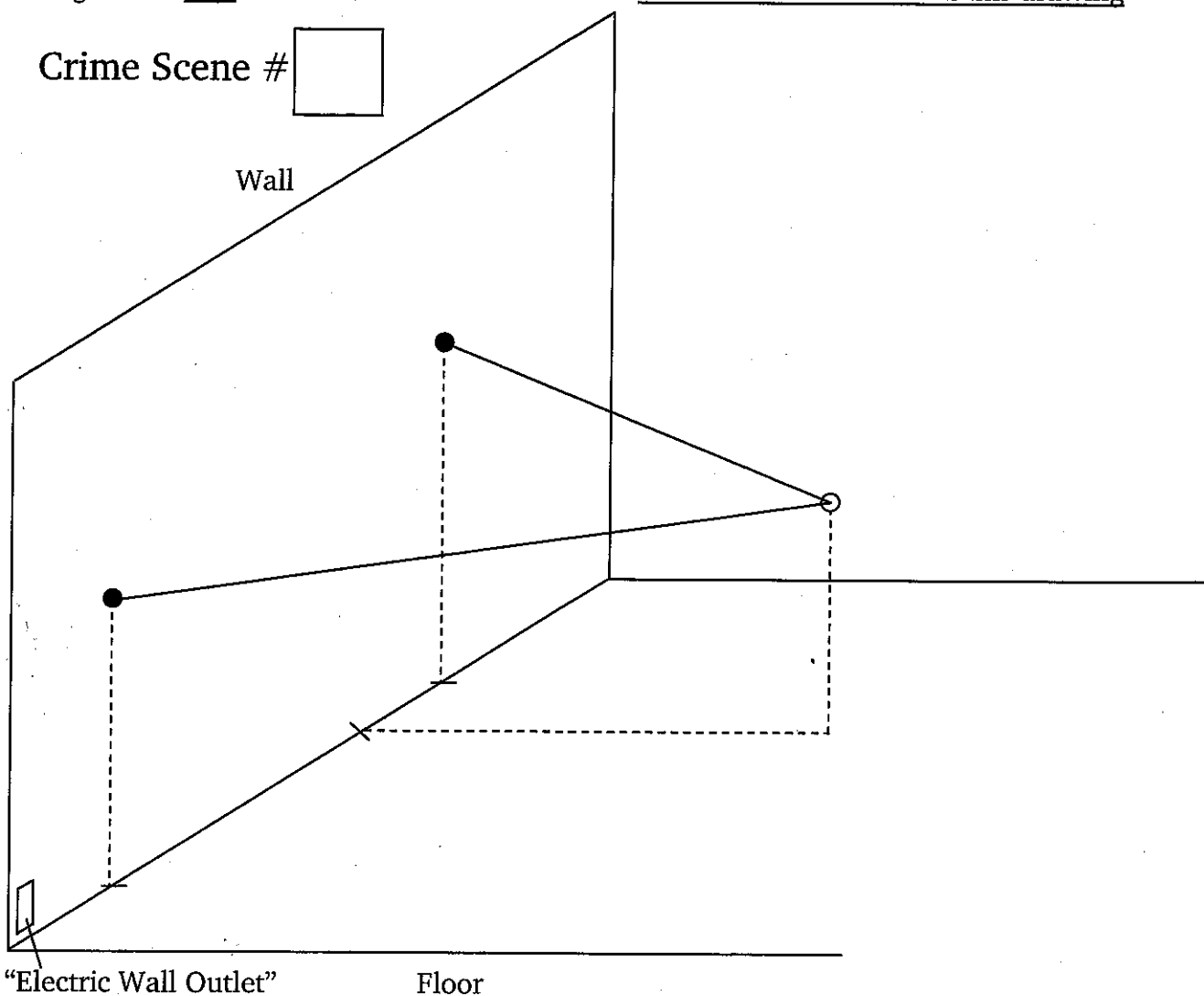
Table 1 - KEY To The Crime Scene Measurements

Height of Point of Origin (inches)	33"
Distance from Point of Origin to Wall (inches)	67"
Distance from Reference Object to Point of Origin Position Along The Wall (inches)	55"
Distance from Reference Object to Bullet Hole #1 Position Along The Wall (inches)	13"
Distance from Reference Object to Bullet Hole #2 Position Along The Wall (inches)	69"
Height of Bullet Hole #1 (inches)	41"
Height of Bullet Hole #2 (inches)	49"

Figure 1 - KEY To The Crime Scene Sketch

Scale: 1 mm = 1 inch in this drawing

Crime Scene #



**QUESTIONS - FIREARMS AND BALLISTICS: USING BULLET TRAJECTORY TO DETERMINE THE POSITION OF A CLOSE RANGE SHOOTER**

NAME \_\_\_\_\_ **KEY**

Answer the questions below based on the UNKNOWN Crime Scene you analyzed.

1. Based on your analysis, how far from the wall was the shooter (in inches)? ANSWERS WILL VARY

2. Based on your analysis, at what height was the gun fired (in inches)? ANSWERS WILL VARY

3. In what position do you think the shooter was in when the gun was fired? (circle one)  
 A. lying on the floor  
 B. sitting on the floor  
 C. on their knees  
 D. standing

**ANSWERS WILL VARY – BUT SHOULD MATCH HEIGHT GIVEN IN QUESTION #2**

4. Based on your analysis, was Bullet #1 fired to the: left, right, or directly in front of the gun/shooter?  
 \_\_\_\_\_

5. Based on your analysis, was Bullet #1 fired: downward, upward, or level?

6. Based on your analysis, was Bullet #2 fired to the: left, right, or directly in front of the gun/shooter?  
 \_\_\_\_\_

**ANSWERS WILL VARY – BUT SHOULD MATCH THEIR SKETCH OF THE CRIME SCENE**

7. Based on your analysis, was Bullet #2 fired: downward, upward, or level?

8. My analysis of the unknown crime scene was (circle one)  
 A. exactly like the key to the crime scene – my point of origin was right on.  
 B. similar to the key to the crime scene – my point of origin was slightly off.  
 C. different than the key to the crime scene – my point of origin was not very close.

**ANSWERS WILL VARY**

9. Why does a Reference Object help when sketching a crime scene?

**A REFERENCE OBJECT GIVES YOU A POINT OF REFERENCE TO MEASURE FROM. IT ALLOWS YOU TO PLACE OBJECTS, LIKE BULLET HOLES AND POINT OF ORIGIN, IN THEIR CORRECT PLACES ALONG A WALL WHEN SKETCHING A CRIME SCENE**

10. You are preparing to “string” bullet holes at a crime scene to determine trajectories and find the Point of Origin. You can choose to use string or lasers. Which method would you choose to use. Explain your choice.

**STUDENTS CAN CHOOSE EITHER METHOD AS LONG AS THEY GIVE A VALID EXPLANATION. EXAMPLES – STRINGS BECAUSE I KNOW HOW TO USE STRINGS AND I'M MORE COMFORTABLE USING THEM / LASERS BECAUSE THEY PROJECT A PERFECTLY STRAIGHT LINE AND WOULD REDUCE THE CHANCE OF ERRORS**