Garfield Public Schools
Forensic Science Curriculum
Forensics

Revision Committee:

Mr. Patrick McCrone

Final Revision Date: August 31, 2011

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Board Adoption Date – September 26, 2011
Resolution # - 09-137-11
Science Curriculum
Forensic Science

Course Description

Forensic Science is the application of science to those criminal and civil laws that are enforced by police agencies in a criminal justice system. It has become a comprehensive subject incorporating Biology, Chemistry, Physics, Entomology, Earth Science, Anatomy and Physiology as well as other aspects of Science. Major topics include processing a crime scene, collecting and preserving evidence, identifying types of physical evidence, organic and inorganic analysis of evidence, hair, fibers, and paint, toxicology, arson and explosion investigations, serology, DNA, fingerprints, firearms, and document analysis. The main focus of this course will be to emphasize the evidential value of crime scene and related evidence and the services of what has become known as the crime laboratory. This course combines basic theory and real laboratory experiments, creating an experiment based situation for the better understanding of the students. The experiments used reinforce previously learned scientific principles rooted in Biology, Chemistry and physics. Each unit has its own experiments, which can be modified depending on class size and exterior circumstances such as climate.
Science Curriculum
Forensic Science
Unit Map

Unit Title: Observation Skills ................................................................. 6

Duration: 1 week

Students will be introduced to the field of forensics. They will learn about the history, development, organization, services and functions of the forensic scientist and lab.

Unit Title: Investigation and Evidence Collection ............................................. 8

Duration: 1 week

Students will be introduced to the basics of the crime scene. During this unit, legal considerations at the crime scene will be addressed. The concept of the primary investigation will be covered. Students will also recognize how the scientific method is used to solve forensic problems.

Unit Title: Hair ..................................................................................................... 10

Duration: 1 weeks

Students will learn about the morphology of hair, and how to identify and compare hair samples. Also discussed are the proper methods for collection and preservation of hair evidence.

Unit Title: Fiber and Textiles ........................................................................ 12

Duration: 2 weeks

Students will learn about the morphology of hair, and how to identify and compare hair samples. Also discussed are the proper methods for collection and preservation of hair evidence. Next, the different types of fiber are introduced. The collection and preservation techniques of fiber evidence are covered. Finally, paint evidence and the method of forensic examination are discussed.

Unit Title: Pollen and Spore Examination ........................................................ 14

Duration: 1 week

Students will learn how pollen and spores can be used as evidence. They will learn how to process pollen and spore evidence.

Unit Title: Fingerprints .................................................................................. 16

Duration: 1 week

Students will learn about the history of fingerprint evidence and how fingerprints are used as evidence. They will learn how to collect fingerprints, identify and match fingerprints.

Unit Title: DNA fingerprinting ......................................................................... 18

Duration: 2 weeks

Students are introduced to DNA evidence at a crime scene. They will learn about processing DNA evidence and the DNA fingerprinting process.
Unit Title: Processing Blood

Duration: 2 weeks

Students will learn how blood identification and blood typing are done in the lab and their importance as evidence in a crime scene. The analysis of blood spatter evidence is also covered.

Unit Title: Drug Identification and Toxicology

Duration: 1 week

Students will learn about drugs identification and toxicology. Also covered are agents of bioterrorism.

Unit Title: Document and Voice Examination

Duration: 1 week

Students learn how to compare handwriting samples, forgery, and counterfeiting.

Unit Title: Death: Meaning, Manner, Mechanism, Cause and Time

Duration: 2 weeks

Students will learn about death in relation to a crime scene. They will learn how a medical examiner can identify the manner, mechanism, cause, and time of death for a victim using various techniques.

Unit Title: Soil Examination

Duration: 1 week

Students will learn about soil evidence. They will learn to how to examine soil samples to recognize the type and how to link evidence to a crime scene.

Unit Title: Forensic anthropology

Duration: 2 weeks

Students will learn about bones in relation to a crime scene. They will learn how to identify bones, and determine sex, age, and ethnic origin of a skeleton.

Unit Title: Glass evidence

Duration: 1 week

Students learn about how glass is formed, characteristics and types of glass. They will also learn about fracture and fracture patterns that are used to analyze glass found as evidence.

Unit Title: Casts and Impressions

Duration: 1 week

Students will learn about imprints. They will also learn how to make molds of imprints: foot imprint, bite imprints, etc.

Unit Title: Ballistics

Duration: 1 week

Students will learn about firearm and impression evidence. They will learn how to compare bullets and cartridge cases. They will learn about gunpowder residues and primer residues which can be used as
evidence to link a suspect to a crime. Also discussed are serial number restoration and tool marks. Finally, students will learn about the automated firearm search system.

New Jersey Core Curriculum Content Standards Index ................................................................. 39
Common Core Standards for Literacy in History/Social Studies, Science, and Technical Subjects.......... 40

In

Range of Reading and Level of Text Complexity

Grades 11-12

Text Types and Purpose

Production and Distribution of Writing

Research to Build and Present Knowledge

Range of Writing
# Unit Overview

**Content Area:** Science  
**Unit Title:** Observation Skills  
**Target Course/Grade Level:** Forensics / Grade 11-12  
**Duration:** 1 week  

**Description**  
Students will be introduced to the field of forensics. They will learn about the history, development, organization, services and functions of the forensic scientist and lab.

## Concepts & Understandings

<table>
<thead>
<tr>
<th>Concepts</th>
<th>Understandings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forensic Science</td>
<td>Observation skills are extremely important in forensics science, especially when processing a crime scene.</td>
</tr>
<tr>
<td>Observation</td>
<td>Eyewitness accounts are useful, but not always accurate.</td>
</tr>
<tr>
<td>Witnesses</td>
<td></td>
</tr>
</tbody>
</table>

## Learning Targets

**CPI Codes**

- 5.1.12.B.1  
- 5.1.12.B.2  
- 5.1.12.B.3  
- 5.1.12.B.4  
- 5.1.12.C.1  
- 5.1.12.C.2  
- 5.1.12.C.3  
- 5.1.12.C.4  
- 5.1.12.D.1  
- 5.1.12.D.2  
- 5.1.12.D.3  
- 5.3.12.A.1  
- 5.3.12.A.2  
- 5.3.12.A.3

## 21st Century Themes and Skills

**Themes**

- Global Awareness  
- Civic Literacy  
- Environmental Literacy

**Skills**

- Critical Thinking and Problem Solving Skills  
- Communication and Collaboration Skills
| • ICT Literacy |
| • Life and Career Skills |

**Guiding Questions**

- What is the role of the forensic scientist?
- What may influence the eyewitness testimony?

**Unit Results**

**Students will ...**

- Define forensic science or criminalistics. Recall the major contributors to the development of forensic science.
- Explain what may influence eyewitness testimony.
- Explain why perception is important in forensics.
- Introduce the students to other areas of forensic science that require expertise in a specialized area.

**Suggested Activities**

*The following activities can be incorporated into the daily lessons:*

- Case Studies

*The following experiments should be included into the daily lessons.*

- Eyewitness exercise
### Unit Overview

**Content Area:** Science  
**Unit Title:** Investigation and Evidence Collection  
**Target Course/Grade Level:**  
**Duration:** 1 week

**Description**  
Students will be introduced to the basics of the crime scene. During this unit, legal considerations at the crime scene will be addressed. The concept of the primary investigation will be covered. Students will also recognize how the scientific method is used to solve forensic problems.

### Concepts & Understandings

<table>
<thead>
<tr>
<th>Concepts</th>
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</thead>
</table>
| • Locard’s Exchange Principle  
• Procedure  
• Evidence | • Locard's principle is applied to crime scenes in (one direction) which the perpetrator(s) of a crime comes into contact with the scene, so the perpetrator(s) will both bring something into the scene and leave with something from the scene.  
• Crime scenes must be processed in a procedural manner.  
• Evidence is needed to determine the method by which a crime has been committed. |

### Learning Targets

<table>
<thead>
<tr>
<th>CPI Codes</th>
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<tbody>
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<td>5.1.12.A.1</td>
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<td>5.1.12.A.2</td>
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<td>5.1.12.D.3</td>
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### 21st Century Themes and Skills

**Themes**  
• Global Awareness  
• Civic Literacy  
• Environmental Literacy
### Skills
- Critical Thinking and Problem Solving Skills
- Communication and Collaboration Skills
- ICT Literacy
- Life and Career Skills

### Guiding Questions
- What is the importance of the physical evidence found at the crime scene?
- What is the best way to search a crime scene?
- Can a crime scene be reconstructed?
- How do you properly package physical evidence?
- What is the difference between indirect and direct evidence?
- How do we use the scientific method in forensic science?
- What is physical evidence?
- What can physical evidence be used to prove in court? What can physical evidence not prove in court?
- What is the difference between individual and class evidence.

### Unit Results
**Students will ...**
- Describe proper procedures for conducting a systematic search of crime scenes for physical evidence.
- Describe proper techniques for packaging common types of physical evidence.
- Explain the legal considerations at the crime scene.
- Distinguish between direct and indirect evidence.
- Describe how the scientific method is used in forensic science.
- Define physical evidence.
- Identify different types of physical evidence.
- Explain what physical evidence can and cannot prove in court.
- Collect physical evidence.
- Differentiate between direct evidence, circumstantial evidence, and individual evidence.
- Differentiate between the significance of individual evidence vs. class evidence.
- Identify individual evidence.
- Identify class evidence.

### Suggested Activities
*The following activities can be incorporated into the daily lessons:*
- Case studies.

### Laboratory Experiments
*The following experiments should be included into the daily lessons.*
- Processing Evidence
## Unit Overview

**Content Area:** Science  
**Unit Title:** Hair  
**Target Course/Grade Level:** Forensics / Grade 11-12  
**Duration:** 1 weeks

**Description**  
Students will learn about the morphology of hair, and how to identify and compare hair samples. Also discussed are the proper methods for collection and preservation of hair evidence.

## Concepts & Understandings

<table>
<thead>
<tr>
<th>Concepts</th>
<th>Understandings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hair Evidence</td>
<td>Hair evidence can be used to tie a suspect to a crime scene and victim. Forensic scientists can determine a number of things from analyzing hairs found at crime scenes. The clues that hairs reveal include what part of the body the hairs came from, the race of the person they came from, if the hairs shed naturally or were pulled from someone's head, and whether the hairs were color treated.</td>
</tr>
</tbody>
</table>

## Learning Targets

**CPI Codes**

- 5.1.12.A.1
- 5.1.12.A.2
- 5.1.12.A.3
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- 5.1.12.B.4
- 5.1.12.C.1
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- 5.1.12.C.3
- 5.1.12.D.1
- 5.1.12.D.2
- 5.1.12.D.3
- 5.3.12.A.1
- 5.3.12.A.2
- 5.3.12.A.3

## 21st Century Themes and Skills

**Themes**

- Global Awareness
- Health Literacy
- Environmental Literacy

**Skills**

Forensics – Hair
### Forensics – Hair

- Critical Thinking and Problem Solving Skills
- Communication and Collaboration Skills
- ICT Literacy
- Life and Career Skills

### Guiding Questions
- What are the proper methods for hair and fiber collection at the crime scene?
- What is the probative value of this evidence?

### Unit Results

**Students will ...**
- Describe the cuticle, cortex and medulla of hair.
- Explain the distinction between animal and human hair.
- Process hair evidence

### Suggested Activities

**The following activities can be incorporated into the daily lessons:**
- Case studies

### Laboratory Experiments

**The following experiments should be included into the daily lessons.**
- Processing hair
## Unit Overview

**Content Area:** Science  
**Unit Title:** Fiber and Textiles  
**Target Course/Grade Level:** Forensics / Grade 11-12  
**Duration:** 2 weeks  

### Description

Students will learn about the morphology of hair, and how to identify and compare hair samples. Also discussed are the proper methods for collection and preservation of hair evidence. Next, the different types of fiber are introduced. The collection and preservation techniques of fiber evidence are covered. Finally, paint evidence and the method of forensic examination are discussed.

### Concepts & Understandings

<table>
<thead>
<tr>
<th>Concepts</th>
<th>Understandings</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Fiber Evidence</td>
<td>• Fiber evidence can be used to tie a suspect to a crime scene. The location of fibers can also suggest the contact the suspect had with the science.</td>
</tr>
</tbody>
</table>

### Learning Targets

<table>
<thead>
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<td>• 5.1.12.B.4</td>
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<td>• 5.1.12.C.2</td>
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<td>• 5.1.12.D.2</td>
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<td>• 5.1.12.D.3</td>
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<td>• 5.3.12.A.1</td>
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<td>• 5.3.12.A.2</td>
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<td>• 5.3.12.A.3</td>
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</tbody>
</table>

## 21st Century Themes and Skills

**Themes**

- Global Awareness  
- Health Literacy  
- Environmental Literacy  

**Skills**

- Critical Thinking and Problem Solving Skills  
- Communication and Collaboration Skills
<table>
<thead>
<tr>
<th>ICT Literacy</th>
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<tbody>
<tr>
<td>Life and Career Skills</td>
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</tbody>
</table>

**Guiding Questions**
- What are the proper methods for hair and fiber collection at the crime scene?
- What is the probative value of this evidence?

**Unit Results**

*Students will...*
- Classify fiber
- Identify common weave patterns and textiles.
- Differentiate between physical and chemical analysis.
- Identify common fibers.
- Perform a forensic analysis of fiber

**Suggested Activities**

*The following activities can be incorporated into the daily lessons:*
- Case studies

**Laboratory Experiments**

*The following experiments should be included into the daily lessons.*
- Processing Fiber
## Unit Overview

**Content Area:** Science  
**Unit Title:** Pollen and Spore Examination  
**Target Course/Grade Level:** Forensics / Grade 11-12  
**Duration:** 1 week  

### Description

Students will learn how pollen and spores can be used as evidence. They will learn how to process pollen and spore evidence.

### Concepts & Understandings

<table>
<thead>
<tr>
<th>Concepts</th>
<th>Understandings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pollen and Spore Evidence</td>
<td>Pollen and spores found at a crime scene can be used as evidence as it can tie a suspect to the scene.</td>
</tr>
</tbody>
</table>

### Learning Targets

**CPI Codes**

- 5.1.12.A.1
- 5.1.12.A.2
- 5.1.12.A.3
- 5.1.12.B.1
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- 5.3.12.A.1
- 5.3.12.A.2
- 5.3.12.A.3

### 21st Century Themes and Skills

**Themes**

- Global Awareness  
- Health Literacy  
- Environmental Literacy

**Skills**

- Critical Thinking and Problem Solving Skills  
- Communication and Collaboration Skills  
- ICT Literacy
<table>
<thead>
<tr>
<th>Life and Career Skills</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Guiding Questions</strong></td>
</tr>
<tr>
<td>• How can pollen and spores be used as evidence?</td>
</tr>
<tr>
<td><strong>Unit Results</strong></td>
</tr>
<tr>
<td><em>Students will...</em></td>
</tr>
<tr>
<td>• Understand the importance of tracing the pollen to its origin</td>
</tr>
<tr>
<td>• Distinguish between pollen and spores</td>
</tr>
<tr>
<td>• Explain the concept of a Pollen “fingerprint”</td>
</tr>
<tr>
<td>• Identify some organisms that produce pollen and spores.</td>
</tr>
<tr>
<td>• Describe characteristics of pollen and spores that are important in forensic studies.</td>
</tr>
<tr>
<td>• Collection of evidence at the crime scene.</td>
</tr>
<tr>
<td>• Analysis and evaluation of pollen and spore samples.</td>
</tr>
<tr>
<td><strong>Suggested Activities</strong></td>
</tr>
<tr>
<td><em>The following activities can be incorporated into the daily lessons:</em></td>
</tr>
<tr>
<td>• Case studies, analyzing pollen particles</td>
</tr>
<tr>
<td><strong>Laboratory Experiments</strong></td>
</tr>
<tr>
<td><em>The following experiments should be included into the daily lessons.</em></td>
</tr>
<tr>
<td>• Processing pollen and spores from our environment.</td>
</tr>
</tbody>
</table>
### Unit Overview

**Content Area:** Science  
**Unit Title:** Fingerprints  
**Target Course/Grade Level:** Forensics / Grade 11-12  
**Duration:** 1 week

**Description**  
Students will learn about the history of fingerprint evidence and how fingerprints are used as evidence. They will learn how to collect fingerprints, identify and match fingerprints.

<table>
<thead>
<tr>
<th>Concepts</th>
<th>Understandings</th>
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</thead>
<tbody>
<tr>
<td>- Fingerprint evidence</td>
<td>- Fingerprints can be used as evidence to tie a suspect to a crime scene.</td>
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</tbody>
</table>

### Concepts & Understandings

**Learning Targets**

<table>
<thead>
<tr>
<th>CPI Codes</th>
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<tbody>
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</table>

### 21st Century Themes and Skills

**Themes**  
- Global Awareness  
- Health Literacy  
- Environmental Literacy

**Skills**  
- Critical Thinking and Problem Solving Skills  
- Communication and Collaboration Skills  
- ICT Literacy  
- Life and Career Skills
### Guiding Questions
- Is it a match?

### Unit Results

**Students will...**
- Summarize the history of fingerprinting.
- Describe some characteristics of fingerprints.
- Identify basic types of fingerprints.
- Explain the Reliability and identification of fingerprints.
- Collect fingerprints.
- Describe some fingerprint identification technologies.
- Lift fingerprints and match latent fingerprints.
- Lift latent prints, process a ten card and match prints.

### Suggested Activities

The following activities can be incorporated into the daily lessons:
- Case studies, analyzing fingerprints.

### Laboratory Experiments

The following experiments should be included into the daily lessons.
- Processing Fingerprints.
**Unit Overview**

**Content Area:** Science  
**Unit Title:** DNA fingerprinting.  
**Target Course/Grade Level:** Forensics/ Grade 11-12  
**Duration:** 2 weeks  

**Description:**  
Students are introduced to DNA evidence at a crime scene. They will learn about processing DNA evidence and the DNA fingerprinting process.

<table>
<thead>
<tr>
<th>Concepts &amp; Understandings</th>
<th>Understandings</th>
</tr>
</thead>
<tbody>
<tr>
<td>● Collecting crime-scene evidence DNA.</td>
<td>● DNA fingerprinting a technique employed by forensic scientists to assist in the identification of individuals by their respective DNA profiles.</td>
</tr>
<tr>
<td>● Processing crime scene evidence to obtain DNA</td>
<td>● DNA Fingerprints can be used as evidence.</td>
</tr>
<tr>
<td>● Comparing DNA. Gel electrophoresis.</td>
<td></td>
</tr>
<tr>
<td>● Analyzing test results.</td>
<td></td>
</tr>
<tr>
<td>● Uses of DNA analysis in matching evidence.</td>
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</tbody>
</table>

**Learning Targets**

**CPI Codes**

- 5.1.12.A.1
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- 5.1.12.D.3
- 5.3.12.A.1
- 5.3.12.A.2
- 5.3.12.A.3

**21st Century Themes and Skills**

**Themes**

- Global Awareness
- Civic Literacy
- Health Literacy
- Environmental Literacy

**Skills**

- Critical Thinking and Problem Solving Skills
### Guiding Questions
- Is it a match?
- What is DNA fingerprinting?

### Unit Results

**Students will...**
- Explain the scientific principles involved in DNA fingerprinting.
- Analyze DNA evidence.
- Process and match DNA fingerprints.

### Suggested Activities

**The following activities can be incorporated into the daily lessons:**
- DNA electrophoresis lab.
- DNA extraction and restriction lab.

**Laboratory Experiments**

**The following experiments should be included into the daily lessons.**
- Processing PCR and gel electrophoresis.
# Unit Overview

**Content Area:** Science  

**Unit Title:** Processing Blood  

**Target Course/Grade Level:** Forensics / Grade 11-12  

**Duration:** 2 weeks  

**Description**  
Students will learn how blood identification and blood typing are done in the lab and their importance as evidence in a crime scene. The analysis of blood spatter evidence is also covered.

## Concepts & Understandings

<table>
<thead>
<tr>
<th>Concepts</th>
<th>Understandings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Composition of Blood</td>
<td>Blood typing is a test used to determine which ABO and Rh blood type a sample is.</td>
</tr>
<tr>
<td>Function of blood cells</td>
<td>DNA fingerprinting a technique employed by forensic scientists to assist in the identification of individuals by their respective DNA profiles.</td>
</tr>
<tr>
<td>History of blood spatter analysis</td>
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<tr>
<td>Blood Typing</td>
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<tr>
<td>Screening for blood and human blood</td>
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<tr>
<td>DNA fingerprinting</td>
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</table>

## Learning Targets

**CPI Codes**  
- 5.1.12.A.1  
- 5.1.12.A.2  
- 5.1.12.A.3  
- 5.1.12.B.1  
- 5.1.12.B.2  
- 5.1.12.B.3  
- 5.1.12.C.1  
- 5.1.12.C.2  
- 5.1.12.C.3  
- 5.1.12.D.1  
- 5.1.12.D.2  
- 5.1.12.D.3  
- 5.3.12.A.1  
- 5.3.12.A.2  
- 5.3.12.A.3

## 21st Century Themes and Skills

**Themes**  
- Global Awareness  
- Civic Literacy  
- Health Literacy  
- Environmental Literacy  

**Skills**  
- Critical Thinking and Problem Solving Skills  
- Communication and Collaboration Skills
| Forensics – Processing Blood |

- ICT Literacy
- Life and Career Skills

### Guiding Questions
- What are the ABO and Rh blood types?
- How can you tell a substance is blood through microscopic examination?

### Unit Results
**Students will ...**
- Determine the ABO and Rh blood type of four suspects and compare them to blood found at the crime scene.
- Determine if a substance found at the scene is blood through microscopic examination.
- Analyze blood spatter.

### Suggested Activities
**The following activities can be incorporated into the daily lessons:**

### Laboratory Experiments
**The following experiments should be included into the daily lessons.**
- Perform blood typing labs and explain the process involved.
- Perform a DNA fingerprinting lab comparing the DNA of three possible suspects. The lab will include gel electrophoresis and analysis.
**Unit Overview**

**Content Area:** Science  
**Unit Title:** Drug Identification and Toxicology  
**Target Course/Grade Level:** Forensics / Grade 11-12  
**Duration:** 1 week

**Description**

Students will learn about drugs identification and toxicology. Also covered are agents of bioterrorism.

### Concepts & Understandings

<table>
<thead>
<tr>
<th>Concepts</th>
<th>Understandings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drugs</td>
<td>Drugs and toxins cause specific signs and symptoms in victims.</td>
</tr>
<tr>
<td>Toxins</td>
<td>Bioterrorism is terrorism that involves the intentional release of biological agents, such as bacteria, viruses, or toxins.</td>
</tr>
<tr>
<td>Bioterrorism.</td>
<td></td>
</tr>
</tbody>
</table>

### Learning Targets

**CPI Codes**

- 5.1.12.A.1  
- 5.1.12.A.2  
- 5.1.12.A.3  
- 5.1.12.B.1  
- 5.1.12.B.2  
- 5.1.12.B.3  
- 5.1.12.B.4  
- 5.1.12.C.1  
- 5.1.12.C.2  
- 5.1.12.C.3  
- 5.1.12.D.1  
- 5.1.12.D.2  
- 5.1.12.D.3  
- 5.3.12.A.1  
- 5.3.12.A.2  
- 5.3.12.A.3

### 21st Century Themes and Skills

**Themes**

- Global Awareness  
- Civic Literacy  
- Health Literacy  
- Environmental Literacy

**Skills**

- Critical Thinking and Problem Solving Skills  
- Communication and Collaboration Skills  
- ICT Literacy
## Forensics – Drug Identification and Toxicology

### Guiding Questions
- How do you identify drugs and what is the probative value of the different tests?
- What is bioterrorism?
- What type of substances can be used in a bioterrorism attack?

### Unit Results

**Students will ...**
- Identify the five types of controlled substances.
- Describe the signs and symptoms of overdose in relation to specific toxins.
- Identify some possible agents of bioterrorism.

### Suggested Activities

The following activities can be incorporated into the daily lessons:
- Bacterial Incubation
- Case Studies

### Laboratory Experiments

The following experiments should be included into the daily lessons.
- Chromatography
- Bacteriological Studies.
### Unit Overview

**Content Area:** Science  
**Unit Title:** Document and Voice Examination  
**Target Course/Grade Level:** Forensics / Grade 11-12  
**Duration:** 1 week

**Description**  
Students learn how to compare handwriting samples, forgery, and counterfeiting.

#### Concepts & Understandings

<table>
<thead>
<tr>
<th>Concepts</th>
<th>Understandings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Handwriting</td>
<td>Handwriting identification is based on the principle that there are individual features that distinguish one person's writing from that of another.</td>
</tr>
<tr>
<td>Forgery</td>
<td>Forgery is the process of making, adapting, or imitating objects, statistics, or documents with the intent to deceive. Many tests can be done on a document to determine whether or not it is a forgery.</td>
</tr>
<tr>
<td>Counterfeiting</td>
<td>Counterfeit products are made to imitate the real product. Many tests can be done to determine the authenticity of the item.</td>
</tr>
</tbody>
</table>

#### CPI Codes

- 5.1.12.A.1  
- 5.1.12.A.2  
- 5.1.12.A.3  
- 5.1.12.B.1  
- 5.1.12.B.2  
- 5.1.12.B.3  
- 5.1.12.B.4  
- 5.1.12.C.1  
- 5.1.12.C.2  
- 5.1.12.C.3  
- 5.1.12.D.1  
- 5.1.12.D.2  
- 5.1.12.D.3  
- 5.3.12.A.1  
- 5.3.12.A.2  
- 5.3.12.A.3

#### 21st Century Themes and Skills

**Themes**  
- Global Awareness  
- Environmental Literacy

Forensics – Document Analysis
## Skills
- Critical Thinking and Problem Solving Skills
- Communication and Collaboration Skills
- ICT Literacy
- Life and Career Skills

## Guiding Questions
- What do you look for when you compare handwriting samples?
- Is it a forgery?

## Unit Results
**Students will ...**
- Explain the process of forensic handwriting analysis.
- Compare handwriting samples.
- Describe the technology used in handwriting analysis.
- Explain how to determine if a bill is counterfeit.

## Suggested Activities
*The following activities can be incorporated into the daily lessons:*
- Process case studies.
- The Case of Lois Mac Arthur

## Laboratory Experiments
*The following experiments should be included into the daily lessons.*
- Chromatography
- Handwriting Analysis
- Crime Scene Analysis
## Unit Overview

**Content Area:** Science  
**Unit Title:** Death: Meaning, Manner, Mechanism, Cause and Time.  
**Target Course/Grade Level:** Forensics / Grade 11-12  
**Duration:** 2 weeks  
**Description**  
Students will learn about death in relation to a crime scene. They will learn how a medical examiner can identify the manner, mechanism, cause, and time of death for a victim using various techniques.

## Concepts & Understandings

**Concepts**  
- Four manners of death.  
- Stages of decomposition.  
- Autopsy’s report.  
- Insects and the determine time of death.  
- Environmental factors in determination of time of death.

**Understandings**  
- The four manners of death are the four main categories in which death can occur that a pathologist will look for when he or she is examining the deceased. They include: natural causes, homicide, accidental death, and suicide.  
- Bodies of living organisms begin to decompose shortly after death. Although no two organisms decompose in the same way, they all undergo the same sequential stages of decomposition.  
- An autopsy report is completed by the medical examiner after the autopsy has been performed. It contains any information relating to the manner, mechanism, cause, and time of death that was found during the autopsy.  
- Insects colonize cadavers in a predictable sequence, also known as insect succession. This can be especially useful in determining time of death.  
- Environmental factors, such as temperature, can affect determination of cause of death because it affects the onset of rigor mortis.

## Learning Targets

**CPI Codes**  
- 55.1.12.A.1  
- 5.1.12.A.2  
- 5.1.12.A.3  
- 5.1.12.B.1  
- 5.1.12.B.2
Forensics – Death: Meaning, Manner, Mechanism, Cause, and Time
## Laboratory Experiments

*The following experiments should be included into the daily lessons.*

- Entomology lab.
- Processing larvae
## Unit Overview

<table>
<thead>
<tr>
<th><strong>Content Area:</strong></th>
<th>Science</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Unit Title:</strong></td>
<td>Soil Examination</td>
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<tr>
<td><strong>Target Course/Grade Level:</strong></td>
<td>Forensics / Grade 11-12</td>
</tr>
<tr>
<td><strong>Duration:</strong></td>
<td>1 weeks</td>
</tr>
</tbody>
</table>

### Description

Students will learn about soil evidence. They will learn how to examine soil samples to recognize the type and how to link evidence to a crime scene.

### Concepts & Understandings

<table>
<thead>
<tr>
<th>Concepts</th>
<th>Understandings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soil</td>
<td>Soil samples can be analyzed and can be linked to a crime scene.</td>
</tr>
</tbody>
</table>

### CPI Codes

- 55.1.12.A.1
- 5.1.12.A.2
- 5.1.12.A.3
- 5.1.12.B.1
- 5.1.12.B.2
- 5.1.12.B.3
- 5.1.12.B.4
- 5.1.12.C.1
- 5.1.12.C.2
- 5.1.12.C.3
- 5.1.12.D.1
- 5.1.12.D.2
- 5.1.12.D.3
- 5.3.12.A.1.
- 5.3.12.A.2
- 5.3.12.A.3

### 21st Century Themes and Skills

#### Themes
- Global Awareness
- Environmental Literacy

#### Skills
- Critical Thinking and Problem Solving Skills
- Communication and Collaboration Skills
- ICT Literacy
- Life and Career Skills.

### Guiding Questions

- Where does this soil sample belong?
### Unit Results

**Students will...**
- Recognize various types of soil and methods for examining soil samples.
- Identify the differences between soils samples by size, color and composition.
- Perform soil analysis.
- Link soil evidence to crime scene.

### Suggested Activities

*The following activities can be incorporated into the daily lessons:*
- Process case studies.

### Laboratory Experiments

*The following experiments should be included into the daily lessons.*
- Soil Analysis
- pH, microscopic examination, chemical analysis
## Unit Overview

**Content Area:** Science  
**Unit Title:** Forensic anthropology  
**Target Course/Grade Level:** Forensics / Grade 11-12  
**Duration:** 2 weeks

### Description

Students will learn about bones in relation to a crime scene. They will learn how to identify bones, and determine sex, age, and ethnic origin of a skeleton.

### Concepts & Understandings

<table>
<thead>
<tr>
<th>Concepts</th>
<th>Understandings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bones</td>
<td>Bones and bone fragments can be analyzed to help you determine sex, age, and origin.</td>
</tr>
</tbody>
</table>

### Learning Targets

**CPI Codes**

- 5.1.12.A.1
- 5.1.12.A.2
- 5.1.12.A.3
- 5.1.12.B.1
- 5.1.12.B.2
- 5.1.12.B.3
- 5.1.12.B.4
- 5.1.12.C.1
- 5.1.12.C.2
- 5.1.12.C.3
- 5.1.12.D.1
- 5.1.12.D.2
- 5.1.12.D.3
- 5.3.12.A.1
- 5.3.12.A.2
- 5.3.12.A.3

### 21st Century Themes and Skills

**Themes**

- Global Awareness
- Health Literacy
- Environmental Literacy

**Skills**

- Critical Thinking and Problem Solving Skills
- Communication and Collaboration Skills
- ICT Literacy
- Life and Career Skills
### Guiding Questions
- Can bones talk?

### Unit Results
*Students will...*
- Process bones
- Determine sex, age and ethnic origin of a skeleton

### Suggested Activities
*The following activities can be incorporated into the daily lessons:*
- Identifying human bones

### Laboratory Experiments
*The following experiments should be included into the daily lessons.*
- Determine sex, age and ethnic origin of a skeleton.
### Unit Overview

**Content Area:** Science  
**Unit Title:** Glass evidence  
**Target Course/Grade Level:** Forensics / Grade 11-12  
**Duration:** 1 week

**Description**  
Students learn about how glass is formed, characteristics and types of glass. They will also learn about fracture and fracture patterns that are used to analyze glass found as evidence.

### Concepts & Understandings

<table>
<thead>
<tr>
<th>Concepts</th>
<th>Understandings</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Glass as evidence.</td>
<td>- Glass fragments and fracture patterns can be analyzed to match glass found at a crime scene.</td>
</tr>
</tbody>
</table>

### Learning Targets

**CPI Codes**
- 5.1.12.A.1  
- 5.1.12.A.2  
- 5.1.12.A.3  
- 5.1.12.B.1  
- 5.1.12.B.2  
- 5.1.12.B.3  
- 5.1.12.B.4  
- 5.1.12.C.1  
- 5.1.12.C.2  
- 5.1.12.C.3  
- 5.1.12.D.1  
- 5.1.12.D.2  
- 5.1.12.D.3  
- 5.3.12.A.1  
- 5.3.12.A.2  
- 5.3.12.A.3

### 21st Century Themes and Skills

**Themes**
- Global Awareness  
- Environmental Literacy  

**Skills**
- Critical Thinking and Problem Solving Skills  
- Communication and Collaboration Skills  
- ICT Literacy  
- Life and Career Skills

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Forensics – Glass Evidence
### Guiding Questions

- How can you analyze glass found at a crime scene?

### Unit Results

**Students will...**

- Explain how glass is formed.
- Identify characteristics of glass.
- Describe the different types of glass.
- Explain density in terms of glass.
- Define refractive index.
- Summarize how fracture and fracture patterns can be used in the analysis of glass.
- Consider glass fragments.

### Suggested Activities

*The following activities can be incorporated into the daily lessons:*

- Case studies.

### Laboratory Experiments

*The following experiments should be included into the daily lessons.*

- Analysis of pattern in broken glass.
# Unit Overview

**Content Area:** Science  
**Unit Title:** Casts and Impressions  
**Target Course/Grade Level:** Forensics / Grade 11-12  
**Duration:** 1 week  
**Description**  
Students will learn about imprints. They will also learn how to make molds of imprints: foot imprint, bite imprints, etc.

### Concepts & Understandings

<table>
<thead>
<tr>
<th>Concepts</th>
<th>Understandings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Imprint Evidence</td>
<td>Imprint evidence involves the examination and comparison of footwear impressions or other types of imprint/impression evidence.</td>
</tr>
</tbody>
</table>

### Learning Targets

**CPI Codes**  
- 5.1.12.A.1  
- 5.1.12.A.2  
- 5.1.12.A.3  
- 5.1.12.B.1  
- 5.1.12.B.2  
- 5.1.12.B.3  
- 5.1.12.B.4  
- 5.1.12.C.1  
- 5.1.12.C.2  
- 5.1.12.C.3  
- 5.1.12.D.1  
- 5.1.12.D.2  
- 5.1.12.D.3

### 21st Century Themes and Skills

**Themes**  
- Global Awareness  
- Environmental Literacy  

**Skills**  
- Critical Thinking and Problem Solving Skills  
- Communication and Collaboration Skills  
- ICT Literacy  
- Life and Career Skills

### Guiding Questions

- What sources can we obtain imprint evidence from?

### Unit Results

*Students will*...  
- Identify the different sources that could provide imprint evidence.
### Suggested Activities

*The following activities can be incorporated into the daily lessons:*
- Case Studies

### Laboratory Experiments

*The following experiments should be included into the daily lessons.*
- Making shoe imprint cast and collecting footprints for analysis
# Unit Overview

**Content Area:** Science  
**Unit Title:** Ballistics  
**Target Course/Grade Level:** Forensics / Grade 11-12  
**Duration:** 1 week  

## Description

Students will learn about firearm and impression evidence. They will learn how to compare bullets and cartridge cases. They will learn about gunpowder residues and primer residues which can be used as evidence to link a suspect to a crime. Also discussed are serial number restoration and tool marks. Finally, students will learn about the automated firearm search system.

## Concepts & Understandings

<table>
<thead>
<tr>
<th>Concepts</th>
<th>Understandings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firearm evidence</td>
<td>Firearm evidence can be analyzed by a forensic scientist to match a bullet to the weapon that fired it.</td>
</tr>
</tbody>
</table>

## Learning Targets

<table>
<thead>
<tr>
<th>CPI Codes</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.1.12.A.1</td>
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<tr>
<td>5.1.12.A.2</td>
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<td>5.1.12.A.3</td>
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<tr>
<td>5.1.12.B.1</td>
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<td>5.1.12.B.2</td>
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<td>5.1.12.B.3</td>
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<tr>
<td>5.1.12.B.4</td>
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<td>5.1.12.C.1</td>
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<td>5.1.12.C.2</td>
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<td>5.1.12.C.3</td>
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<td>5.1.12.D.1</td>
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<td>5.1.12.D.2</td>
</tr>
<tr>
<td>5.1.12.D.3</td>
</tr>
<tr>
<td>5.3.12.A.1</td>
</tr>
<tr>
<td>5.3.12.A.2</td>
</tr>
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<td>5.3.12.A.3</td>
</tr>
</tbody>
</table>

## 21st Century Themes and Skills

### Themes
- Global Awareness  
- Environmental Literacy

### Skills
- Critical Thinking and Problem Solving Skills  
- Communication and Collaboration Skills  
- ICT Literacy  
- Life and Career Skills
<table>
<thead>
<tr>
<th>Guiding Questions</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>How can bullets be analyzed?</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Unit Results</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Students will ...</td>
<td></td>
</tr>
<tr>
<td>Analyze of bullets using a microscope.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Suggested Activities</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>The following activities can be incorporated into the daily lessons:</td>
<td></td>
</tr>
<tr>
<td>Case studies</td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Laboratory Experiments</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>The following experiments should be included into the daily lessons.</td>
<td></td>
</tr>
<tr>
<td>Analyze bullets for matching as well as cartridges</td>
<td></td>
</tr>
</tbody>
</table>
### New Jersey Core Curriculum Content Standards Index

<table>
<thead>
<tr>
<th>Standard Code</th>
<th>Description</th>
<th>Standards Met</th>
<th>Year Range</th>
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<tbody>
<tr>
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<tr>
<td>5.1.12.D.3</td>
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<td>5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25</td>
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</tbody>
</table>
Common Core Standards for Literacy in History/Social Studies, Science, and Technical Subjects

The following Common Core Standards are infused throughout the curriculum. Specific standards addressed will be noted in the individual teacher’s lesson plans.

Reading Standards for Literacy in Science and Technical Subjects (RST)

Grades 11-12

Key Ideas and Details

- **RST.11-12.1** – Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
- **RST.11-12.2** – Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.
- **RST.11-12.3** – Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.

Craft and Structure

- **RST.11-12.4** – Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.
- **RST.11-12.5** – Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.
- **RST.11-12.6** – Analyze the author’s purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.

Integration of Knowledge and Ideas

- **RST.11-12.7** – Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
- **RST.11-12.8** – Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.
- **RST.11-12.9** - Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.

Range of Reading and Level of Text Complexity
• RST.11-12.10 - By the end of grade 12, read and comprehend science/technical texts in the grades 11-CCR text complexity band independently and proficiently.

Writing Standards for Literacy in History/Social Studies, Science, and Technical Subjects (WHST)

Grades 11-12

Text Types and Purpose

• WHST.11-12.1 - Write arguments focused on discipline-specific content.
  o WHST.11-12.1a - Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences the claim(s), counterclaims, reasons, and evidence.
  o WHST.11-12.1 - Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form that anticipates the audience’s knowledge level, concerns, values, and possible biases.
  o WHST.11-12.1c - Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims.
  o WHST.11-12.1d - Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.
  o WHST.11-12.1e - Provide a concluding statement or section that follows from or supports the argument presented.

• WHST.11-12.2 - Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.
  o WHST.11-12.2a - Introduce a topic and organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.
  o WHST.11-12.2b - Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience’s knowledge of the topic.
  o WHST.11-12.2c - Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts.
  o WHST.11-12.2d - Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic; convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers.
  o WHST.11-12.2e - Provide a concluding statement or section that follows from and supports the information or explanation provided (e.g., articulating implications or the significance of the topic).
● **WHST.11-12.3** (See note; not applicable as a separate requirement)
  ○ NOTE: Students’ narrative skills continue to grow in these grades. The Standards require that students be able to incorporate narrative elements effectively into arguments and informative/explanatory texts. In history/social studies, students must be able to incorporate narrative accounts into their analyses of individuals or events of historical import. In science and technical subjects, students must be able to write precise enough descriptions of the step-by-step procedures they use in their investigations or technical work that others can replicate them and (possibly) reach the same results.

### Production and Distribution of Writing

- **WHST.11-12.4** - Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
- **WHST.11-12.5** - Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.
- **WHST.11-12.6** - Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.

### Research to Build and Present Knowledge

- **WHST.11-12.7** - Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
- **WHST.11-12.8** - Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.
- **WHST.11-12.9** - Draw evidence from informational texts to support analysis, reflection, and research.

### Range of Writing

- **WHST.11-12.10** - Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.