

Grade & Course: 11th/12th Forensic Science	Topic: Biological Evidence- Blood Typing & Bloodstain Patterns	Duration: 3 Weeks
Teachers: Forensic PLC Teachers		
Georgia Standards and Content: SFS3. Obtain, evaluate, and communicate information relating to biological evidence in forensic investigations. c. Construct an explanation to distinguish the difference between human and animal blood. d. Plan and carry out an investigation to analyze the physics of bloodstain patterns.		
Narrative / Background Information		
Prior Student Knowledge: (REFLECTION – PRIOR TO TEACHING THE UNIT) Students should understand the value of DNA evidence that can be found in blood and tissue samples and the processes involved to extract and analyze DNA. Students should also understand how to process a basic crime scene.		
Year-Long Anchoring Phenomena: (LEARNING PROCESS) An unidentified body was found in the back seat of a wrecked vehicle where the driver had fled the scene and the passenger was injured.		
Unit Phenomena (LEARNING PROCESS) An 80 year old woman was found dead on the floor of her bathroom. Her husband states it was suicide.		
Inquiry Statement: Because blood demonstrates surface tension, or cohesive forces that act like an outer skin, a drop of blood dropped at a 90° angle forms a near perfect spherical shape.		
Global Context: Scientific and Technical Innovation		
Science & Engineering Practices: <ul style="list-style-type: none"> ● Constructing Explanations ● Plan and Carry Out Investigations 	Disciplinary Core Ideas: (KNOWLEDGE & SKILLS) <ul style="list-style-type: none"> ● History of blood spatter evidence ● Characteristics of blood and blood spatter ● Collecting blood spatter evidence <ul style="list-style-type: none"> ● Forensic analysis of blood spatter 	Crosscutting Concepts: (KNOWLEDGE & SKILLS) <ul style="list-style-type: none"> ● Patterns <hr style="border: 1px solid black;"/> Key and Related Concepts: <ul style="list-style-type: none"> ● time, space, & place ● patterns
Possible Preconceptions/Misconceptions: (REFLECTION – PRIOR TO TEACHING THE UNIT) Students may think that being able to get a person’s blood type can be considered individual evidence, however, blood typing would be considered class evidence. Students may also think that all blood evidence is useful to solve the crime. Investigators need enough blood evidence to be able to process in order for the blood evidence to be useful.		
Key Vocabulary: (KNOWLEDGE & SKILLS) agglutination antibodies antigen-antibody response antigens cell-surface protein lines of convergence point of origin red blood cells (erythrocytes)		

white blood cells (leukocytes)
 satellite drop of blood
 Rh factor
 Blood type
 luminol
 Kastle-Meyer Test
 Leukomalachite Green
 ELISA Test
 angle of convergence
 terminal velocity

Inquiry Questions:

Factual -

- What is the composition of blood?
- What is agglutination?
- What are the presumptive tests for blood?
- What is terminal velocity?

Conceptual –

- How can you determine a person's blood type?
- What factors affect the terminal velocity of a substance?
- What is the terminal velocity of blood?
- How far does blood need to fall until it reaches its terminal velocity?
- How can you determine the direction and angle of impact of blood spatter?
- How can the angle of impact of blood spatter help investigators solve crimes?
- How can the angle of convergence be calculated?

Debatable -

- How reliable is blood spatter analysis?

Summative assessment

Unit Objectives:

Learning Activities and Experiences	Inquiry & Obtain: (LEARNING PROCESS)	Evaluate: (LEARNING PROCESS)	Communicate: (LEARNING PROCESS)
Week 1:	Phenomenon: An 80 year old woman was found dead on the floor of her bathroom. Her husband states it was suicide. <ul style="list-style-type: none"> ● Blood Spatter Notes ● Presumptive test for Blood & typing activity (Ward's Kit #470024-156) 	<ul style="list-style-type: none"> ● Station labs for blood spatter analysis (Blood spatter: Bloodstain Analysis as a Forensic Tool #IS9014) 	<ul style="list-style-type: none"> ● Finish station lab

Week 2:	<ul style="list-style-type: none"> Calculating blood stain patterns and trajectory (Where's the Victim? Carolina 21-2100) 	Review	
Week 3:	Assessment		

Resources (hyperlink to model lessons and/or resources):

- Textbook Forensic Science Bertino & Bertino, 3rd Edition
- Forensic Science Schoology Course
- Additional resources can be found in the common Schoology group under the Unit 6 folder.

Reflection: Considering the planning, process and impact of the inquiry

Prior to teaching the unit	During teaching	After teaching the unit
<p>Unit links to unit 5 through a continuation of blood analysis.</p> <p>Lab materials come from Kits (Wards, & Carolina) See above information in weekly plans.</p> <p>Students may struggle with math calculations for angle of trajectory. Be sure to include detailed directions for math calculations.</p>	(click here)	(click here)