Teacher: CORE Forensic Science | Year: 2016-17

Course: Forensic Science | Month: All Months

Aug Introduction Forensic Science

Essential Questions	Content	Knowledge and Skills	Vocabulary	Assessments	Lessons	Resources	Standards
How did forensics change law enforcement?	Founding forensic scientists	Magnifying lens usage	expert witness, Locard's Principle, scientific method				3.4.12.C.3-Apply the concept that many technological problems require a multi-disciplinary approach.
How is Locard's Exchange Principle useful in forensics?		taking notes					3.4.12.D.2-Verify that engineering design is influenced by personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly.
		trace evidence collecting					
How did forensic science evolve to today?	forensic definition,	Pay attention to detail					
	Locard's Exchange Principle	recalling memory					
	eye witness concerns	staying alert for mistakes					

Sept Introduction Forensic Science

Essential Questions	Content	Knowledge and Skills	Vocabulary	Assessments	Lessons	Resources	Standards
What are the basic functions of a forensic scientist?	Functions and skills of a forensic scientist expert witness compared to lay witness	Communication, teamwork, collaboration, distinguishing two different types of court	expert witness				3.4.12.C.3-Apply the concept that many technological problems require a multi-disciplinary approach.
		room witnesses	Locard's Principle				3.4.12.E.7-Analyze the technologies of prefabrication and new structural materials and processes as they pertain to constructing the modern world.
How does a forensic scientist use the scientific method?	Types of forensic careers	Depict an expert witness' testimony from a movie	scientific method				
		Inquiry thinking, deductive reasoning	expert witness testimony				

b	What are the differences between the expert witness and lay person?		forensic careers				
e	What is the role of an expert witness?						
r	How does an expert witness act?						
	How and why did expert testimony evolve over the years?						
	How is an expert witness questioned in direct examination and cross examination?						
	What qualifies an expert witness?						
	Who are forensic scientists?						

Careers in Forensics

Essential Questions	Content	Knowledge and Skills	Vocabulary	Assessments	Lessons	Resources	Standards
What other careers are in forensic science? What are the job descriptions?	Forensic scientists job description	Deductive reasoning	forensic anthropologist forensic odontologist forensic entomologist forensic palynologist forensic toxicologist				3.1.11.C-Assess and apply patterns in science and technology. 3.2.11.C-Apply the elements of scientific inquiry to solve multi-step problems. 3.3.11.A-Explain the relationship between structure and function found among living things. 3.3.11.B-Analyze the chemical and structural basis of living organisms.

Oct Crime Scene and Physical Evidence

Essential Questions	Content	Knowledge and Skills	Vocabulary	Assessments	Lessons	Resources	Standards
How is a crime scene processed?	Crime scene, primary, secondary, macroscopic size,	Designing search warrant on computer, note-taking, computer surveys, open discussion, interpretation of crime scene, analysis of crime scene, delegate duties, perform search, prepare sketches, photograph scene, evaluate physical evidence, record evidence in reports	crime scene				3.4.12.A.2-Describe how management is the process of planning, organizing, and controlling work.
How is physical evidence analyzed?	microscopic size, search warrant, Fourth Amendment, crime scene processing	Analyze crime scene, delegate duties, perform search, prepare sketches, photograph scene, evaluate physical evidence, record evidence in reports, evidence submission to labs	rough sketch				3.4.12.B.2-Illustrate how, with the aid of technology, various aspects of the environment can be monitored to provide information for decision making.
What happens if the integrity of the evidence is compromised?	Physical evidence, testimonial, trace, class characteristics, individual characteristics		finished sketch				3.4.12.C.3-Apply the concept that many technological problems require a multi-disciplinary approach.
How is a crime scene reconstructed?	Crime scene process and reports		physical evidence				
	Physical evidence, crime scene reconstruction		algor mortis autopsy livor mortis rigor mortis				

Physical Properties: Glass and Soil

Essential Questions	Content	Knowledge and Skills	Vocabulary	Assessments	Lessons	Resources	Standards
How are the physical properties of glass and soil used in forensics?	Physical and chemical properties of matter, density, water displacement, refraction	Determining the identity of an unknown metal by calculating its density in lab	Becke Line chemical property concentric fracture density mass physical property				3.2.12.A.1-Compare and contrast colligative properties of mixtures. Compare and contrast the unique properties of water to other liquids.

				radial fracture refractive index tempered glass weight				
N	Physical Properties: Glass and Soil							
o	Essential Questions	Content	Knowledge and Skills	Vocabulary	Assessments	Lessons	Resources	Standards
v	How are the physical properties of glass and soil used in forensics?	Types of glass, Refraction, metric system, Becke line,	Determine refractive index of glass beads	Becke Line				3.4.12.C.3-Apply the concept that many technological problems require a multi-disciplinary approach.
e		flotation method	Determine which fracture came first and what direction was the force	chemical property				
m		Density, refractive index		concentric fracture				
b		Glass fractures, radial fractures, concentric fractures		density				
e		Soil types, soil analysis		mass				
r				physical property radial fracture refractive index tempered glass weight				
D	Microscope							
e	Essential Questions	Content	Knowledge and Skills	Vocabulary	Assessments	Lessons	Resources	Standards
c	How is a microscope used in forensic science?	Parts of a microscope and their uses	Identifying parts of a microscope and describing their uses	eyepiece lens				3.1.11.B-Apply concepts of models as a method to predict and understand science and technology.
e				objective lens				3.1.11.C-Assess and apply patterns in science and technology.
m				real image				3.2.11.B-Evaluate experimental information for appropriateness and adherence to relevant science process.
b				virtual image				
e				comparison microscope				

r Hairs, Furs, Fibers, and Paint

Essential Questions	Content	Knowledge and Skills	Vocabulary	Assessments	Lessons	Resources	Standards
How are human and animal hairs identified and used?	hair parts, cuticle, cuticle patterns, coronal, imbricate, spinous	identify types of human and animal hair by observing cuticles	anagen phase				3.4.12.B.1-Analyze ethical, social, economic, and cultural considerations as related to the development, selection, and use of technologies.
How are human and animal different and how are they the same?			catagen phase				3.4.12.B.2-Illustrate how, with the aid of technology, various aspects of the environment can be monitored to provide information for decision making.
			cortex cuticle follicular tag medulla mitochondrial DNA nuclear DNA telogen phase				

J Organic and inorganic analysis

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Essential Questions	Content	Knowledge and Skills	Vocabulary	Assessments	Lessons	Resources	Standards
n How is organic analysis different from inorganic analysis?	matter, phase changes, organic analysis, gas	interpret GC and GC/MS data, virtual lab, interpret line spectrum, interpret	chromatography				3.4.12.A-Apply concepts about the structure and properties of matter.
u	chromatography, inorganic, HPLC high performance liquid chromatography, TLC thin	spectrophometry graphs	electrophoresis				3.7.12.A-Apply advanced tools, materials and techniques to answer complex questions.
a How are inorganic substances analyzed?	layer chromatography, electrophoresis, spectrophotometry (UV-Vis, infrared, mass, AAS), emission spectroscopy,		inorganic				3.8.12.A-Synthesize and evaluate the interactions and constraints of science and technology on society.
r y			matter organic phase spectrophotometry				

				ultraviolet visible light X-ray electron emission specctrum line spectrum cucleaus proton X-ray diffraction				
F e	Organic and inorganic analysis							
	Essential Questions	Content	Knowledge and Skills	Vocabulary	Assessments	Lessons	Resources	Standards
b r	How is organic analysis different from inorganic analysis?	matter, phase changes, organic analysis, gas chromatography, inorganic, HPLC high performance liquid chromatography, TLC thin layer chromatography,	interpret GC and GC/MS data, virtual lab, interpret line spectrum, interpret spectrophometry graphs	chromatography electrophoresis				3.4.12.A-Apply concepts about the structure and properties of matter. 3.7.12.A-Apply advanced tools, materials and techniques to answer complex questions.
u	How are inorganic substances analyzed?	electrophoresis, spectrophotometry (UV-Vis, infrared, mass, AAS), emission spectroscopy,		inorganic				3.8.12.A-Synthesize and evaluate the interactions and constraints of science and technology on society.
a r y				matter organic phase spectrophotometry ultraviolet visible light X-ray electron emission specctrum line spectrum cucleaus proton X-ray diffraction				

Drugs and Toxicology

Essential Questions	Content	Knowledge and Skills	Vocabulary	Assessments	Lessons	Resources	Standards
How are drugs identified, analyzed, categorized, and collected?	psychological /physical dependence, narcotics drug classification, hallucinogens and depressants identification and categorization, stimulants, club drugs and anabolic steroids identification and categorization, drug control laws, drug identification, screening tests, confirmation tests	identify narcotic abuse symptoms, classify the types of narcotics, determine the drug schedule, observe the types of drug tests, identify hallucinogen and depressants abuse symptoms, classify the types of hallucinogens and depressants, identify stimulants, club drugs, and anabolic steroids abuse symptoms, classify the types	analgesic confirmation depresssant hallucinogen narcotic physical dependence psychological ldependence screening test stimulant metabolize				3.1.12.B-Apply concepts of models as a method to predict and understand science and technology. 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.

M Drugs and Toxicology

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Essential Questions	Content	Knowledge and Skills	Vocabulary	Assessments	Lessons	Resources	Standards
r How do forensic toxicologists analyze drugs and poisons?	role of the toxicologist, instrumentation, screening and confirming tests, postmortem drug testing, UV Vis spectrophotometry	interpret a graph for concentration, interpret a graph for concentration of a crime scene overdose,	analgesic				3.1.12.C-Assess and apply patterns in science and technology.
c			confirmation				3.1.12.D-Analyze scale as a way of relating concepts and ideas to one another by some measure.
h			depresssant				3.2.12.C-Apply the elements of scientific inquiry to solve multi-step problems.

			hallucinogen narcotic physical dependence psychological ldependence screening test stimulant metabolize				

Fire Investigation and Explosives

Essential Questions	Content	Knowledge and Skills	Vocabulary	Assessments	Lessons	Resources	Standards
What is the chemistry of fire? How is a fire investigated?	arson, facts on arson, local arson case, oxidation, combustion, exothermic, endothermic, flash point, radiation, convection, convection, pyrolysis, flammable range, spontaneous combustion, accelerant, chemistry of fire, searching the fire scene, collection of fire evidence,	online search on arson case, online activity how heat transfers, determine how to search a fire for origin, use of gas chromatography, interpretation of GC results	accelerant combustion endothermic reaction exothermic reaction pyrolysis				3.7.12.B-Evaluate appropriate instruments and apparatus to accurately measure materials and processes. 3.7.12.C-Evaluate computer operations and concepts as to their effectiveness to solve specific problems.

A Fire Investigation and Explosives

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Essential Questions	Content	Knowledge and Skills	Vocabulary	Assessments	Lessons	Resources	Standards
r What are explosives and how are they investigated?	explosion, low explosive, deflagration, high explosive, detonation	determine the type of explosive	deflagration detonation				3.1.12.C-Assess and apply patterns in science and technology. 3.1.12.E-Evaluate change in nature, physical systems and man made systems.

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			explosion high explosive low explosive primaty explosive secondary explosive				

Serology

Essential Questions	Content	Knowledge and Skills	Vocabulary	Assessments	Lessons	Resources	Standards
What is blood typing? How is blood identified? What other bodily fluids are used in forensics, other than blood?	ABO system, antibodies, antiserum, agglutination, antigens, blood testing, luminol, other bodily fluids, gene, allele, chromosome, locus	determine blood types based on antibodies,determine if blood is present for a crime scene, determine the identity using heredity of blood types	agglutination				3.3.12.C-Explain gene inheritance and expression at the molecular level.
How is heredity used to determine identification in blood and other bodily fluids?			antibody				
			antigen aspermia DNA gene genotype heterozygous homozygous luminol oligospermia phenotype plasma				

Blood Stain Pattern Analysis

Essential Questions	Content	Knowledge and Skills	Vocabulary	Assessments	Lessons	Resources	Standards
How is blood stain patterns analyzed?	blood properties, blood pattern evidence, blood patterns, angle of	determine blood patterns based on height of blood source, determine blood	angle of impact				3.1.12.C-Assess and apply patterns in science and technology.

	impact, projected blood spatter, angle of impact, convergence, direction, projected blood spatter high, medium, and low velocity, transfer blood patterns	patterns based on angle of impact, determine the angle of impact, direction of impact, and point of convergence, determine the impact type, produce and interpret most blood stain patterns	area of convergence				3.4.12.A-Apply concepts about the structure and properties of matter.
			area of origin arterial spray cast-off back spatter expirated blood high velocity spatter impact spatter low velocity spatter medium velocity spatter satellite spatter transfer pattern void				

Fingerprints

Essential Questions	Content	Knowledge and Skills	Vocabulary	Assessments	Lessons	Resources	Standards
How are fingerprints used in forensics? How are fingerprints detected, used, and filed?	ridges, valleys, minutiae, fingerprint formation, fingerprint patterns, whorls, loops, arches, whorl tracing, ridge patterns, fingerprint types, patent, latent, plastic, latent fingerprints, superglue fuming, ninhydrin processing	calculate Henry system, determine fingerprint patterns, determine whorl tracing, ridge patterns, determine fingerprint types, develop latent fingerprints using superglue fuming, powder, and ninhydrin	anthropometry				3.3.12.B-Analyze the chemical and structural basis of living organisms.
			arch latent fingerprint				3.8.12.A-Synthesize and evaluate the interactions and constraints of science and technology on society. 3.8.12.B-Apply the use of ingenuity and technological resources to solve specific societal needs and improve the quality of life.

			loop ninhydrin plastic print ridge characteristics superglue fuming visible print whorl				

M Fingerprints

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Essential Questions	Content	Knowledge and Skills	Vocabulary	Assessments	Lessons	Resources	Standards
y How are fingerprints used in forensics? How are fingerprints detected, used, and filed?	ridges, valleys, minutiae, fingerprint formation, fingerprint patterns, whorls, loops, arches, whorl tracing, ridge patterns, fingerprint types, patent, latent, plastic, latent fingerprints, superglue fuming, ninhydrin processing	calculate Henry system, determine fingerprint patterns, determine whorl tracing, ridge patterns, determine fingerprint types, develop latent fingerprints using superglue fuming, powder, and ninhydrin	anthropometry arch latent fingerprint loop ninhydrin plastic print ridge characteristics superglue fuming visible print whorl				3.3.12.B-Analyze the chemical and structural basis of living organisms. 3.8.12.A-Synthesize and evaluate the interactions and constraints of science and technology on society. 3.8.12.B-Apply the use of ingenuity and technological resources to solve specific societal needs and improve the quality of life.

Firearms, Tool Marks, and other Impressions

Essential Questions	Content	Knowledge and Skills	Vocabulary	Assessments	Lessons	Resources	Standards
How are firearms classified? How are bullets and casings analyzed? How are tool	types of firearms, ammunition, striations, rifling, analysis of bullets and casings, shoeprint	identify type of firearm, determine caliber, type of ammunition, interpret bite marks, interpret tool marks,	breechblock caliber distance determination				3.1.12.C-Assess and apply patterns in science and technology.

	marks analyzed and identified?	impressions, bite mark impresisons, tire mark impressions, distance of weapon to target	interpret shoeprints	ejector extractor gauge grooves lands rifling				
	Document Examination							
	Essential Questions	Content	Knowledge and Skills	Vocabulary	Assessments	Lessons	Resources	Standards
	How are documents and handwriting analyzed?	roles of document examiner, handwriting comparisons, exemplars of writing, tyepscript comaprsons, alterations, erasures, and obliterations	distinguish common individual characteristics with handwriting, analyze shredded documents,	exemplar natural variations questioned document				3.1.12.D-Analyze scale as a way of relating concepts and ideas to one another by some measure.
J	Document Examination							
u	Essential Questions	Content	Knowledge and Skills	Vocabulary	Assessments	Lessons	Resources	Standards
n	How are documents and handwriting analyzed?	roles of document examiner, handwriting comparisons, exemplars of writing, tyepscript comaprsons, alterations, erasures, and obliterations	distinguish common individual characteristics with handwriting, analyze shredded documents,	exemplar natural variations questioned document				3.1.12.D-Analyze scale as a way of relating concepts and ideas to one another by some measure.
e								