

Bloodstain Geometry

By Bill Licopoli

Purpose-The objective of this lesson is to allow the student to become familiar with the basic geometric shapes and patterns formed by droplets of blood when they impact various target surfaces at various angles. The student will also learn the effects that various surface textures have on the geometry of blood droplets and the basic concepts and rationale employed to recognize, document, and interpret bloodstain evidence.

Materials- ‘blood’, unknown bloodstain sample, disposable pipettes, whiteboard, wood, cardboard, meter stick, ruler, protractor, tape

Background/Story-June 22, Friday, 11:30 PM. It’s getting late and you feel exhausted from all that dancing. You’re out with your friends when that annoying, high pitched beeper goes off, informing you that your night has just begun. You’re called to Rats-A-Way Motel where suspected crack dealers frequent. A grotesque scene awaits you in room 201. The victim is a 6 foot 1 inch male, 21 years of age laying on his back on the tile floor and is dead as a result of two 9mm bullets to the chest. He is holding a knife in his right hand. The suspect is a female, also 21 years of age, who said she shot him in self defense as a result of a drug deal gone bad. You wish to corroborate her statement by examining the spatter evidence. Is she telling the truth?

Procedure

1. Lay the whiteboard (similar to a tiled floor) flat on the floor. Drop several samples of ‘blood’ using a pipette at a height of 1 inch, 12 inches, 36 inches, and 60 inches. This will represent blood dropping from an object/person who is not moving horizontally. Be sure to label these drops appropriately.
2. Repeat step 1 (use additional whiteboards if necessary) but adjust the angle of the whiteboard using the protractor to 30 degrees. This will represent blood dropping from an object/person who is moving at a slow to moderate pace.
3. Repeat this process again but adjust the angle of the whiteboard to 70 degrees. This will represent blood dropping from an object/person who is moving at a quick pace. You should have a total of 12 different samples of blood drops from steps #1-3.
4. Lay the cardboard flat on the floor. Drop a sample of ‘blood’ using a pipette at a height of 12 inches. Repeat this step but replace the cardboard with the wood.
5. Create a chart that summarizes the similarities and differences between the wood, cardboard, and whiteboard. Pay close attention to size, shape, thickness, spatter patterns, etc.
6. Write the evidence number of your bloodstain sample in the data section of your lab. Measure the length and width of your unknown bloodstain sample (width is shorter of the two measurements). Use the following formula to determine the angle of impact.

$$\frac{\text{Width}}{\text{Length}} = \sin (\text{angle})$$

*To solve for the angle, you must take *inverse sin* of Width




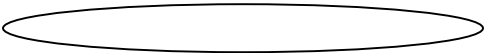

Length

7. Compare your determined angle of impact (step 4) to the appropriate bloodstain from step 1 (angle and height). Draw and label (height, angle, length, width) a copy of the unknown bloodstain sample in your data section and explain why there are any similarities/differences.
8. Clean off all surfaces and rinse out all glassware. Throw the plastic pipettes in trash can. Return all lab materials.

Include the following in your ‘Conclusion’ section.

1. As a result of your analysis, which bloodstain matches the appropriate height and angle?
2. What are your possible sources of error?
3. Was the suspect telling the truth?
4. What possible theory (theories) can you create of what happened at the crime scene based on the unknown blood stain?
5. What was the biggest difference between the bloodstains on the different surfaces?

Determine the angle of impact from the following ‘sample’ blood stain patterns (for #6-10)

6. 
7. 
8. 
9. 
10. 

Include the following in your ‘Questions for Further Research’ section.

Create at least 3 questions that could help in the study of bloodstain spatter.

Include the following in your ‘Defense Attorney Analysis’ section.

Create at least 3 questions that a defense attorney would ask you, the Forensic Lab Technician specializing in blood spatter, concerning the procedures and possible inaccuracies within this lab. (remember, the defense attorney wishes to show all possible mistakes to the jury so that any evidence can be inadmissible in court. Please be detailed!)