Pequea Valley School District
Science

Unit 1: Crime Scene Basics **Course: Forensics** **Grade: 10-12**

Planning the Focus Based on the Desired Result
What do you want all students to know, understand and do by the end of the unit?

Unit Essential Question(s):
- How does the science of forensics work to solve investigative problems?

Keystone Eligible Content/PA Core Standard
3.1.12.A. - Apply concepts of systems, subsystems, feedback and control to solve complex technological problems.
3.1.12.C. - Assess and apply patterns in science and technology.
3.2.12.A. - Evaluate the nature of scientific and technological knowledge.
3.2.12.B. - Evaluate experimental information for appropriateness and adherence to relevant science processes.
3.2.12.C. - Apply the elements of scientific inquiry to solve multi-step problems.
3.2.12.D. - Analyze and use the technological design process to solve problems.
3.3.12.A. - Explain the relationship between structure and function at all levels of organization.
3.3.12.B. - Analyze the chemical and structural basis of living organisms.
3.4.12.A. - Apply concepts about the structure and properties of matter.
3.8.12.B. - Apply the use of ingenuity and technological resources to solve specific societal needs and improve the quality of life.

Pacing: Approximate number of class sessions per unit
- 10

Tier 3 Vocabulary (Content specific vocabulary)
- Observation
- Inference
- Inductive reasoning
- Class evidence
- Individual evidence
- Physical evidence
- Biological evidence
- Trace evidence

Know - What do learners need to **know** in order to be able to do and understand? ***List concepts, such as facts, formulas, key vocabulary and knowledge "nuggets".***

- Vocabulary
- Types of evidence
- Observation versus inference

Understand - What do learners need to **understand**? What is the **big idea**? ***List broad concepts or "big ideas" in a statement of enduring understanding.***

- Every contact leaves a trace.
- Inductive reasoning can be used to solve investigative problems.

Learning Outcome - What do learners need to be able to **accomplish** by the unit's end? ***List skills and competencies.***

- Sketch a crime scene
- Properly collect evidence

Literature:

Software/Resources:

Pequea Valley School District
Science

Unit 2: Death and Decomposition **Course: Forensics** **Grade: 10-12**

Planning the Focus Based on the Desired Result
What do you want all students to know, understand and do by the end of the unit?

Unit Essential Question(s):

- How can evidence be used to determine time of death?

Keystone Eligible Content/PA Core Standard

3.1.12.A. - Apply concepts of systems, subsystems, feedback and control to solve complex technological problems.
3.1.12.C. - Assess and apply patterns in science and technology.
3.2.12.A. - Evaluate the nature of scientific and technological knowledge.
3.2.12.B. - Evaluate experimental information for appropriateness and adherence to relevant science processes.
3.2.12.C. - Apply the elements of scientific inquiry to solve multi-step problems.
3.2.12.D. - Analyze and use the technological design process to solve problems.
3.3.12.A. - Explain the relationship between structure and function at all levels of organization.
3.3.12.B. - Analyze the chemical and structural basis of living organisms.
3.4.12.A. - Apply concepts about the structure and properties of matter.
3.8.12.B. - Apply the use of ingenuity and technological resources to solve specific societal needs and improve the quality of life.

Pacing: Approximate number of class sessions per unit

- 20

Tier 3 Vocabulary (Content specific vocabulary)

- Algor Mortis
- Autolysis
- Death
- Decomposition
- Forensic Entomology
- Instar
- Larvae
- Livor Mortis
- Pupae
- Rigor Mortis
- Manner Of Death

- Cause Of Death
- Proximate Cause Of Death
- Mechanism Of Death
- Medical Examiner
- Coroner

Know - What do learners need to **know** in order to be able to do and understand? ***List concepts, such as facts, formulas, key vocabulary and knowledge "nuggets".***

- Vocabulary
- Algor mortis formula
- Sequence of decomposition
- Entomology life cycles

Understand - What do learners need to **understand**? What is the **big idea**? ***List broad concepts or "big ideas" in a statement of enduring understanding.***

- The processes of death and decomposition follow a sequence of events that allows for estimation of time of death.

Learning Outcome - What do learners need to be able to **accomplish** by the unit's end? ***List skills and competencies.***

- Identify the manner, cause and mechanism of death
- Determine cause of death from lividity, rigor, algor and entomology

Literature:

Software/Resources:

Pequea Valley School District
Science

Unit 3: Fingerprinting **Course: Forensics** **Grade: 10-12**

Planning the Focus Based on the Desired Result
What do you want all students to know, understand and do by the end of the unit?

Unit Essential Question(s):
- How are fingerprints found at a crime scene visualized and analyzed by forensic scientists?

Keystone Eligible Content/PA Core Standard
3.1.12.A. - Apply concepts of systems, subsystems, feedback and control to solve complex technological problems.
3.1.12.C. - Assess and apply patterns in science and technology.
3.2.12.A. - Evaluate the nature of scientific and technological knowledge.
3.2.12.B. - Evaluate experimental information for appropriateness and adherence to relevant science processes.
3.2.12.C. - Apply the elements of scientific inquiry to solve multi-step problems.
3.2.12.D. - Analyze and use the technological design process to solve problems.
3.3.12.A. - Explain the relationship between structure and function at all levels of organization.
3.3.12.B. - Analyze the chemical and structural basis of living organisms.
3.4.12.A. - Apply concepts about the structure and properties of matter.
3.8.12.B. - Apply the use of ingenuity and technological resources to solve specific societal needs and improve the quality of life.

Pacing: Approximate number of class sessions per unit
- 10

Tier 3 Vocabulary (Content specific vocabulary)
- Loop
- Whorl
- Arch
- Minutiae
- Latent print
- Patent print
- Plastic print

Know - What do learners need to **know** in order to be able to do and understand? ***List concepts, such as facts, formulas, key vocabulary and knowledge "nuggets".***

- Key vocabulary
- Patterns of the various fingerprint classifications
- Minutiae types

Understand - What do learners need to **understand**? What is the **big idea**? ***List broad concepts or "big ideas" in a statement of enduring understanding.***

- Fingerprints have individual characteristics that allow them to be systematically categorized.

Learning Outcome - What do learners need to be able to **accomplish** by the unit's end? ***List skills and competencies.***

- The student will demonstrate proper technique for collection and preservation of fingerprint evidence.
- The student will identify the common characteristics of fingerprints.
- The student will use fingerprint evidence to confirm or deny the identity of a suspect.

Literature:

Software/Resources:

Pequea Valley School District
Science

Unit 4: Blood Typing and Blood Spatter **Course: Forensics** **Grade: 10-12**

Planning the Focus Based on the Desired Result
What do you want all students to know, understand and do by the end of the unit?

Unit Essential Question(s):
- How can blood typing be used by forensic scientists?
- How can blood spatter be used to determine the sequences of events at a crime scene?

Keystone Eligible Content/PA Core Standard
3.1.12.A. Apply concepts of systems, subsystems, feedback and control to solve complex technological problems.
3.1.12.C. Assess and apply patterns in science and technology.
3.2.12.A. Evaluate the nature of scientific and technological knowledge.
3.2.12.B. Evaluate experimental information for appropriateness and adherence to relevant science processes.
3.2.12.C. Apply the elements of scientific inquiry to solve multi-step problems.
3.2.12.D. Analyze and use the technological design process to solve problems.
3.3.12.A. Explain the relationship between structure and function at all levels of organization.
3.3.12.B. Analyze the chemical and structural basis of living organisms.
3.4.12.A. Apply concepts about the structure and properties of matter.
3.8.12.B. Apply the use of ingenuity and technological resources to solve specific societal needs and improve the quality of life.

Pacing: Approximate number of class sessions per unit

Tier 3 Vocabulary (Content specific vocabulary)
- Erythrocyte
- Leukocyte
- Thrombocyte
- Antigen
- Antibody
- Agglutination
- Probability
- Bloodstain
- Blood spatter
- Cast-off pattern
- Forward spatter pattern

- Area of convergence
- Directionality
- Drip stain
- Drip trail
- Edge characteristic
- Expiration pattern
- Impact pattern
- Spatter stain
- Void
- Point of origin
- Backspatter pattern
- Flow pattern
- Mist pattern
- Parent stain
- Perimeter stain
- Pool
- Projected pattern
- Satellite stain
- Splash pattern
- Swipe pattern
- Target
- Transfer stain
- Wipe pattern

Know - What do learners need to **know** in order to be able to do and understand? ***List concepts, such as facts, formulas, key vocabulary and knowledge "nuggets".***

- Blood types
- Blood typing procedure
- Types of bloodstain patterns

Understand - What do learners need to **understand**? What is the **big idea**? ***List broad concepts or "big ideas" in a statement of enduring understanding.***

- Blood left at a crime scene can provide evidence as to who was there as well as the sequence of events that occured.

Learning Outcome - What do learners need to be able to **accomplish** by the unit's end? ***List skills and competencies.***

- The learner will be able to perform a blood typing test and interpret the results of the test.
- The learner will be able to identify blood stain patterns to obtain information about the crime scene.

Pequea Valley School District
Science

Unit 5: DNA Profiling **Course: Forensics** **Grade: 10-12**

Planning the Focus Based on the Desired Result
What do you want all students to know, understand and do by the end of the unit?

Unit Essential Question(s):
- How is DNA profiling used by forensic scientists?

Keystone Eligible Content/PA Core Standard
3.1.12.A. - Apply concepts of systems, subsystems, feedback and control to solve complex technological problems.
3.1.12.C. - Assess and apply patterns in science and technology.
3.2.12.A. - Evaluate the nature of scientific and technological knowledge.
3.2.12.B. - Evaluate experimental information for appropriateness and adherence to relevant science processes.
3.2.12.C. - Apply the elements of scientific inquiry to solve multi-step problems.
3.2.12.D. - Analyze and use the technological design process to solve problems.
3.3.12.A. - Explain the relationship between structure and function at all levels of organization.
3.3.12.B. - Analyze the chemical and structural basis of living organisms.
3.4.12.A. - Apply concepts about the structure and properties of matter.
3.8.12.B. - Apply the use of ingenuity and technological resources to solve specific societal needs and improve the quality of life.

Pacing: Approximate number of class sessions per unit

Tier 3 Vocabulary (Content specific vocabulary)
- DNA
- mtDNA
- VNTR
- STR
- RFLP
- PCR
- SNP
- CODIS
- Capillary electrophoresis
- Gel electrophoresis
- Probability

Know - What do learners need to **know** in order to be able to do and understand? ***List concepts, such as facts, formulas, key vocabulary and knowledge "nuggets".***

- Key vocabulary
- How to determine probability
- Process of DNA profiling
- How to interpret DNA profiling results

Understand - What do learners need to **understand**? What is the **big idea**? ***List broad concepts or "big ideas" in a statement of enduring understanding.***

- DNA left at a crime scene can help to identify individuals present at a crime scene.

Learning Outcome - What do learners need to be able to **accomplish** by the unit's end? ***List skills and competencies.***

- Learners will be able to determine the probability that DNA obtained at a crime scene matches the DNA of a suspect.