Activity: Blood Spatter Reconstruction - Introduction

Mathematics is one of the languages that forensic scientists rely on to reconstruct crime scenes and explain a sequence of events. Often physical evidence is more reliable than eyewitness accounts.

The use of mathematics and physics are the best and most unbiased witnesses to the sequence and origin of blood spatter patterns at a scene. The use of these tools may help reconstruct a physical conflict and thereby support or impeach a suspect/witness statement in a pending case. It may even point to valuable information about an injury someone sustained at the scene. This along with DNA evidence could provide important probative evidence in placing an individual at the scene of the crime.

Essential Question: Can you explain how the laws of physics and mathematical relationships allow investigators to reconstruct events to protect the innocent and incriminate the guilty.

Learning activities to be completed:

- Calculating the angle of impact of a blood stain
- Use a simple stringing method to find the point of origin of a particular spatter pattern
- Practice an alternative measurement using basic trigonometry to calculate the point of origin in space of a particular spatter pattern
- Assess the percent error of the two methods using the first as an experimental set of measurement and the latter as the accepted value.

Introduction:

Blood, like other liquids, is governed by predictable laws of physics as it falls. It will accelerate to the earth like other objects ($g = 9.8 m/s/s$) and the force of gravity will slow its fall. Ultimately it will reach terminal velocity as a result of the balance between air friction and the force of gravity. **If the droplet falls at a 90° to a relatively non-porous surface, what will the resulting pattern be?**

Using the red paint and droppers provided, release three drops onto the space below at a 90° angle. Next measure the width and length of each drop.

Length: _____cm	Length: _____cm	Length: _____cm
Width: _____ cm	Width: _____ cm	Width: _____ cm

What is the relationship between the width to the length?

What angle has the sin of this ratio?

Predict what will happen to the shape and ratio of the droplet if dropped from an angle less than 90°?