

# Blood

Content Area: **Science**  
 Course(s): **Introduction to Forensic Investigations**  
 Time Period: **First Marking Period**  
 Length: **2 Weeks**  
 Status: **Published**

## Unit Overview

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Students will learn how to determine if a provided sample is blood and if so the species of origin. Students will also be able to discuss the components of human blood, discuss and successfully utilize the ABO/Rh blood typing system to characterize simulated human blood samples. Students will also be able to hypothesize the nature of crimes based on bloodstain patterns.

## STAGE 1- DESIRED RESULTS

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### Standards- 2020 New Jersey Student Learning Standards- Science

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SCI.9-12.HS-PS1-2	Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties.
SCI.9-12.HS-LS3-3	Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.
SCI.9-12.HS-ETS1-2	Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

### Science and Engineering Practices

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- Analyzing and Interpreting Data
- Asking Questions and Defining Problems
- Constructing Explanations and Designing Solutions
- Developing and Using Models
- Engaging in Argument from Evidence
- Obtaining, Evaluating, and Communicating Information
- Planning and Carrying Out Information
- Using Mathematics and Computational Thinking

## **Cross Cutting Concepts**

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- Cause and Effect
- Energy and Matter
- Influence of Engineering, Technology, and Science on Society and the Natural World
- Interdependence of Science, Engineering, and Technology
- Patterns
- Scale, Proportion, and Quantity
- Stability and Change
- Structure and Functions
- Systems and System Models

## **Disciplinary Core Ideas**

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### **Physical Sciences**

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### **Life Sciences**

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- LS1A: Structure and Functions
- LS1D: Information Processing
- LS3A: Inheritance of Traits
- LS3B: Variation of traits

### **Earth and Space Sciences**

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### **Engineering. Technology. and Applications of Science**

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- ETS1B: Developing Possible Solutions
- ETS1C: Optimizing the Design Solution

### **Essential Questions**

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What is the composition of blood?

How has blood and blood spatter been used in solving criminal cases?

How can blood spatter be recreated for analysis?

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**Enduring Understanding**

Blood that is found at a crime scene may help investigators solve the crime.

The way blood spatter is left may give evidence as to what happened at the crime scene.

Blood types may exclude suspects from certain crimes.

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**Students will know...**

**Vocabulary** - agglutination, angle of impact, antibodies, antigen, antigen-antibody response, area of convergence, area of origin, cast-off pattern, passive drop, satellite, spine, swipe, wipe

**Misconceptions** - blood is blue, any blood can be used in transfusions, blood is an individual evidence

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**Students will be able to...**

Identify characteristics of bodily fluids that are most useful in forensic comparisons.

Demonstrate procedures used by forensic scientists when processing blood evidence.

Conduct a blood spatter analysis and use them to recreate crime scene events.

Explain the importance of evidence databases available to forensic scientists.

## **STAGE 2- EVIDENCE OF LEARNING**

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### **Formative Assessment**

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- 3- Minute Pause
- Analogy Prompt
- Choral Response
- Debriefing
- Exit Card / Ticket
- Index Card Summaries
- Journal Entry
- Misconception Check
- Observation
- Questions & Answers
- Quiz
- Self-Assessment
- Student Conference
- Think-Pair-Share
- Web or Concept Map

### **Authentic Assessments**

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Blood Typing Lab

Bloodstains on Different Medium Lab

Blood Spatter Pattern Lab

Area of Convergence Lab

Analyzing Crime Scene using Blood Analysis

**Benchmark Assessments**

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Unit test on Blood

**STAGE 3- LEARNING PLAN**

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**Instructional Map**

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Blood Basics

History of Blood

Composition of Blood

Blood Spatter Patterns

Bloodstain Patterns

Area of Convergence

Blood Typing

**Modification/Differentiation of Instruction**

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Differentiation Strategies for Special Education Students

- Remove unnecessary material, words, etc., that can distract from the content
- Use of off-grade level materials
- Provide appropriate scaffolding
- Limit the number of steps required for completion
- Time allowed
- Level of independence required
- Tiered centers, assignments, lessons, or products
- Provide appropriate leveled reading materials
- Deliver the content in “chunks”
- Varied texts and supplementary materials
- Use technology, if available and appropriate

- Varied homework and products
- Varied questioning strategies
- Provide background knowledge
- Define key vocabulary, multiple-meaning words, and figurative language.
- Use audio and visual supports, if available and appropriate
- Provide multiple learning opportunities to reinforce key concepts and vocabulary
- Meet with small groups to reteach idea/skill
- Provide cross-content application of concepts
- Ability to work at their own pace
- Present ideas using auditory, visual, kinesthetic, & tactile means
- Provide graphic organizers and/or highlighted materials
- Strategy and flexible groups based on formative assessment
- Differentiated checklists and rubrics, if available and appropriate

### Differentiation Strategies for Gifted and Talented Students

- Increase the level of complexity
- Decrease scaffolding
- Variety of finished products
- Allow for greater independence
- Learning stations, interest groups
- Varied texts and supplementary materials
- Use of technology
- Flexibility in assignments
- Varied questioning strategies
- Encourage research
- Strategy and flexible groups based on formative assessment or student choice
- Acceleration within a unit of study
- Exposure to more advanced or complex concepts, abstractions, and materials
- Encourage students to move through content areas at their own pace
- After mastery of a unit, provide students with more advanced learning activities, not more of the same activity
- Present information using a thematic, broad-based, and integrative content, rather than just single-subject areas

### Differentiated Strategies for ELL Students

- Remove unnecessary materials, words, etc., that can distract from the content
- Provide appropriate scaffolding
- Limit the number of steps required for completion
- Gradually increase the level of independence required

- Tiered centers, assignments, lessons, or products
- Provide appropriate leveled reading materials
- Deliver the content in “chunks”
- Varied texts and supplementary materials, including visuals
- Use technology, if available and appropriate
- Differentiate homework and products
- Varied questioning strategies
- Provide background knowledge
- Define key vocabulary, multiple-meaning words, and figurative language.
- Use audio and visual supports, if available and appropriate
- Provide multiple learning opportunities to reinforce key concepts and vocabulary
- Meet with small groups to reteach idea/skill
- Provide cross-content application of concepts
- Allow students to work at their own pace
- Presenting ideas through auditory, visual, kinesthetic, & tactile means
- Role play
- Provide graphic organizers, highlighted materials
- Strategy and flexible groups based on formative assessment

### Differentiation Strategies for At Risk Students

- Remove unnecessary materials, words, etc., that can distract from the content
- Provide appropriate scaffolding
- Limit the number of steps required for completion
- Gradually increase the level of independence required
- Tiered centers, assignments, lessons, or products
- Provide appropriate leveled reading materials
- Deliver the content in “chunks”
- Varied texts and supplementary materials
- Use technology, if available and appropriate
- Differentiate homework and products
- Varied questioning strategies
- Provide background knowledge
- Define key vocabulary, multiple-meaning words, and figurative language
- Use audio and visual supports, if available and appropriate
- Provide multiple learning opportunities to reinforce key concepts and vocabulary
- Meet with small groups to reteach idea/skill
- Provide cross-content application of concepts
- Presenting ideas through auditory, visual, kinesthetic, & tactile means
- Provide graphic organizers and/or highlighted materials
- Strategy and flexible groups based on formative assessment

## 504 Plans

Students can qualify for 504 plans if they have physical or mental impairments that affect or limit any of their abilities to:

- walk, breathe, eat, or sleep
- communicate, see, hear, or speak
- read, concentrate, think, or learn
- stand, bend, lift, or work

Examples of accommodations in 504 plans include:

- preferential seating
- extended time on tests and assignments
- reduced homework or classwork
- verbal, visual, or technology aids
- modified textbooks or audio-video materials
- behavior management support
- adjusted class schedules or grading
- verbal testing
- excused lateness, absence, or missed classwork
- pre-approved nurse's office visits and accompaniment to visits
- occupational or physical therapy

## Modification Strategies

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- Cooperative Grouping
- Extended Time
- Frequent Breaks
- Highlighted Text
- Modified Test
- Oral Directions
- Peer Tutoring
- Preferential Seating
- Re-direct
- Repeated Drill and Practice



- Teacher Notes
- Tutorials
- Use of Additional Reference Materials
- Use of Audio Resources

## **Differentiation Strategies**

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### **High Preparation**

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- Alternative Assessments
- Games and Tournaments
- Group Investigations
- Guided Reading
- Independent Research / Project
- Interest Groups
- Leveled Rubrics
- Multiple Intelligence Options
- Multiple Texts
- Project Based Learning (PBL)
- Stations / Centers
- Tiered Activities / Assignments
- Varying Graphic Organizers

### **Low Preparation**

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- Choice of Book / Activity
- Exploration by Interest (using interest inventories)
- Flexible Grouping
- Goal Setting With Student
- Homework Options
- Jigsaw
- Open-ended Activities
- Think-Pair-Share by Readiness, Interest, or Learning Style
- Use of Collaboration
- Use of Reading Buddies
- Varied Product Choice

- Varied Supplemental Materials
- Work Alone / Together

## **Horizontal Intergration- Interdisciplinary Connections**

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See Appendix

## **Vertical Integration- Discipline Mapping**

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Biology/Anatomy & Physiology - Composition of blood/blood typing

Middle School Science - Diversity of Life, Populations and Ecosystems, Human Systems Interactions, and Heredity and Adaptations

## **Additional Materials**

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Forensic Science Fundamentals and Investigations - Bertino & Bertino

Sciencespot.net

Forensics.rice.edu

Blood typing game - <http://www.nobelprize.org/educational/medicine/bloodtypinggame/>