

Scheme of work – Unit F185 – Forensic biology

About this Scheme of work

Our new AAQ Cambridge Advanced National in Applied Science is for first teaching from September 2025.

This resource:

- is **unit-specific** and has a **lesson by lesson** approach by area of study and allocated guided learning hours (GLH)
- has a **simple** and **editable** Word format
- highlights each lesson's **key words/terms** and **learning outcomes**
- contains **ideas** for teaching and learning with useful **links**
- provides additional **subject knowledge support by area of study**.

Assumptions for teachers

- You will adapt the SOW and lesson content to match your own timetabling arrangements
- You are aware that this SOW is just one approach to how the specification could be taught and the use of any resources highlighted is optional
- Students can access some resources outside of lessons for any online homework or extension tasks
- You will refer to the Cambridge Advanced National [Applied Science specification](#) as the key document for detailed insight into the qualification's content and assessment requirements.

In this scheme of work we have made suggestions for useful resources both for in class activities and for teacher subject knowledge enhancement. Where we have included a reference to endorsed products such as the Cambridge Advanced National textbook, this indicates that a resource is suitable to support delivery of an OCR specification, but it does not mean that the endorsed resource is the *only* suitable resource to support delivery, or that it is required or necessary to achieve the qualification. Unlike endorsed resources, the other listed resources have not been subject to review and so we cannot offer recommendations or guarantee the quality. We leave this to your professional judgment. These resources are suggestions and are not the only ones suitable to support delivery, neither are they required or necessary to achieve the qualification.

Performance objectives

Here is a reminder of the performance objectives in Unit F185 – Forensic biology

Performance Objectives	
PO2	Apply knowledge and understanding
PO3	Analyse and evaluate knowledge, understanding and performance
PO4	Demonstrate and apply skills and processes relevant to the subject

Further personal development support

For further training and professional development support, find out about our [upcoming training events](#). You'll be able to choose and book on to live online and face-to-face professional development.

Area of study: 1.1 The nature and origins of forensic science

Lessons

Lesson number	Specification coverage	GLH	Lesson aims and outcomes	Lesson ideas, key words and activities	Useful resources	Student independent learning – ideas and useful resources
1	1.1.1 Features of forensic science and forensic biology	1	By the end of the lesson, students should understand: - that forensic science is the application of science to criminal and civil laws - the difference between criminal and civil law. Throughout the teaching of this unit, students could collect their notes as part of a manual of information that forensic scientists would use when working a case.	Keywords: Analysis, Civil law, Criminal law, Evidence Activity 1: Mock crime report. Provide students with several mock crime reports or case studies. The student's task is to identify where science has been or could have been involved in each case. This introduces students to the idea of science in forensics. Activity 2: Sort activity. After some direct teaching and introduction to criminal and civil law, provide students with some example scenario titles (e.g. shop theft, contract disputes, murder, medical malpractice). Students can then sort these scenarios into 'criminal' or 'civil' categories. This could be done either as an individual task or in small groups. To extend the task students can provide either verbal (in the form of 'think, pair, share' or class	An Intro to Forensics: The Science of Crime (youtube.com, 9 min) A video introduction to forensic science that can be used to introduce students to the topic. A mock crime report from Mesa Police Department may be useful for Activity 1. (mesaaz.gov) Civil and criminal law explained in under 2 mins (youtube.com, 2 min) A video explaining the difference between criminal and civil law. What is the Difference Between Civil and Criminal Law?	Forensic scientist (nationalcareers.service.gov.uk) Students can use the National Careers Service website to research possible careers in forensic science and forensic biology to better understand the field. They can use this information to create a profile showing a possible route into a forensic science job of their choosing. Forensic Science: Last Week Tonight with John Oliver (HBO) (youtube.com, 18 min) A longer introduction to forensic science and the shortfalls of how it is portrayed in

Lesson number	Specification coverage	GLH	Lesson aims and outcomes	Lesson ideas, key words and activities	Useful resources	Student independent learning – ideas and useful resources
				discussion) or written justification for their decision on each scenario.	(oneeducation.org.uk , 10 min read) This blog explains the differences between criminal and civil law.	the media. Students can watch this to build schema around the topic.
2	1.1.1 Features of forensic science and forensic biology	1	By the end of the lesson, students should understand: - the principle that every contact leaves a trace - the importance of Locard's exchange principle to modern forensic science - the differences between forensic biology and	Keywords: Evidence contamination, Locard's exchange principle, Trace evidence Activity 1: Comparing forensic biology and forensic science. First, using taught content students can create a comparison chart with two columns: one for forensic biology (e.g. DNA, blood analysis) and one for general forensic science (e.g. ballistics, fingerprints). After this, provide students with evidence types (e.g. a hair sample, bullet casing) and have them classify them as either forensic science or forensic biology. Activity 2: Locard's exchange principle demonstration. To demonstrate the concept that 'every contact leaves a trace', set up a scenario	What Are the Types of Forensic Science? (National University, 5 min read) National University explains the different forensic disciplines and how they fit together. This may support activity 1. How Locard's Exchange Principle Works (science.howstuffworks.com, 3 min read) This blog gives a short overview of Locard's Exchange Principle to help plan Activity 2.	Students may begin to create a glossary of key terms for this unit, this could include; civil law, criminal law, Locard's exchange principle and trace evidence, so far. This can be added to throughout the unit.

Lesson number	Specification coverage	GLH	Lesson aims and outcomes	Lesson ideas, key words and activities	Useful resources	Student independent learning – ideas and useful resources
			forensic science.	where students interact with a controlled 'crime scene' (e.g. a table with objects like gloves, fake evidence, or different surfaces). Have students examine the traces they leave after interacting with the scene (e.g. fingerprints, fibres, hairs or smudges). Facilitate a discussion on whether these traces fall under forensic biology or forensic science.	Locard's Exchange Principle (youtube.com, 2 min) This video gives an example demonstration of Locard's principle occurring which may be useful for Activity 2. Principles of Trace Evidence (forensicsciencesimplified.org, 3 min read) This blog gives an overview of trace evidence.	

Subject knowledge support for this area of study

Subject knowledge enhancement	Details
Underlying knowledge and understanding	To actively engage in the lessons, students should bring a basic understanding of biology and wider science from GCSE level. It is important students understand the scientific process of observation, hypothesis testing, and evidence validation, which is fundamental to forensic investigations. Students may have some understanding or basic knowledge that forensic science involves investigating evidence (e.g. DNA, fingerprints) from exposure to popular culture and TV shows like CSI or Bones. Students might know that forensic science helps solve crimes, but they may not realise its broader applications in civil law. Having this prior exposure will allow students to attach new concepts to the schema but may also bring misconceptions that need to be addressed.
Common misconceptions	After learning about forensic science, students may conclude that forensic scientists are the ones who determine guilt or innocence. In learning the differences between criminal and civil law, students may develop the concept that criminal and civil cases are completely separate and unrelated, or that forensic science is only used in criminal cases Based on their prior knowledge students may believe that forensic biology and forensic science are interchangeable or think all forensic evidence comes from biological sources. Students may misunderstand that Locard's principle is the same as trace evidence. Make sure to clarify that while related, Locard's principle is a broader concept about transfer during contact, while trace evidence refers specifically to the materials exchanged. Students may assume from Locard's principle that evidence cannot be removed or lost once transferred. Make clear that factors like environmental conditions, cleaning, or natural degradation can affect the preservation of evidence even after transfer has occurred. It's natural for conversations in this new unit to centre around case studies and stories from the media that students have experience of. It may be, however, that stereotypes and biases are articulated about groups of people who commit or are victims of crime.
Key concepts	Forensic science: students should have an understanding of forensic science being the field of science applied to criminal and civil law. Students should understand the difference between criminal and civil law. Forensic biology: students should understand the differences between forensic science and forensic biology.

Subject knowledge enhancement	Details
	Locard's exchange principle: students should know the principle that every contact leaves a trace and understand the importance of Locard's exchange principle.
Subject knowledge enhancement for teachers	This blog gives an example of a practical lesson teaching Locard's exchange principle: A Fun Way to Teach Locard's Exchange Principle in Forensics (thetrendyscienceteacher.com) This video explains Locard's exchange principle in depth at a university level: Locard's Exchange Principle (youtube.com, 3 min) The Center for Forensic Science Research & Education explains forensic biology in this post: Forensic Biology (cfsre.org). The University of Portsmouth Crime Scene Investigation Online Activity could be used by students and teachers to explore criminology, some forensic investigations and a little about offender journey. This may help to contextualise some of the uses of forensic investigations. The Major Crime Investigation Manual may also be helpful for this, but probably more appropriate for teachers only. Brits still associate working-class accents with criminal behaviour – study warns of bias in the criminal justice system could be used to explore conversations around stereotypes of criminals from the media. 6 Common Forensic Science Myths and Misconceptions you should know (rasmussen.edu) Managing the myths – The CSI effect in forensic science (microbiologysociety.org)

Area of study: 1.2 Forensic biology disciplines

Lessons

Lesson number	Specification coverage	GLH	Lesson aims and outcomes	Lesson ideas, key words and activities	Useful resources	Student independent learning – ideas and useful resources
3	1.2.1 Disciplines associated with forensic biology 6. Serology 7. Pathology	1	By the end of the lesson, students should understand: 8. the area of study involved in serology and pathology 9. how serology and pathology can be used as tools that support an investigation 10. the type of evidence serology and pathology can contribute to an investigation.	Keywords: Antibody, Antigen, Pathology, Serology Activity 1: Evidence exploration. Set up stations with mock evidence (blood spatter patterns, body diagrams showing injuries). Students can rotate between stations to identify what type of discipline (serology or pathology) applies to each piece of evidence. They can write a summary for each station as to which discipline would be appropriate for the station and what evidence it could provide. Activity 2: Forensic report writing. Provide students with a fictional scenario, or scenarios involving evidence from both serology and pathology. Students can then analyse this evidence and write a mock forensic report summarising how the findings support the investigation. They should focus on what evidence has	What is Serology? (healthline.com, 4 min read) This post explains what serology is and gives an overview of some serologic tests which may be useful when planning Activity 1. All Crime Scene Photos (engagedscholarship.csuohio.edu) This link provides a series of crime scene photographs which may be useful for Activity 1. Serology Blood Test Serologic Tests (youtube.com 3 min) This video explains	Become a forensic pathologist Students can research and create a fact file on how to become a forensic pathologist. They could use this information from the Royal College of Pathologists to start their research.

Lesson number	Specification coverage	GLH	Lesson aims and outcomes	Lesson ideas, key words and activities	Useful resources	Student independent learning – ideas and useful resources
			By the end of each lesson students should be able to produce a paragraph to summarise each discipline associated with forensic biology.	contributed to the investigation and how it has supported the investigation.	different types of serologic tests which may be used to introduce students to Activity 1. What is a pathologist? (youtube.com, 1 min) This video from the Royal College of Pathologists explains what a pathologist does. Forensic pathology 101 (YouTube 22 min) This video podcast from the mayo clinic laboratories talks in depth about forensic pathology. There is discussion on how to enter the career.	
4	1.2.1 Disciplines associated with forensic biology 11. Anthropology	1	By the end of the lesson, students should understand: 13. the area of study	Keywords: Anthropology, Cranial, Odontology	Anthropology noun (merriam-webster.com) This entry provides the definition and	Students can complete a self assessment of their understanding from the lesson with a short answer question:

Lesson number	Specification coverage	GLH	Lesson aims and outcomes	Lesson ideas, key words and activities	Useful resources	Student independent learning – ideas and useful resources
	12. Odontology		involved in anthropology and odontology 14. how anthropology and odontology can be used as tools that support an investigation 15. the type of evidence anthropology and odontology can contribute to an investigation.	Activity 1: Brainstorming introduction: Ask students to try and define 'anthropology' and 'odontology' in their own words. You could guide them through breaking down the terms and thinking of other words they already know that contain parts of the word (e.g. students would likely be familiar with the word 'orthodontist' already). Then, provide definitions of the terms and explain their forensic applications. Activity 2: Evidence categorisation: Provide students with a list of hypothetical evidence (e.g. bones, dental records, bite marks, personal items). Ask students to determine whether the evidence falls under anthropology, odontology, or both, and how it could support an investigation. Students could write up their responses in their work books or you could provide a worksheet with a table of the evidence and columns for 'discipline' and 'how this could support an investigation'. Activity 3: Lab exercises: Use models or online simulators to examine human bones and teeth. Guide students to	breakdown of anthropology etymology which will be useful for Activity 1. Forensic odontology noun (merriam-webster.com) This entry provides the definition and breakdown of odontology etymology which will be useful for Activity 1. Forensic Odontology: An Overview and Bite Mark Controversy This entry provides information and links to pages describing what forensic odontology is used for which may be useful for Activities 2 and 3.	What is the role of forensic anthropology in investigations?. This could be answered with a short paragraph to summarise learning.

Lesson number	Specification coverage	GLH	Lesson aims and outcomes	Lesson ideas, key words and activities	Useful resources	Student independent learning – ideas and useful resources
				identify features that can estimate age, sex, or trauma.	Human skeleton HD (artec3d.com) This 3D model of the human skeleton may be useful for teaching Activity 3.	
5	1.2.1 Disciplines associated with forensic biology 16. Botany 17. Microbiology	1	By the end of the lesson, students should understand: 18. the area of study involved in botany and microbiology 19. how botany and microbiology can be used as tools that support an investigation 20. the type of evidence botany and microbiology can contribute to an investigation.	Keywords: Botany, Decomposition, Geolocation, Microbial, Microbiology Activity 1: True or false quiz: Provide simple statements about botany and microbiology (e.g. 'Pollen can be used to locate a crime scene.'). Have students answer 'True' or 'False.' This could be done as a mini whiteboard quiz where students all show their answers at once, or an online quiz using a tool such as Kahoot!. Activity 2: Timeline: Discuss how microbiology contributes to estimating time of death. To do this, show students images or videos of decomposition stages and relate microbial activity to investigative timelines. Students can then create their own flow diagram or timeline showing how microbiology contributes to forensic analysis. Activity 3: Vocabulary match: Provide students with cards of key terms (e.g.	True or False (cliffsnotes.com) You may want to use some questions about forensic botany from this source when preparing Activity 1. Microbial Succession as a Forensic Tool: Estimating time of death (news-medical.net, 6 min read) This article provides detail on using microbiology to assess time of death which may be useful for creating Activity 2.	Ask students to write a short paragraph or story using at least 5–7 key terms from the vocabulary list (e.g. pollen, DNA sequencing, decomposition, biosecurity). Alternatively, students could create a crossword puzzle or word search using the terms and their definitions. Students could use Criss-Cross Puzzle to create the crossword. (puzzlemaker.discovereducation.com)

Lesson number	Specification coverage	GLH	Lesson aims and outcomes	Lesson ideas, key words and activities	Useful resources	Student independent learning – ideas and useful resources
				pollen, bacteria, algae) and their definitions. The student's task is to match terms to the correct definitions. This could expand to include vocabulary from the whole topic.	Botany: terms used in botany (collinsdictionary.com) This list of key terms may help prepare Activity 3.	
6	1.2.1 Disciplines associated with forensic biology 21. Ornithology 22. Entomology	1	By the end of the lesson, students should understand: 23. the area of study involved in ornithology and entomology 24. how ornithology and entomology can be used as tools that support an investigation 25. the type of evidence ornithology and entomology can	Keywords: Entomology, Geolocation, Migration, Ornithology Activity 1: Visual identification / introduction: After providing definitions for ornithology and entomology, show students pictures of evidence such as birds, feathers, and insects. Ask students to identify whether the evidence relates to ornithology or entomology. Students could write their response for each on a mini white board and you can check for global understanding with a '3-2-1 show me' task. Activity 2: Life cycle analysis: Provide diagrams of an insect's life cycle (e.g. blowfly). Ask students to determine how the stage of development could help estimate time since death. Students can	Forensic Ornithology – Bird Detective (naturalhistory.si.edu) This page contains a video on forensic ornithology and links to teaching resources useful for forensic ornithology lessons. How Entomologists Use Insects to Solve Crimes WIRED (youtube.com, 6 min) This video can provide students with an introduction	Ask students to research and draw another insect's life cycle (e.g. beetle or mosquito) and write a short paragraph about how this species could help estimate time since death. Alternatively, they could compare the blowfly's lifecycle with another insect, highlighting similarities and differences in forensic applications. Hairy rove beetle (entnemdept.ufl.edu, 5 min read). Students may find this a useful starting point for comparison.

Lesson number	Specification coverage	GLH	Lesson aims and outcomes	Lesson ideas, key words and activities	Useful resources	Student independent learning – ideas and useful resources
			contribute to an investigation.	then create their own lifecycle diagram and highlight the key forensic indicators.	to forensic entomology and why it is important. Blow Fly Life Cycle Forensic Significance (sifs.in) This blog post discusses the blowfly lifecycle and may be useful for Activity 2.	

Subject knowledge support for this area of study

Subject knowledge enhancement	Details
Underlying knowledge and understanding	Cell structure and function: students need an understanding of cells and tissues as the building blocks of organisms, and the organelles they contain. Body systems: students will need a basic familiarity with human anatomy, including skeletal, circulatory, and digestive systems in order to understand how traits like age and sex are determined. Microscopy: students should be familiar with light and electron microscopes for analysing biological materials. Environmental science: students should understand the basics of ecosystems and how plant, microbial, and animal components relate to each other.
Common misconceptions	Immediate results: Thinking forensic analyses yield quick, definitive results, akin to portrayals in TV shows and movies. Infallibility: Believing forensic methods always provide accurate and irrefutable evidence. Availability: Students may believe DNA evidence is always available and can be obtained from any fluid. Pathology can always determine the exact time of death: Students might struggle to grasp that time of death is often approximate and influenced by numerous variables. Bones alone can provide exact identity: thinking bones can provide identity rather than typically providing general traits like age, sex, or ancestry, but not identity unless linked to other evidence. Plants near a body are always directly related to the crime: Students may not remember that some plants may naturally occur in the area without forensic relevance. All insects on a body are forensic indicators: students may not separate the occurrence of insects at a scene in general from the relevant insects.
Key concepts	Students need to know the area of study involved in each discipline associated with forensic biology: serology, pathology, anthropology, odontology, botany, microbiology, ornithology, entomology. Students need to know how each discipline could be used as a tool that supports an investigation and understand the type of evidence each discipline can contribute to an investigation; • Serology: Blood, semen, saliva, sweat, and other bodily fluids, DNA evidence. Identifying individuals, determining the presence of substances, and reconstructing events based on fluid distribution.

Subject knowledge enhancement	Details
	• Pathology: Cause of death (e.g. injury, disease, poisoning), time of death (post-mortem interval), signs of trauma or disease (e.g. wounds, fractures, organ damage). • Anthropology: Skeletal remains (e.g. bone fragments, skull), age, sex, ancestry, and stature estimation, evidence of trauma or disease on bones. Reconstruction of physical characteristics. • Odontology: Dental records for individual identification, bite mark analysis, age estimation based on dental development. • Botany: Pollen, seeds, leaves, or plant fragments, geographic and seasonal clues from plant species, time of death based on plant growth through or around remains. • Microbiology: Pathogens or microbes in or on a body (e.g. bacteria, viruses), soil microbes specific to geographic areas, microbial decomposition patterns to estimate time of death. • Ornithology: Feathers or bird remains at a crime scene, identification of bird species to determine location or activity, damage to aircraft or vehicles caused by birds (e.g. bird strikes). • Entomology: Insects present on decomposing bodies (e.g. maggots, beetles), life cycle stages of insects to estimate time of death, geographic clues based on insect species.
Subject knowledge enhancement for teachers	To learn more about forensic ornithology you may want to watch: Unraveling Mysteries: The Fascinating World of Forensic Ornithology (youtube.com, 5 min). To learn more about forensic pathology you may want to read: What You Need to Know About Forensic Pathology, from the College of American Pathologists (cap.org). To read more about forensic odontology consider this article: Who are you? – The Role Forensic Odontology Plays in Identifying Human Remains (roseman.edu). To read more in depth on forensic serology: What Is Forensic Serology? by the National University provides more detail (nu.edu). Sex estimation by N Langley and B Dudzik (2016, oxfordbibliographies.com) discusses how different bones and their estimation are used to determine sex of adult skeletons.

Area of study: 1.3 Types of evidence in forensic biology

Lessons

Lesson number	Specification coverage	GLH	Lesson aims and outcomes	Lesson ideas, key words and activities	Useful resources	Student independent learning – ideas and useful resources
7	1.3.1 Evidence available from crime scenes and individuals, relevant to forensic biology 26. Biological evidence (hair, tissues, microorganisms in soil)	1	By the end of the lesson, students should understand: 27. the relative importance of biological evidence in securing particular convictions 28. how biological evidence may be used for generic (class evidence) or unique identification (individual evidence) purposes 29. the role biological evidence plays in	Key words: Algor mortis, Livor mortis, Post-mortem interval, Rigor mortis Activity 1: Introduction: In order to help students identify the variety of biological evidence, start with a brainstorming session where students list examples of biological evidence they already know. Activity 2: Individual vs. class: After direct instruction on generic and unique identification, students can link evidence types to identification purposes. Using the brainstorm that students created in activity 1; students should sort their examples and ideas of biological evidence into which ones can lead to unique identification versus generic classification. Activity 3: Estimating time of death with biological clues: Split the class into small groups. Present a short, simple scenario, for example 'A body was found at 6:00 PM. Investigators noted some clues about the body and the environment.	Solving Crimes With Soil Bacteria (nij.ojp.gov, 5 min read) This article provides more insight into microorganisms in soil and their use in forensic biology as well as new developments in the field. Biological Evidence (ncfs.ucf.edu, 1 min read) This page from the National Center for Forensic Science lists some examples of biological evidence which may	Students can answer the question 'If you could only collect one type of biological evidence at a crime scene, which would it be and why?' to consolidate their learning from the lesson.

Lesson number	Specification coverage	GLH	Lesson aims and outcomes	Lesson ideas, key words and activities	Useful resources	Student independent learning – ideas and useful resources
			supporting time of death in an investigation.	Your task is to figure out how long the person has been dead.' Give students a list of clues on a worksheet or verbally, such as: • Clue 1: The body feels cool to the touch but not cold. • Clue 2: Stiffness is present in the arms and legs. • Clue 3: There is a purplish discoloration on the lower back. • Clue 4: No visible insect activity is present. In small groups, students can use the clues to estimate the time of death. You might want to provide a simple reference chart explaining: • Rigor mortis starts 2-4 hours after death and peaks at 12 hours. • Livor mortis appears 30 minutes to 2 hours after death and becomes fixed at 6-12 hours. • Body cooling (algor mortis) drops about 1°C (1.8°F) per hour. If there is time, each group can present their estimate and explain their reasoning.	be useful for Activity 1. What Are The 4 Post-mortem Stages Of Death? (scienceabc.com, 6 min read) This article explains algor mortis, livor mortis and rigor mortis which may be useful for Activity 3.	

Lesson number	Specification coverage	GLH	Lesson aims and outcomes	Lesson ideas, key words and activities	Useful resources	Student independent learning – ideas and useful resources
8	1.3.1 Evidence available from crime scenes and individuals, relevant to forensic biology 30. Physical evidence (fingerprints, footprints)	1	By the end of the lesson, students should understand: 31. the relative importance of physical evidence in securing particular convictions 32. how physical evidence may be used for generic (class evidence) or unique identification (individual evidence) purposes 33. the role physical evidence plays in supporting time of death in an investigation	Key words: Arterial spray, Cast-off patterns, Point of convergence Activity 1: Fingerprint identification exercise: Provide students with fingerprint samples (real or printed) and a reference chart of common fingerprint patterns (e.g. loops, whorls, arches). Students can identify patterns and then determine whether they believe fingerprints to be generic or unique physical evidence. Activity 2: Blood spatter demonstration: Use simulated blood (red paint or fake blood) to demonstrate different blood patterns. Show students what patterns are created by: passive blood drops, an impact spatter and cast-off patterns. Students can then complete a worksheet where you provide images or illustrations of various bloodstain patterns. Ask students to identify the type of blood pattern and infer how it might have been created (e.g. a weapon or gravity). Activity 3: Evidence importance scale: in order to visualise how important various evidence is in securing a conviction; provide students with a scale or ranking	Fingerprints (forensicsciencesimplified.org) This article covers the key aspects of fingerprints, including identifying features, and analysis any may be useful for Activity 1. What Is a Fingerprint? Definition, Types, Trends (2025) (aratek.co) This article contains images of fingerprint examples which may be useful in Activity 1. Make a Blood Spatter Lab for High School (teachscienceofcuriosity.com) This post contains instructions and equipment needed to	Ask students to draw a basic blood spatter pattern showing: A low-impact droplet (straight drop of blood). A medium-velocity spatter (e.g. blunt force impact). A high-velocity spatter (e.g. gunshot). They should label each and explain in one sentence what it indicates. Blood Spatter Analysis (scientistwhodraws.com) Students may find this article useful to refer to while drawing their blood spatters.

Lesson number	Specification coverage	GLH	Lesson aims and outcomes	Lesson ideas, key words and activities	Useful resources	Student independent learning – ideas and useful resources
			34. how blood patterns can be used to indicate how blood was shed.	board and pictures or cards representing evidence types (this could be only physical or both physical and biological for comparison). Present a scenario (e.g. hit-and-run) and ask students to place evidence types on a scale of importance for solving the crime and securing a conviction. They can write a paragraph to justify their answer.	create blood spatters to visualise and analyse in the classroom which may be helpful for Activity 2.	
9	1.3.1 Evidence available from crime scenes and individuals, relevant to forensic biology 35. Trace evidence (fibres, hair, soil)	1	By the end of the lesson, students should understand: 36. the relative importance of trace evidence in securing particular convictions 37. how trace evidence may be used for generic (class evidence) or unique identification (individual evidence) purposes	Key words: Cortex, Cuticle, Density Testing, Medulla, Root Activity 1: Trace evidence sorting: Provide students with examples of trace evidence (either real or images of fibres, hair, and soil). Students can then categorise each as class or individual evidence. This could be done either as a mini whiteboard task or as a worksheet. Activity 2: Soil comparison lab: Provide students with soil samples from different locations (e.g. garden, sandpit, forest). Students can analyse and record the texture, colour, and composition of the samples. This could be extended by asking students to compare them to a	National Forensic Science Week - Trace Evidence (youtube.com, 3 min) This video gives an overview of trace evidence, what it is and how to collect it. CSI: Forensic Soil Analysis (soils.org) This resource provides guidance on how to conduct a forensic soil analysis practical which may	Present students with a case study where trace evidence was critical in securing a conviction (e.g. fibres linking a suspect to a victim). The student's task is to write a discussion on how the evidence was analysed and its impact and relative importance. 10 Criminals Who Were Caught Thanks to Trace Fiber Evidence (listverse.com) These cases may be a good starting point.

Lesson number	Specification coverage	GLH	Lesson aims and outcomes	Lesson ideas, key words and activities	Useful resources	Student independent learning – ideas and useful resources
			38. the role trace evidence plays in supporting time of death in an investigation 39. the limitations of techniques available in schools for a full forensic analysis of evidence.	'crime scene' sample to find a possible match. Activity 3: School-based analysis limitations: Compare real-world forensic techniques (e.g. DNA analysis, chromatography) to what students can do in the classroom (e.g. microscopic examination, burn tests). Discuss the strengths and limitations of school-based methods.	be a useful reference for Activity 2. 3 Minute Forensics - Trace Evidence (youtube.com, 4 min) This video gives an overview of trace evidence which might help introduce students to the topic. What lab equipment is used in a forensic lab? (evolveltd.eu, 2 min read) This post contains a list of equipment used in a forensics lab that may support Activity 3.	

Subject knowledge support for this area of study

Subject knowledge enhancement	Details
Underlying knowledge and understanding	Biology: students need to have an understanding of the definition of biology, and the field that biology addresses in order to understand biological evidence and the role that it plays. Analysis skills: students should be able to critically analyse scenarios in order to identify and understand limitations, such as the limitations of techniques available in schools.
Common misconceptions	Importance of evidence: students might believe that biological evidence (e.g. DNA, blood) is always more reliable than physical or trace evidence. All evidence is unique and can directly identify a suspect: students might bring preconceived ideas that one type of evidence identifies a suspect, not realising many types of evidence (e.g. fibres, soil, hair without DNA) are class evidence, meaning they only narrow down possibilities rather than pointing to a specific individual. All evidence related to decomposition changes at the same rate: students might not consider that decomposition rate varies based on factors like body location, cause of death, and microbial activity. Bloodstain patterns always provide clear and conclusive evidence of how blood was shed: students are likely to place more trust in bloodstain patterns than warranted, forgetting or overlooking that while blood patterns can offer insights into events, interpreting them requires skill and expertise, and they can sometimes be inconclusive. Incomplete techniques mean school experiments are not useful: students need to understand that even with limitations, school techniques are valuable for understanding basic principles and processes in forensic science.
Key concepts	Relative importance: Students should know the relative importance of biological, physical and trace evidence in securing particular convictions. Evidence types: Students should know what generic (class evidence) and unique identification (individual evidence) is, and how each type of evidence may be used for generic or unique identification purposes. Time of death: Students should understand the role evidence (including hair, tissues, microorganisms in soil, fingerprints, footprints, fibres, soil and blood) plays in supporting time of death in an investigation. Blood patterns: Students should know how blood patterns can be used to indicate how blood was shed. Students should understand the limitations of techniques available in schools for a full forensic analysis of evidence, including equipment limitations and access to techniques.

Subject knowledge enhancement	Details
Subject knowledge enhancement for teachers	To learn more about trace evidence consider watching: Inside the Crime Lab: Trace Evidence Unit, a video from Denver Police about what trace evidence is often collected, and how (youtube.com, 3 min). You can read more in depth about biological evidence from the National Center for Forensic Science (ncfs.ucf.edu). For an in depth read on footprints as physical evidence you can read Footprints a Forensic Analysis blog post (forensicfield.blog).

Area of study: 2.1 Microscopy in forensic biology

Lessons

Lesson number	Specification coverage	GLH	Lesson aims and outcomes	Lesson ideas, key words and activities	Useful resources	Student independent learning – ideas and useful resources
10	2.1.1 Key features of microscopy 1. Light microscopes (LM) - Stereo microscopes - Electron microscopes (EM)	1	By the end of the lesson, students should understand: - how to select the appropriate type of microscopy to use for different forensic evidence - the limitations of each type of microscopy to observe forensic evidence.	Key words: Analysis, Magnification, Nanoscale, Resolution Activity 1: Comparison: Set up stations with microscopes (light and stereo, if possible). Provide samples of pre-made slides like fibres, soil, or hair. Students can observe the same samples under each microscope and compare the level of detail. They can then fill in a worksheet or make notes comparing which microscope would be best for each type of evidence. Activity 2: Electron microscope demonstration: Show a video or simulation of an SEM or TEM being used to examine evidence (e.g. pollen, gunshot residue, hair). Discuss the preparation steps and resolution advantages. Activity 3: Comparison chart: Students can create a table showing the benefits and limitations of each type of microscope, focusing on the application to forensic contexts.	My 250'000x scanning electron microscope (youtube.com, 5 min) This video details an electron microscope and shows images it produces. This may be useful in Activity 2. What Role Does SEM Play in Trace Evidence Analysis? (nanoscience.com) This article provides uses of electron microscopy in forensic science and	Possible independent learning activities: Provide students with a list of forensic evidence types (e.g. fibres, hair, gunshot residue). The students task is to independently match the evidence to the most appropriate type of microscopy (light, stereo, electron). Additionally you could provide images of evidence viewed under different microscopes (light, stereo, SEM) and students must try to identify the type of microscope used to create the image based on the image quality and scale.

Lesson number	Specification coverage	GLH	Lesson aims and outcomes	Lesson ideas, key words and activities	Useful resources	Student independent learning – ideas and useful resources
				Possible extension of activity: Divide the class into small groups. Each group argues for or against the use of a specific microscopy type in certain forensic contexts. For example, 'Light microscopy is sufficient for fibre analysis' one group would argue for while the other argues against.	images of trace evidence under the electron microscope, useful for Activity 2. Stereomicroscope (forensicfield.blog, 3 min read) This blog explains the use of the stereo microscope in forensics as well as some limitations that may be useful for Activity 3.	
11	2.1.2 Use of light microscopes (LM) and stereomicroscopes to observe forensic evidence	2	By the end of the lesson, students should understand: 4. how to measure evidence using an eyepiece graticule in eyepiece units (EPU) 5. how to calibrate the units into microns using a	Key words: Eyepiece graticule, Eyepiece units, Calibration factor, Micron (μm), Stage micrometer Activity 1: The Slow practical approach: Show students how to locate the eyepiece graticule in a microscope and how to place the stage micrometer on the stage. Demonstrate the alignment process. Students observe prepared slides (e.g. hair, fibres) under a microscope. They record the number of EPUs covered by the evidence.	The Slow Practical (achemicalorthodoxy.co.uk) This blog post explains what a slow practical is and how to conduct it in the classroom. CLEAPSS provides a series of useful guidance for using microscopes in the	Students can create a set of flashcards to remember the uses of microscopy in forensics and how to calibrate and provide actual sizes of evidence observed. StudySmarter provides a starting point for flashcard questions and answers. (studysmarter.co.uk, free subscription required)

Lesson number	Specification coverage	GLH	Lesson aims and outcomes	Lesson ideas, key words and activities	Useful resources	Student independent learning – ideas and useful resources
			stage micrometer 6. how to provide actual sizes of forensic evidence observed.	Show students how to calibrate the eyepiece graticule using a stage micrometer. The students can then determine the microns per EPU at two magnifications (e.g. 10× and 40×) and record their calibration factors on a worksheet. Extension or challenge: Provide unknown samples (e.g. fibres, pollen). Students measure the samples, calculate actual sizes, and identify the evidence using a size reference chart. Activity 2: Size calculation exercise: On a worksheet, provide students with evidence measured in EPUs and a calibration factor. The student's task is to calculate the actual sizes of the evidence in microns.	classroom, including how to calibrate the eyepiece graticule, and fix common faults (science.cleapss.org.uk). Microscopy - How to use a microscope (youtube.com, 13 min) Malmsbury Science provides a video on how to correctly set up the light microscope and specimen slide.	
12	2.1.3 Preparing forensic evidence for microscopy	2	<u>By the end of the lesson, students should understand:</u> <u>the difference between wet and dry mounts of specimens and when to use them</u>	Key words: Contrast, Dry mount, Wet mount Activity 1: Comparison: Students can create a table with the sections 'wet mount' and 'dry mount'. Present students with slides prepared as wet and dry mounts of the same specimen (e.g. two slides of cheek cells and two slides of pollen, one wet one dry). Students can	How to make dry and wet mount slides (youtube.com, 4 min) This video provides a demonstration on how to prepare dry and wet mount slides.	Students can create a poster, detailing the pros and cons of wet and dry mounts for specific evidence types. Students may find Making a wet mount microscope slide a good starting point for advantages and disadvantages of

Lesson number	Specification coverage	GLH	Lesson aims and outcomes	Lesson ideas, key words and activities	Useful resources	Student independent learning – ideas and useful resources
			<u>how to produce a temporary, stained mount of an LM specimen for cheek cells</u> <u>how to produce a temporary, dry mount of a LM specimen for pollen</u> <u>staining and lifting techniques for tissues, including skin and hair.</u>	compare the visual clarity, sample stability, and possible application contexts. Activity 2: Preparing a wet mount: Students collect their cheek cells using a sterile swab, prepare a wet mount using saline, and stain the sample with methylene blue. Students can then observe their collected cells under a light microscope. This could be conducted as a 'slow practical' approach as detailed in the previous lesson. Activity 3: preparing a dry mount: Provide students with dry pollen grains (e.g. from flowers). Students must then mount the grains on a slide, cover them with a cover slip, and observe using a light microscope. This can be approached as a whole class practical either following teacher directions or a written method, dependent on class confidence. Activity 4: Staining: Provide students with tissue samples (e.g. onion skin for cells, hair strands for keratin visualisation). Students can then experiment with the use of different stains (e.g. iodine, methylene blue) and compare the effects on each specimen.	Making a wet mount microscope slide (microbehunter.com, 5 min read) This blog post provides a written method of preparing a wet mount slide with microbes which may be useful for Activities 1 and 2. Staining Microscopic Specimens (courses.lumenlearning.com, 12 min read) This post contains detailed information on staining in microbiology, as well as knowledge check questions.	wet mounts. (microbehunter.com)

Lesson number	Specification coverage	GLH	Lesson aims and outcomes	Lesson ideas, key words and activities	Useful resources	Student independent learning – ideas and useful resources
				Activity 5: Lifting techniques: Students can collect skin cells using an adhesive tape method and hair strands using tweezers. They can then mount the samples on slides and observe the samples with and without staining. They can make a before staining and after staining sketch to highlight the differences in their observations.		

Subject knowledge support for this area of study

Subject knowledge enhancement	Details
Underlying knowledge and understanding	Parts of a microscope: students would benefit from understanding the components of a microscope (e.g. eyepiece, objective lens, stage, light source, diaphragm) and their functions before beginning this topic. Magnification and resolution: to understand the benefits and limitations of types of microscopy students need to understand what magnification and resolution are. Units of measurement: students need a basic understanding of standard units. Students should know what microns (μm) are and how they relate to millimetres and nanometres. Forensic evidence: students need general familiarity with biological evidence (e.g. hair, tissues, bodily fluids) and trace evidence (e.g. fibres, soil) to understand which microscopes might be used with this evidence in a forensic setting. Laboratory safety: Students must know the proper handling of microscopes, slides, and staining agents and have an awareness of precautions when working with biological materials (e.g. gloves, sterilisation). Students should also already understand the rules of laboratory safety.
Common misconceptions	All microscopes work the same way or can be used interchangeably: students may not have encountered electron microscopes before and therefore assume all microscopes work with light and can be used for all material. Electron microscopes are always better because they have higher magnification: students might not grasp that while EMs offer greater resolution, they require more preparation and are not always practical for all forensic evidence. Stereo microscopes are only 'low power' versions of light microscopes: you will need to make it clear to students that stereo microscopes provide 3D views and are specifically designed for observing surface details and larger objects. Measuring with an eyepiece graticule automatically provides the size in standard units like microns: students might not understand that the eyepiece graticule measures in arbitrary units rather than standard one, or possibly the difference between arbitrary and standard units. Staining and mounting are only for creating temporary slides: students might not realise that the temporary mounts they produce allow for quick observations but may degrade over time. Microscopes are the primary tool for forensic analysis in all cases: from being immersed in the topic, students might forget that microscopy is just one tool among many, and its applicability depends on the evidence type.

Subject knowledge enhancement	Details
Key concepts	Features: students should know the key features of light microscopes (LM), stereo microscopes and electron microscopes (EM) including how to select the appropriate type of microscopy to use for different forensic evidence. Students should also know the limitations of each type of microscopy when used for forensic evidence analysis. Use: Students should understand how to use light microscopes and stereo microscopes to observe forensic evidence. Students should know how to measure evidence using an eyepiece graticule in eyepiece units (EPUs). Students should know how to calibrate the EPUs into microns using a stage micrometer. Students should be able to use these skills to provide actual sizes of forensic evidence observed. Preparation: Students should know how to prepare forensic evidence for microscopy. To do this, students should know the difference between wet and dry mounts of specimens and understand when to use them. Students should know how to produce a temporary, stained mount of an LM specimen and how to produce a temporary, dry mount of a LM specimen. Students should also know staining and lifting techniques for tissues (such as skin and hair). This topic also links to Unit F180, Topic B1.2.
Subject knowledge enhancement for teachers	Review of Forensic Microscopes is a 15 minute read providing more insight into forensic microscopy (microscopes.unitronusa.com). To learn more about how electron microscopes work you can watch The Principle of the Electron Microscope (youtube.com, 10 minutes). For more depth on stereomicroscopy you can read this chapter from Practical Forensic Microscopy: A Laboratory Manual (catalogimages.wiley.com).

Area of study: 2.2 Observing biological evidence

Lessons

Lesson number	Specification coverage	GLH	Lesson aims and outcomes	Lesson ideas, key words and activities	Useful resources	Student independent learning – ideas and useful resources
13	2.2.1 Cellular evidence in Forensic Biology 7. Prokaryotes 8. Bacteria 9. Eukaryotes 10. Yeasts 11. Unicellular algae 12. Pollen 13. Fungal Spores 14. Cheek cells 15. Skin cells 16. Blood cells	1	By the end of the lesson, students should understand: 17. how to identify cell structure as observed and measured from: - temporary slides - microscope drawings / photographs - electron micrographs - generalised diagrams / photographs 18. the type of information that cell evidence	Key words: Organelles, Qualitative, Quantitative, Trauma, Variability Activity 1: Qualitative vs. quantitative: Prime students' knowledge of qualitative and quantitative data by doing a short knowledge check task, for example asking students to provide definitions on their mini whiteboards. In the second part of the task, divide the class into small groups and provide each group with a mystery object (e.g. a fruit, a rock, a fabric sample). Ask each group to: list their qualitative observations (e.g. 'The object is smooth and shiny', 'The fabric is soft') and list quantitative observations (e.g. 'The object weighs 150 grams', 'The fabric is 20 cm long'). The groups then present their findings to the class who have to guess what the object is. You can then discuss how both types of data can be useful in forensic analysis, as either one alone does not provide the full picture.	Qualitative and Quantitative Data (youtube.com, 4 min) This video explains the difference between qualitative and quantitative data which may prime students' knowledge for Activity 1. Red Blood Cells under the Microscope 400x and 1000x (youtube.com, 2 min) This video provides images of blood cells under the light microscope at different magnifications which	Matching biological evidence to individuals: Provide students with a list of descriptions of hair samples, blood cells, or tissue fragments. Students can analyse the evidence and write a response on how it may or may not uniquely identify individuals.

Lesson number	Specification coverage	GLH	Lesson aims and outcomes	Lesson ideas, key words and activities	Useful resources	Student independent learning – ideas and useful resources
			19. can reveal as forensic proof 20. how to record quantitative and qualitative information about biological evidence the limitations from observing evidence alone when trying to match to an individual.	Activity 2: Cell structure identification: Provide students with a range of resources (temporary slides, electron micrographs, and generalised diagrams) This could be in the form of PowerPoint presentation or a worksheet of images. Ask students to identify and label the key cell structures (e.g. nucleus, membrane) in each resource. Activity 3: Quantitative data from slides: Using pre-made slides, ask students to observe temporary slides of onion skin or cheek cells and identify key structures. These can be recorded on a worksheet showing a rough diagram of the slide. Students can then record quantitative data (e.g. size of the nucleus) using an eyepiece graticule. They can then identify the qualitative data (describe features like shape or texture).	may be useful for Activity 2. Microscope View of Plant Cells (youtube.com, 0.5 min) This video shows plant cells under the microscope which may be useful for Activity 2. What Lives In Your Mouth? Saliva under the Microscope (youtube.com, 2 min) This video shows cells found in saliva under the microscope which may be useful for Activity 2 or 3.	
14	2.2.2 Tissue evidence in Forensic Biology 21. Hair	1	By the end of the lesson, students should understand:	Key words: Degradation, Species confusion, Visual aid	DNA and Biological Analysis – Case Studies	Lesson reflection: Ask students to write a short paragraph explaining the limitations of using

Lesson number	Specification coverage	GLH	Lesson aims and outcomes	Lesson ideas, key words and activities	Useful resources	Student independent learning – ideas and useful resources
	22. Skin 23. Blood 24. Bodily fluids		25. how to identify tissue structure as observed and measured from: ○ temporary slides ○ microscope drawings / photographs ○ electron micrographs ○ generalised diagrams / photographs 26. the type of information that tissue evidence can reveal as forensic proof 27. how to record quantitative	Activity 1: Case study: Provide case studies showing forensic uses of hair, skin, or blood (e.g. identifying suspects or time of death). Students can then identify the information provided by each tissue type in each case and discuss the limitations of the evidence in their pairs. They can then write up a list of tissue evidence types and the information each can provide in cases. Activity 2: Observing hair samples: Provide hair samples (e.g. human and animal). Students can then examine these under a light microscope. The students can work down a task checklist to measure diameter using an eyepiece graticule, and describe qualitative features (e.g. colour, texture). They can then write a paragraph to 'present' the information that they have gathered from their sample and compare this to an electron micrograph of human hair. This activity could also be completed with prepared slides showing blood or saliva.	(forensicscience.ie) This case study details how blood and other tissues can be useful in forensics and may be useful for Activity 1. Scanning Electron Microscopy Study of Hair Shaft Damage Secondary to Cosmetic Treatments of the Hair (pmc.ncbi.nlm.nih.gov) This article contains electron micrograph images of hair tissue which may be useful in Activity 2. Forensic Hair Comparison Lab (youtube.com, 5 min) This video could be used in place or as well as physical	tissue evidence alone for matching to an individual. You could provide prompts like: 'Why might two different individuals have similar tissue evidence?' or 'What other types of evidence might be needed to support tissue analysis?'

Lesson number	Specification coverage	GLH	Lesson aims and outcomes	Lesson ideas, key words and activities	Useful resources	Student independent learning – ideas and useful resources
			and qualitative information about biological evidence 28. the limitations from observing tissue evidence alone when trying to match to an individual.		samples of hair for Activity 2.	
15	2.2.3 Organ evidence in Forensic Biology 29. Teeth 30. Bone 31. Leaves 32. Seeds 33. Fruits 34. Flowers 35. Roots	1	By the end of the lesson, students should understand: 36. the type of information that organ evidence can reveal as forensic proof 37. how to record quantitative	Key words: Age estimation, Seasonality, Trauma Activity 1: Teeth and bone identification: Provide replicas of teeth and bones for students to examine. The student's task is to record quantitative data (e.g. length of bones) and qualitative observations (e.g. dental decay) of these replicas / models. This could be done independently or you could scaffold the recording with a worksheet prompting students on data to record. Students can	Inside the Tooth (msdmanuals.com) This 3D interactive model of the teeth may be useful when teaching Activity 1 to support visually. Images can be used if replicas are not available from Shutterstock, the search can be	Plant evidence observation: Provide students with images of samples of leaves, seeds, or flowers to observe. Ask them to measure features (e.g. leaf length, seed weight) and record qualitative traits (e.g. leaf shape, flower colour).

Lesson number	Specification coverage	GLH	Lesson aims and outcomes	Lesson ideas, key words and activities	Useful resources	Student independent learning – ideas and useful resources
			and qualitative information about biological evidence 38. the limitations from observing organ evidence alone when trying to match to an individual.	then work in pairs to complete a 'think-pair-share' and discuss how these features help determine age or identity. Activity 2: Brainstorm: Ask students to work in small groups to brainstorm as many limitations to observing organ evidence alone when trying to match to an individual as they can. (For example: Generic evidence: Many organ features are not unique to individuals (e.g. similar bone size across populations). Environmental effects: Decomposition, damage, or alterations from exposure. Context dependency: Organs need corroboration (e.g. DNA analysis or scene context) to confirm identity.	refined to specific types of bone. Skeletal system (msdmanuals.com) This 3D interactive model of the skeletal system may also support Activity 1. Class Evidence vs Direct Evidence: Key Differences in Forensic Science (simplyforensic.com, 12 min read) This article provides some benefits and limitations of generic and unique evidence which may be useful for Activity 2.	

Subject knowledge support for this area of study

Subject knowledge enhancement	Details
Underlying knowledge and understanding	Cell structure: Students should know the basic differences between prokaryotic and eukaryotic cells, as well as the key components of cells (nucleus, cytoplasm, cell wall, ribosome, cell membrane, mitochondria, chloroplast, vacuole). Tissue: Students need to know the concept of tissues as groups of similar cells performing specific functions and some examples of human tissues (e.g. skin, hair) and their roles Organ structure: Students should have an understanding of organs as part of larger systems (e.g. teeth and bones in the skeletal system) as well as knowing basic anatomy and functions of key organs like skin, bones, and teeth. Plant structure: Students need an understanding of the basics of plant structures such as leaves, seeds, and pollen, and their roles.
Common misconceptions	All cells look the same under a microscope: Students may have studied limited cell types under the microscope at this point in their education and therefore have limited schema of the variety of cells. Electron micrographs always show the 'true' colour of cells: Students should be made aware that colours are often added artificially for visual clarity when viewing electron micrographs and that they only provide black and white images. Hair and skin provide direct individual identification like fingerprints: Students may confuse the idea that DNA in hair follicles or skin cells can help identify individuals, but that hair or skin structure alone typically provides class (generic) evidence. Teeth and bones always yield DNA: Students may not comprehend that DNA may degrade in extreme environments. All organs decompose at the same rate: Different tissues and organs decompose at different rates depending on environmental factors, students may not factor in environmental conditions when discussing limitations of organ evidence. Recording quantitative information is unnecessary if qualitative observations are detailed: Students need to remember that quantitative measurements, such as cell or tissue dimensions, provide critical evidence that qualitative observations cannot replace.
Key concepts	Cells: students should know the type of information that cell evidence can reveal as forensic proof. Students should know the following types of cells: Prokaryotes - bacteria and eukaryotes: • Yeasts • Unicellular algae • Pollen • Fungal spores • Cheek cells • Skin cells • Blood cells. Students should recognise cell structure as observed and measured from: • Temporary slides • Microscope drawings / photographs • Electron micrographs • Generalised diagrams / photographs. Tissue evidence: students should know the type of information that tissue evidence can reveal as forensic proof. Students should know the following types of tissue: hair, skin, blood, bodily fluids. Students should recognise tissue structure as

Subject knowledge enhancement	Details
	observed and measured from: • Temporary slides • Microscope drawings / photographs • Electron micrographs • Generalised diagrams / photographs. Organ evidence: students should know the type of information that organ evidence can reveal as forensic proof. Students should know the following types of organs: teeth, bone, leaves, seeds, fruits, flowers, roots Recording: Students should know how to record quantitative and qualitative information about cell, tissue and organ evidence. This should include recording measurements, colour and presence or absence of markers. Limitations: students should be familiar with the limitations from observing cell, tissue or organ evidence alone when trying to match to an individual. This topic also links to Unit F180, Topic B1.2. The topic of qualitative and quantitative data also appears in Unit F181, Topic 2.
Subject knowledge enhancement for teachers	To read more about bone evidence in forensic biology consider reading: Skeletal Pathology in Forensic Investigation, an article from Future Learn (futurelearn.com). For more information on tissue evidence in forensic biology read: Forensic dermatology, an article by Monash Medical Centre (dermnetnz.org). How to Catch a Criminal: The Science of Forensic Hair Analysis is a useful video to learn more about hair as tissue evidence in forensic biology (youtube.com, 10 min).

Area of study: 2.3 Microbiology in Forensic Science

Lessons

Lesson number	Specification coverage	GLH	Lesson aims and outcomes	Lesson ideas, key words and activities	Useful resources	Student independent learning – ideas and useful resources
16	2.3.1 Contributions of microbiology to forensics 39. Bioterrorism 40. Cause of death 41. Time of death 42. Place of death 43. Outbreaks of foodborne disease 44. Biosecurity 45. Identification of individuals	1	By the end of the lesson, students should understand: 46. how microorganisms are isolated, identified and genetically sequenced from microbiomes 47. how microorganisms may contribute to forensic investigations.	Key words: Bioinformatics, Biosecurity, Bioterrorism, Culturing, Profiling Activity 1: Role of microorganisms in forensics: Create cards with names of microorganisms or microbial evidence on one set (e.g. 'Soil microbes', 'Pollen grains') and their forensic roles on another set (e.g. 'Helps determine place of death', 'Estimates time of death'). Students can work in pairs to match the evidence to the role. Activity 2: Microbial time of death timeline: Create a worksheet with descriptions of microbes that appear at different stages of decomposition. Students can cut out the microbes and arrange them in the correct order on a timeline to show how forensic scientists estimate time of death.	Introduction to forensic microbiology (youtube.com, 5 min) This video provides an introduction to microbiology in forensics. Microbial traces and their role in forensic science Table 1 in this article provides a list of microorganisms and where they are found in forensic investigations which may be useful when creating flashcards. Bioterrorism Diseases (health.state.mn.us, 2 min read) This post contains a	Students can research a case where microbiology has been crucial to forensics. For example students may look at: The Forensic Microbiome: The Invisible Traces We Leave Behind , an article discussing the case of anthrax attacks following 9/11 (nij.ojp.gov).

Lesson number	Specification coverage	GLH	Lesson aims and outcomes	Lesson ideas, key words and activities	Useful resources	Student independent learning – ideas and useful resources
					list of microbes involved in bioterrorism and links to more information about each which may be useful for Activity 1. Microbiology of death (cell.com, 5 min read) This article contains a diagram showing the microbial decomposers at stages after death which may be helpful for Activity 2.	
17	2.3.2 Culturing microorganisms effectively and safely 48. Preparation of work area 49. Aseptic technique	1.5	By the end of the lesson, students should understand: 53. the importance of aseptic technique in culturing microorganis	Key words: Aseptic technique, Contamination, Disinfection, Incubation Activity 1: Aseptic technique demonstration: You, as the teacher, can demonstrate aseptic technique, including disinfecting work areas, sterilising inoculating loops with a Bunsen burner, and properly transferring microorganisms	Aseptic Techniques: Cell Culture Basics (youtube.com, 5 min) This video provides a demonstration of aseptic technique.	Method write up: Students can practice writing up a method for aseptic techniques used in the laboratory. They may want to create a revision poster for aseptic techniques.

Lesson number	Specification coverage	GLH	Lesson aims and outcomes	Lesson ideas, key words and activities	Useful resources	Student independent learning – ideas and useful resources
	50. Preparation of sterile agar plates and nutrient media		54. ms and for forensic proof	to an agar plate. Students can write a method for aseptic technique after viewing the demonstration.	Aseptic techniques in microbiology (science.cleapss.org.uk)	
	51. Preparation of sterilised equipment		54. how to use alcohol and other sterilisation procedures	Activity 2: Method peer review: After viewing the demonstration and writing a method, students can peer review each other's methods to ensure no steps are missed and proper technique has been noted.	CLEAPSS provides useful guidance on aseptic techniques in the school laboratory.	
	52. Disposal		55. how to use PPE and biosafety cabinets and understand the importance of airflow around workspace	Activity 3: Sterilisation practice: Have students follow a demonstration to disinfect their work area using alcohol, and sterilise inoculating loops using a Bunsen burner (if available). Simulated Contamination: Simulate contamination by handling equipment without sterilisation and compare the results of clear agar plates with properly sterilised equipment vs. contaminated equipment.	Aseptic techniques (practicalbiology.org)	
			56. how to safely culture microorganisms and the implications of temperature, sealing Petri dishes and incubation time	Discuss other methods of sterilisation used in labs, such as autoclaving, and how they are important for preventing contamination in forensic investigations. Following this, students can create a short written safety protocol for using alcohol and sterilising equipment in forensic labs.	The Royal Society of Biology provides a procedure for aseptic techniques which may be useful for Activity 1.	

Lesson number	Specification coverage	GLH	Lesson aims and outcomes	Lesson ideas, key words and activities	Useful resources	Student independent learning – ideas and useful resources
			57. how to carry out sterilisation, disinfection and safe disposal after exposure.			
18	2.3.3 The culture of microorganisms by the inoculation of agar plates 58. Streak plates 59. Lawn plates 60. Pour plates	1.25	By the end of the lesson, students should understand: 61. how to culture bacteria and fungi using the streak plates, lawn plates and pour plates 62. the advantages and disadvantages of culturing microorganisms in forensic proof.	Keywords: Incubation, Isolation, Lawn, Microbial culturing Technicians will need advance notice of this lesson to ensure best results. Activity 1: Creating streak plates: You should demonstrate how to sterilise the inoculating loop using ethanol, then dip the loop into the bacterial culture and streak it across the agar plate in a zigzag motion to achieve isolated colonies. Students can then work in pairs to practice the streak plate method on their own agar plates, isolating individual colonies. Activity 2: Lawn plates: You can demonstrate how to spread a bacterial culture evenly over the surface of the agar plate using a sterile spreader or cotton swab, creating a uniform 'lawn'.	Lab technique microbiology: Streak plate method (youtube.com, 4 min) This video demonstrates how to achieve a streak plate. Making a microbial lawn plate (youtube.com, 3 min) CLEAPSS provides a demonstration of creating a microbial lawn plate.	Students can write a short report explaining which method would be best for different forensic applications (e.g. identifying a pathogen or isolating individual bacterial species from a crime scene sample).

Lesson number	Specification coverage	GLH	Lesson aims and outcomes	Lesson ideas, key words and activities	Useful resources	Student independent learning – ideas and useful resources
				Students can then apply bacterial cultures to their own plates to create a lawn. Activity 3: You as the teacher can demonstrate the pour plate method, where diluted microbial culture is mixed with molten agar and poured into a Petri dish to solidify, or you can provide a worksheet method for students to follow. Students can then prepare their own pour plates, inoculating molten agar with bacterial cultures.	Pour Plating (youtube.com, 3 min) The University of Lincoln demonstrate the pour plate method. CLEAPSS Microbiology Resources CLEAPSS provide resources for safe use of microorganisms in school environments.	
19	2.3.4 The identification of bacteria and fungi through: 63. Appropriate staining 64. Microscopy 65. Colony morphology 66. Selective and differential media	1.75	By the end of the lesson, students should understand: 69. how to identify colony types and match to reference samples 70. how to carry out testing for gram-negative and	Keywords: Colony morphology, Gram-negative, Gram-positive, Reference sample Technicians will need advance notice of this lesson to ensure best results. Activity 1: Comparison: After incubation of the three agar plates created previously with the three different techniques, students can observe their results. While observing results, students can create a table to note the advantages and disadvantages of each technique in	Gram Stain (my.clevelandclinic.org, 8 min read) This article provides an overview of Gram staining and a list of gram- positive and negative bacteria	After performing the Gram staining in class, students can write step-by-step instructions for the Gram staining process, including the purpose of each step. This will help to retain the information from the lesson. Students may want to watch: The Gram Stain Procedure to

Lesson number	Specification coverage	GLH	Lesson aims and outcomes	Lesson ideas, key words and activities	Useful resources	Student independent learning – ideas and useful resources
	67. Serology 68. DNA analysis		gram-positive bacteria 71. the role of different types of growth media in the culturing and identification of microorganisms 72. how to compare bacterial and fungal cultures from the scene with those provided from individuals 73. the advantages and disadvantages of each technique for	terms of isolation, speed, and ease of identification in forensic microbiology. Activity 2: Reference sample matching: Provide students with pre-made agar plates containing mystery colonies. The student's task is to compare the colonies from their plates to a set of reference sample descriptions (using microscopes and photographs) and identify possible matches. Students should write up the reasons they have matched the sample to the reference for each match. Activity 3: Gram staining: You can demonstrate the Gram staining procedure. Students can then perform their own Gram staining on bacterial cultures provided by the teacher or technician and observe the results under a microscope. Students can then identify whether the bacteria are gram-negative (pink) or gram-positive (purple) based on their reaction to the stain. Activity 4: Advantages and disadvantages of techniques: Divide the class into small groups, each group focusing on one technique (e.g. streak plate or pour plate). The groups will work together to research and list the pros and cons of their assigned technique in forensic use, such as speed, ease of	which may be useful for Activity 2. Gram staining (science.cleapss.org.uk) CLEAPSS provide useful guidance for carrying out Gram staining. Gram Staining (youtube.com, 4 min) This video demonstrates the techniques required for Gram staining.	remind them of the process (youtube.com, 2.5 min). In dependent research project: Students can independently research how selective and differential media, serology and DNA analysis can be used to identify fungi and bacteria and produce a research poster. Students may find Identification Methods for Bacteria and Fungi a helpful starting point.

Lesson number	Specification coverage	GLH	Lesson aims and outcomes	Lesson ideas, key words and activities	Useful resources	Student independent learning – ideas and useful resources
			74. forensic proof the limitations of techniques available in schools to safely identify microorganisms.	identification, risk of contamination, and effectiveness for large sample volumes. The groups can then present their findings for the whole class to take notes on.		

Subject knowledge support for this area of study

Subject knowledge enhancement	Details
Underlying knowledge and understanding	Basic cell biology: Students will need an understanding of prokaryotic and eukaryotic cells, including their structure, function and differences, as well as familiarity with microbial cells like bacteria and fungi in order to fully engage with the lessons. Microbial growth: Students will need some knowledge of the conditions necessary for microbial growth, for example nutrients, temperature and pH in order to fully apply their knowledge of microbes to a forensic setting. Sterilisation and disinfection: Students should understand the difference between sterilisation (e.g. autoclaving) and disinfection (e.g. alcohol) and know how sterilisation prevents contamination. Laboratory best practices: Students should understand laboratory safety, particularly the importance of maintaining a clean workspace.

Subject knowledge enhancement	Details
Common misconceptions	Microorganisms always provide definitive forensic proof: students might overestimate the usefulness of microorganisms in investigations. Microorganisms from a scene or body can pinpoint a time of death exactly: Students may not consider the external influence by environmental factors like temperature and humidity. Bioterrorism and biosecurity only involve pathogens: students may infer from news articles and media that bioterrorism is a pathogen problem, overlooking that it can involve non-pathogenic but disruptive microorganisms (e.g. crop-affecting fungi). Alcohol alone sterilises workspaces: due to the emphasis placed on alcohol both in the lab and in health messaging particularly during the pandemic, students may believe it completely sterilises, rather than it disinfects but doesn't kill all microbial spores and is part of a broader sterilisation protocol.
Key concepts	Contributions of microbiology to forensics: students should know how microorganisms can be isolated, identified and genetically sequenced from microbiomes and how these may contribute to forensic investigations in the fields of: Bioterrorism, cause of death, time of death, place of death, outbreaks of foodborne disease, biosecurity and identification of individuals. Aseptic technique: students should understand the importance of aseptic technique in culturing microorganisms and for forensic proof. Preparation of work area: students should know how to use alcohol and other sterilisation procedures and be familiar with consideration of airflow around the workspace. Preparation of sterile agar plates and nutrient media, and preparation of sterilised equipment: Students should know how to prepare sterile agar plates and nutrient media and understand the use of PPE and biosafety cabinets. How to safely culture microorganisms: Students should understand how to safely culture microorganisms, including the implications of temperature, contamination and sealing Petri dishes, incubation time, and the importance of keeping Petri dishes closed after incubation. Disposal: including sterilisation, disinfection and safe disposal after exposure.
Subject knowledge enhancement for teachers	To read more on teaching aseptic technique, 5 Ways to Get Students Excited About Aseptic Techniques is a 7 minute read with teaching ideas and tips (labster.com). Basic Practical Microbiology: a Manual: this manual provides information on microbiological laboratory practice, equipment, preparation of culture media, as well as sterilisation and disinfection (stem.org.uk).

Subject knowledge enhancement	Details
	To read more about forensic microbiology, Forensic Microbiology: When, Where and How provides a detailed article including the applications of forensic microbiology (pmc.ncbi.nlm.nih.gov).

Area of study: 3.1 Scene investigation and preservation of site

Lessons

Lesson number	Specification coverage	GLH	Lesson aims and outcomes	Lesson ideas, key words and activities	Useful resources	Student independent learning – ideas and useful resources
20	3.1.1 Restriction of the scene and access to the scene 75. Police tape 76. Scenes of Crime Officers (SOCO) 77. Forensic tents / work areas 78. Cordon log	1	By the end of the lesson, students should understand: 79. how to carry out appropriate scene preservation in schools 80. the purpose of crime scene preservation and initial documentation. Throughout the topic students can create and add to a 'Crime scene manual' where they collate their learning from each lesson.	Key words: Chain of custody, Contamination, Evidence integrity, Preservation Activity 1: Role play: Create role cards (e.g. police officer, SOCO, paramedic, reporter). Have students act out a crime scene, deciding who is allowed in and why. Students create and use a cordon log, noting who enters and for what purpose. Activity 2: Scene contamination game: Present an image or describe a hypothetical scene where contamination occurs (e.g. someone touches an item without gloves). Students identify what went wrong and suggest how to fix it.	Roles and Responsibilities (crime-scene-investigator.net, 5 min read) This post provides a list of roles at a crime scene and their responsibilities which may be useful in Activity 1. Examination and Documentation of the Crime Scene (crime-scene-investigator.net, 6 min read) This post details how a crime scene should be documented,	Students can design a poster summarising key steps to preserve a crime scene (e.g. use of tape, limiting access, PPE). The poster can include simple illustrations or bullet points. Throughout this area of study, students could produce a manual/portfolio on forensic science. This could include definitions, interpretations of the value of different roles of professionals or types of evidence in a forensic case.

Lesson number	Specification coverage	GLH	Lesson aims and outcomes	Lesson ideas, key words and activities	Useful resources	Student independent learning – ideas and useful resources
				Activity 3: Crime scene simulation: Set up a mock crime scene in the classroom or outdoor area with props (e.g. evidence items, police tape). Assign roles to students: SOCO, recorder, police officer. The student's task is to preserve the scene by setting up police tape, restricting access, and creating a cordon log.	which may be useful in Activity 3. Securing the scene (college.police.uk) This page gives more detail on how and why the scene must be secured which may help Activity 3. Do not use it opens up	
21	3.1.2 Recording and documenting the scene 81. Crime scene notes and visual evidence 82. Search patterns 83. Quadrant 84. Lane 85. Grid 86. Spiral 87. Wheel	1	By the end of the lesson, students should understand: 88. how to take crime scene notes and record visual evidence 89. how to select suitable search patterns.	Key words: Quadrant, Scale, Systematic Activity 1: Mock crime scene documentation: Set up a small mock crime scene in the classroom with several pieces of evidence (e.g. objects, markings, or props). Using a scaffolded worksheet, students take notes on their observations, including evidence placement, weather, and initial scene conditions. Optionally, they can sketch the scene or take photographs. They can then try a second crime scene without	How to Reconstruct a Crime Scene for Problem-Solving Skills (classroom.synonym.com) This blog post gives guidance on setting up a mock crime scene in the classroom and contains links to further guidance on the set up which may	Students can create a series of flash cards to detail the different search patterns used at a crime scene. They may want to use Search Patterns notes to help (studyrocket.co.uk).

Lesson number	Specification coverage	GLH	Lesson aims and outcomes	Lesson ideas, key words and activities	Useful resources	Student independent learning – ideas and useful resources
				scaffolding to test their retention on how to document the scene. Activity 2: Search pattern simulation: Scatter small items (e.g. paperclips, buttons, or coloured beads) around an area. Assign different groups specific search patterns (e.g. quadrant, lane, grid). Each group searches the area using their assigned pattern and records the evidence they find. Compare the efficiency of each pattern.	be useful in Activity 1. Forensics Lesson: Searching the Scene (youtube.com, 8 min) This video details how to search the crime scene, including different search patterns which may help Activity 2. Crime Scene Search Methods (youtube.com, 5 min) This shorter video from DeBacco University details the spiral, line, grid and zone search and how to select one. A Cool Way to Practice Crime Scene Search Patterns in Forensics (thetrendyscienceteacher.com) This blog post also provides some more ideas for activities to	

Lesson number	Specification coverage	GLH	Lesson aims and outcomes	Lesson ideas, key words and activities	Useful resources	Student independent learning – ideas and useful resources
					teach search patterns.	
22	3.1.2 Recording and documenting the scene 90. Documenting trace materials - Scene of crime documentation - Crime scene notes - Sketches and photographs - Video - Evidence labels	1	By the end of the lesson, students should understand: 91. how to document trace materials from a crime scene 92. how to record and document crime scenes and evidence appropriately	Key words: Comprehensive, Dynamic, Secure Handling Activity 1: Set up a simple crime scene with trace materials (e.g. a piece of string, soil, a hair sample). Students document the scene using notes, sketches, and photographs. Assign specific roles for each student (e.g. photographer, note-taker, sketch artist). Activity 2: Evidence labelling exercise: Provide students with labelled bags or containers for evidence. Place mock evidence items (e.g. string, dust, or beads) around the room. Students label each item properly, documenting what it is, where it was found, and when it was collected. Activity 3: Quiz: quiz students on key knowledge from the lesson, this could be as a whole class online quiz where students can compete to win. Questions could include multiple choice questions	Hosting a Mock Crime Scene in Forensics (thetrendyscienceteacher.com, 7 min read) This blog details how to set up a mock crime scene and may be useful when preparing Activity 2. Proper Tagging and Labeling of Evidence for Later Identification (crime-scene-investigator.net, 2 min read) This post details how to properly label	Ask students to write a brief plan for photographing a mock crime scene, answering questions such as: What angles should be covered? What items need close-up shots? How should scale be included in the photos?

Lesson number	Specification coverage	GLH	Lesson aims and outcomes	Lesson ideas, key words and activities	Useful resources	Student independent learning – ideas and useful resources
				such as: What should be included on an evidence label? What is one advantage of video documentation at a crime scene? What is the primary purpose of crime scene notes? Or true / false questions such as: Crime scene sketches are more detailed than photographs. Evidence labels must include the collector's initials and the location of collection. Documenting a crime scene is not necessary if video recording is used.	evidence and may be useful for Activity 2. Kahoot! can be a useful tool for creating an engaging whole class quiz (kahoot.com).	

Subject knowledge support for this area of study

Subject knowledge enhancement	Details
Underlying knowledge and understanding	Types of evidence: To access the learning in this topic, students will need some familiarity with different types of evidence (biological, physical, and trace evidence) and their roles in forensic investigations. They should have this from Topics 1.3 and 2.2. Purpose: Students need an understanding of the importance of preserving the scene to prevent contamination or loss of evidence. Media: Students need to be familiar with the different types of media used in crime scene documentation; sketches, photographs, video, in order to understand their use and limitations.
Common misconceptions	Police tape is only for preventing public access: Students may not comprehend that police tape serves multiple purposes, including delineating the crime scene boundaries, protecting evidence, and controlling access for authorised personnel only. Anyone wearing a uniform can access a crime scene: from watching forensic popular culture shows students might bring preconceived notions of who can access a crime scene. Forensic tents are only used in high-profile cases: due to their associations, students may overlook the fact that forensic tents are used whenever weather or environmental conditions might compromise evidence. Walking carefully through the scene won't disturb evidence: possible confusion from television shows may make students less likely to realise that any movement within the scene, even if careful, risks disturbing evidence. Search patterns are rigid and cannot overlap: students may focus too much on the differentiating features of search patterns that they do not recognise that patterns can be adapted or combined as needed to ensure thoroughness in an investigation. Videos and photographs eliminate the need for sketches: students might struggle to acknowledge that sketches provide contextual and spatial relationships that may not be clear in photographs or videos, such as distances or evidence placement.
Key concepts	Restriction and access: students should understand the restriction of the scene and access to the scene, including the use of police tape, Scenes of Crime Officers (SOCO), forensic tents and work areas and cordon logs. Students should understand the purpose of crime scene preservation and initial documentation and know how to carry out appropriate scene preservation in schools.

Subject knowledge enhancement	Details
	Recording and documenting: Students should know how to record and document a scene, including taking crime scene notes and visual evidence. Students should understand the importance of recording detailed observations at the crime scene. Searching: Students should know search patterns including: • Quadrant • Lane • Grid • Spiral • Wheel. Students should know how to select suitable search patterns. Documenting: Students should know how to document trace materials from a crime scene, including: • Scene of crime documentation • Crime scene notes • Sketches and photographs • Video • Evidence labels. Students should know how to record and document crime scenes and evidence appropriately.
Subject knowledge enhancement for teachers	For more details on preserving crime scenes in the real world, consider reading this freedom of information request from the Metropolitan Police which details how evidence is preserved at a real murder scene (met.police.uk). To watch more about documenting crime scenes, the University of Derby has an Introduction to Crime Scenes (youtube.com, 4 min). For more information about crime scene search methods 4 Essential Crime Scene Search Patterns Every Forensic Investigator Must Know is a 14 minute blog post read (quickcreator.io).

Area of study: 3.2 Collection of evidence

Lessons

Lesson number	Specification coverage	GLH	Lesson aims and outcomes	Lesson ideas, key words and activities	Useful resources	Student independent learning – ideas and useful resources
23	3.2.1 Hazards associated with forensic work 93. At the crime scene 94. In the laboratory	1	By the end of the lesson, students should understand: 95. how unfamiliar environments may pose physical, chemical and biological risk 96. the biological hazards associated with the collection and analysis of the biological evidence 97. the need for suitable personal protective equipment	Key words: Contamination, Disinfection, Exposure, Hazard, Infectious agents Activity 1: Risk identification: Start by showing the class a crime scene photo or scenario. Ask students to identify the potential hazards visible in the scene, including physical risks (e.g. broken glass), chemical risks (e.g. hazardous chemicals), and biological risks (e.g. bodily fluids). Divide the students into small groups. Each group can discuss the different types of risks they can identify from the crime scene image. They should focus on: physical risks (sharp objects, unstable structures), chemical risks (potential exposure to drugs, explosives, or poisons) and biological risks (infectious disease, bodily fluids). You could provide a worksheet with titles to scaffold this. Activity 2: PPE show and tell: Show the students different types of PPE used in	All Crime Scene Photos (engagedscholarship.csuohio.edu) This link provides a series of crime scene photographs which may be useful for Activity 1. Crime Scene Safety Manual (sbsheriff.org, 12 pages) This document details the ways in which someone could be exposed to hazards at the crime scene and safety precautions that should be taken.	Students can produce their own risk assessment templates to be used in a school laboratory. They may find the resources from CLEAPSS useful to scaffold their responses. Making and recording risk assessments in school science (science.cleapss.org.uk)

Lesson number	Specification coverage	GLH	Lesson aims and outcomes	Lesson ideas, key words and activities	Useful resources	Student independent learning – ideas and useful resources
			(PPE) and other appropriate control measures to reduce risk 98. how to complete a risk assessment for a crime scene investigation and laboratory analysis of samples.	forensic work (e.g. gloves, face shields, lab coats) and explain the purpose of each item. Students can then use this information to create a set of cards with the type of PPE on one side and the role on the other. Activity 3: Risk assessment: Explain what a risk assessment is and why it's crucial in forensic work. Discuss the need to assess potential risks in both crime scene and laboratory environments. Then provide students with a forensic scenario (e.g. crime scene involving hazardous chemicals or biological fluids). Students can then work in pairs to complete a risk assessment for the given scenario using a risk assessment template. They should assess: potential hazards (identify physical, chemical, and biological risks), risk level (estimate the likelihood of harm occurring, e.g. low, medium, high), control measures (recommend control measures, e.g. PPE, barriers, ventilation).	Personal Protective Equipment in the Lab (labmanager.com, 5 min read) This article details the types of PPE in the lab and what they are used for which may be useful in Activity 2. Using Personal Protective Equipment (PPE) in Labs (youtube.com, 7 min) This video shows examples of the different types of PPE and may be used in Activity 2.	

Lesson number	Specification coverage	GLH	Lesson aims and outcomes	Lesson ideas, key words and activities	Useful resources	Student independent learning – ideas and useful resources
24	3.2.2 Collection of evidence 99. Evidence recognition 100. Recovery of trace materials 101. Swabbing 102. Forceps 103. Taping 104. Shaking, brushing and vacuuming 105. Marks and impressions 106. Print lifting	1	By the end of the lesson, students should understand: 107. how to identify probative evidence at the crime scene 108. how to recover trace evidence in the correct order to prevent damage and loss of evidence.	Key words: Documentation, Evidence preservation, Integrity, Probative evidence Activity 1: Present students with a crime scene scenario (e.g. a car crash, break-in, or assault) with various types of evidence present (biological, trace, and physical). Small Group Discussion: Ask students to discuss and decide the order in which they would collect different types of evidence. For example, which should be collected first — biological samples or trace materials? Why is it important to follow a sequence in evidence recovery? Order Matching: Provide students with a worksheet listing different types of evidence (fingerprints, biological fluids, hair, soil, etc.). Students must decide in which order each type of evidence should be collected to minimise contamination or loss. After the activity, go over the correct order of recovery and have students reflect on any choices they got wrong.	Trace Evidence Recovery Guidelines (Section 5.0) (nist.gov) This document details the methods of recovery for trace materials and may be useful for Activity 1. Collection and Preservation of Evidence (crime-scene-investigator.net, 6 min read) This article contains an explanation of the consideration of the order in which to recover evidence which may be useful in Activity 1.	Students can create a short quiz on identifying and recovering trace evidence. Students can then use each other's quizzes as recall practice and consolidation of knowledge. They could use sites like kahoot.com or quizizz.com .

Lesson number	Specification coverage	GLH	Lesson aims and outcomes	Lesson ideas, key words and activities	Useful resources	Student independent learning – ideas and useful resources
				Activity 2: Start by explaining what 'probative evidence' means (evidence that can prove something about the crime, such as fingerprints, footprints, or trace materials). Scavenger Hunt: Provide students with a crime scene image. Ask them to work in pairs or small groups to identify the different types of evidence shown in the image (e.g. biological, physical, trace evidence). Students should discuss each type of evidence and record why it might be considered probative.	Probative value (law.cornell.edu) This entry explains how evidence is considered probative and may be useful for teaching Activity 2.	
25	3.2.2 Collection of evidence 109. Recovery of trace materials 110. Swabbing 111. Forceps 112. Taping 113. Shaking, brushing and vacuuming 114. Marks and impressions 115. Print lifting	1.5	By the end of the lesson, students should understand: 116. how to recover trace materials appropriately using practical techniques 117. the importance of correct methods for individual recovery	Key words: Cross-contamination, Protocol, Recovery, Sample integrity Activity 1: Trace evidence recovery simulation: Create a mock 'crime scene' by placing small, easily recoverable items (e.g. fibres, hair, dirt, small items) on a surface. First, demonstrate how to use different tools for evidence collection: Swabbing: Use a swab to collect liquid or biological evidence. Forceps: Show how to pick up small objects, such as fibres or hairs, without contaminating them.	How to Properly Swab DNA Evidence at a Crime Scene (youtube.com, 9 min) This video details how to collect biological evidence using the swabbing technique. Forensics Expert Explains How to Lift Fingerprints WIRED	There are a number of new terms and techniques here. It may be helpful for students to create flow charts or Cornell notes to bring together the ideas covered. This may help students understand which techniques to use and when, and possibly in which order when recovering material from a scene.

Lesson number	Specification coverage	GLH	Lesson aims and outcomes	Lesson ideas, key words and activities	Useful resources	Student independent learning – ideas and useful resources
			methods to avoid cross-contamination 118. the usefulness of the method of recovery for each sample of biological evidence 119. the use of the double swab technique for recovering DNA evidence.	Taping: Demonstrate how to use tape to lift trace materials from surfaces (e.g. dust, fibres). Vacuuming: Show how to use a vacuum (or a simulated one) for collecting trace evidence like dust or small debris. Have students practice collecting evidence using each of these methods. They should work in pairs or small groups and document the process (e.g. how to use each tool, the order of evidence collection). Activity 2: Double Swab Technique: Explain the double swab technique as a method used to recover DNA evidence from surfaces (e.g. skin, clothing, or objects). Describe the process: The first swab is used to moisten the surface with a saline solution to collect the first layer of material (e.g. cells, debris). The second dry swab is used to pick up the remaining material from the surface to recover any trace DNA. Demonstrate the technique by swabbing a mock surface for DNA recovery. Show how to moisten the first swab, then use a dry swab to collect the DNA, and properly	(youtube.com, 13 min) This video demonstrates one method of print lifting. Forensic Evidence and DNA: considering the collection methods (youtube.com, 3 min) This video explains when the different recovery techniques are appropriate.	While there will be no exam questions, and students may have access to their notes for the NEA assignment, this may help identify misconceptions. (lsc.cornell.edu)

Lesson number	Specification coverage	GLH	Lesson aims and outcomes	Lesson ideas, key words and activities	Useful resources	Student independent learning – ideas and useful resources
				store the swabs in separate containers to maintain evidence integrity. Have students practice the double swab technique on various mock surfaces (e.g. objects or clothing). Emphasise the importance of using different swabs for the two steps and the need to store each swab in separate containers to avoid contamination. Activity 3: Cross-contamination consequences: Present a real-life or hypothetical case where evidence was compromised due to cross-contamination (e.g. mixing DNA samples, improper handling of trace materials). Divide the class into small groups and ask students to discuss the case study and identify the mistakes made during evidence collection or analysis. The groups can then present their thoughts to the class.		
26	3.2.3 Storing evidence 120. Packaging and labelling 121. Storage and transport of a variety of	1	By the end of the lesson, students should understand: 123. how packaging, labelling and storage are	Keywords: Chain of custody, Contamination prevention, Degradation, Forensic protocols, Preservation Activity 1: Evidence packaging practice: Demonstrate how to properly package	Evidence Collection & Storage (youtube.com, 7 min)	Have students design a proper evidence label that includes the necessary details for collecting and storing evidence that they

Lesson number	Specification coverage	GLH	Lesson aims and outcomes	Lesson ideas, key words and activities	Useful resources	Student independent learning – ideas and useful resources
	forensic evidence 122. Chain of evidence		selected for the recovered materials by forensic biologists 124. how to ensure effective preservation and storage of evidence to prevent contamination and degradation 125. the importance of storage and preservation for recovered trace materials 126. the stages in the chain of evidence and how they	and label various types of evidence (e.g. fibres in paper bags, biological samples in sterilised containers). Provide students with different types of evidence (e.g. mock hair, soil, blood, or fibres). Have them practice packaging and labelling these correctly, using appropriate materials (e.g. paper bags for fibres, sealed containers for liquids). Ensure they write clear labels with essential details such as the case number, evidence description, date, and location of recovery. Activity 2: Chain of custody role play: Divide students into groups and assign roles such as forensic biologist, crime scene investigator, and evidence custodian. Create a scenario where they must handle evidence from collection to storage, documenting each stage on the chain of custody log. Students collect evidence (e.g. swabbing for DNA, gathering fibres), package it, label it, and transfer it while logging each step. They must ensure proper documentation at each stage. Students can then work individually to identify steps in the process where evidence integrity could be compromised.	A police department explains how they preserve and store evidence, which may help Activity 1. Chain of Custody (youtube.com, 2 min) This video explains the chain of custody and may be helpful for Activity 2. Evidence Collection, Handling and Storage (resourcehub01.blob.core.windows.net) This resource gives examples of slides and notes for teaching storage and handling of different types of evidence.	have learnt in the lesson.

Lesson number	Specification coverage	GLH	Lesson aims and outcomes	Lesson ideas, key words and activities	Useful resources	Student independent learning – ideas and useful resources
			preserve the integrity of the evidence 127. how to package, label and store evidence in schools and the differences from techniques available to forensic biologists.	Activity 3: Incorrect packaging scenarios: Present students with a set of packaging scenarios, some correct and some incorrect. For example, 'A hair sample is placed in a plastic bag' or 'A biological fluid is stored in an open container'. Ask students to identify which methods would preserve evidence effectively and which would risk contamination. As an extension, students could write up the corrections for the improperly packaged evidence and the possible consequences of the improper packaging.		
27		1	By the end of the lesson, students should understand: 128. how to reference material from the internet or other sources, including infographics (graphical	Theme words: Citations, Credibility, Plagiarism, Reliable, Source, Validity Activity 1: Practice referencing: Model referencing information used from a website, talking through how you would provide a reference for information used from the website. Give students a list of information snippets from a variety of different sources (e.g. a website, a	For more information check the OCR Guide to Referencing. DNA Recovery and Analysis from Skeletal Material in Modern Forensic Contexts (academic.oup.com)	

Lesson number	Specification coverage	GLH	Lesson aims and outcomes	Lesson ideas, key words and activities	Useful resources	Student independent learning – ideas and useful resources
			information providing data or knowledge) 129. to always identify information they have copied from teaching handouts and presentations for the unit, using quotation marks and stating the text is from class handouts.	textbook and a journal article) to practice referencing this information. Activity 2: Peer swap: Students can check their peer's work, including whether all information has been referenced, the consistency of citations and whether the reference is accurate. Activity 3: Identifying appropriate sources: Provide students with a list of sources (such as the NHS website, a blog, a journal article, a Reddit thread). The students' task is to identify whether each source is credible, reliable or valid or not and justify their decision.	This open source journal article provides an example of referencing in a forensics context.	

Subject knowledge support for this area of study

Subject knowledge enhancement	Details
Underlying knowledge and understanding	Students will need an understanding of what biological hazards are (e.g. bacteria, viruses, fungi) and how they can pose risks to human health. Students will need some familiarity with types of PPE (e.g. gloves, masks, goggles) and their purposes. By this point students should have an awareness of what trace evidence is (e.g. hair, fibres, soil) and its significance in linking suspects to crime scenes. Students will need an awareness of physical hazards (e.g. sharp objects, slippery surfaces) and chemical hazards (e.g. cleaning agents, solvents).
Common misconceptions	Crime scenes are always safe after law enforcement secures them: Students might assume that once law enforcement has secured a crime scene, it is free of risks. They may overlook hazards such as sharp objects, chemical spills, or unstable structures. Believing PPE is optional or universally protective: Students may believe that wearing gloves or masks alone eliminates all risks, or they may not appreciate the importance of wearing the correct type of PPE for specific hazards (e.g. gloves resistant to chemicals or cut-proof gloves). Any collected evidence is useful: Students might believe that all evidence recovered is equally useful without considering the relevance to the crime. Trace materials don't degrade: Students might assume that once evidence is collected, it remains in its original condition indefinitely.
Key concepts	Hazards associated with forensic work: students should be aware of the hazards both at the crime scene and in the laboratory. Students should know how unfamiliar environments may pose physical, chemical and biological risks and know about the biological hazards associated with the collection and analysis of the biological evidence. Students should also understand the need for suitable personal protective equipment (PPE) and other appropriate control measures to reduce risk, and how to complete a risk assessment for a crime scene investigation and laboratory analysis of samples. Collection of evidence: Students should know how to identify probative evidence at the crime scene and how to recover trace evidence in the correct order to prevent damage and loss of evidence. Recovery of trace materials: Students should know how to recover trace materials appropriately using the following techniques: • Swabbing • Forceps • Taping • Shaking, brushing and vacuuming • Marks and impressions • Print lifting.

Subject knowledge enhancement	Details
	Students should understand the importance of correct methods for individual recovery methods to avoid cross-contamination and the usefulness of the method of recovery for each sample of biological evidence. Students should also know the use of the double swab technique for recovering DNA evidence. Storing evidence: Students should know how packaging, labelling and storage are selected for the recovered materials by forensic biologists. Students should know how to ensure effective preservation and storage of evidence to prevent contamination and degradation and understand the importance of storage and preservation for recovered trace materials. Students will know the stages in the chain of evidence and how they preserve the integrity of the evidence. Students should understand how to package, label and store evidence in schools and the differences from techniques available to forensic biologists. Referencing: Students should understand the need for clear referencing of the intellectual property of others, and of different techniques for doing so in their work.
Subject knowledge enhancement for teachers	Trace Evidence Recovery Guidelines: These guidelines from the FBI provide more detailed insight into real-world guidelines on the collection of evidence (archives.fbi.gov). To watch a detailed explanation of how to package evidence, Packaging an item of evidence (youtube.com, 16 min) provides an in depth review of how this is done. To read more about the double swab technique, Double swab technique for collecting touched evidence is a journal article that provides a comprehensive overview (sciencedirect.com).

Area of study: 4.1 Observational analytical techniques

Lessons

Lesson number	Specification coverage	GLH	Lesson aims and outcomes	Lesson ideas, key words and activities	Useful resources	Student independent learning – ideas and useful resources
28	4.1.1 Types of observational evidence 130. Bodily fluids 131. Fingerprints 132. Footprints 133. Other forms of print	1	By the end of the lesson, students should understand: 134. the components of bodily fluids and their role in matching to individuals 135. how forensic biologists make use of bodily fluids such as blood, saliva and urine to support an investigation 136. the uses of fingerprint patterns, ridge characteristi	Key words: Antigens, Enzymes, Exclusion, Gait, Minutiae, Proteins Activity 1: Fingerprint analysis: Provide students with ink pads and fingerprint sheets / plain paper. Students can take their own fingerprints and classify the patterns (arches, loops, whorls). You can ask students to count ridges and make notes of any unique ridge characteristics. Students can compare their fingerprints and note the uniqueness of them. This can be repeated with students' foot and shoe prints if time allows. You may wish to scaffold this activity by providing a worksheet with a table of characteristics students can compare, or a checklist of characteristics for each type of print that students should look for. Activity 2: Observing lip and ear prints: Students can press their lips or ears onto paper using washable ink or a clear surface to create their own lip and ear prints. Examine the prints under a	Unveiling Fingerprints on Human Skin: Techniques and Case Studies (nikouiandassociates.com) This post details methods for fingerprint collection and may enhance Activity 1. Fingerprint Fuming on a Budget: A Hands-On Lab for Forensic Science Classrooms (thetrendyscienceteacher.com) This post details one way of carrying out fingerprint collection in the classroom and	Analysing your own shoe tread: students can draw or photograph their own shoe print or tread and note any unique characteristics (e.g. patterns, wear marks). They can then write a short paragraph explaining how a forensic biologist could use this for identification.

Lesson number	Specification coverage	GLH	Lesson aims and outcomes	Lesson ideas, key words and activities	Useful resources	Student independent learning – ideas and useful resources
			cs and ridge counting 137. the types of information available from finger, foot and shoe prints and how to use them for identification 138. how lip and ear prints, among others, can also be used to confirm identity 139. the limitations of observational evidence techniques 140. when it is appropriate to use each technique.	magnifying glass or microscope and have students note any features that could be useful to confirm identity in a crime (e.g. shape, piercings, scars) Activity 3: Bodily fluid evidence matching: Provide students with mock profiles of bodily fluids (e.g. blood type, presence of specific enzymes). Give students a fictional scenario where evidence needs to be matched to a suspect using these profiles. Students can then individually match the evidence to a given suspect and justify their conclusions. Activity 4: Limitations of observational evidence: Provide students with descriptions of visual evidence (e.g. a blurry shoe print or a partial fingerprint). Students can then work in a 'think-pair-share' format to discuss why such evidence might lead to inconclusive or incorrect conclusions. You can then ask students to suggest additional methods to support observational evidence.	may be useful for Activity 1. Footprints (crimemuseum.org, 2 min read) This post details what footprints can be used to determine in forensic analysis. On the Identification of Body Fluids and Tissues: A Crucial Link in the Investigation and Solution of Crime (https://pmc.ncbi.nlm.nih.gov/articles/PMC8617621/) This article reviews the value, investigation and interpretation of body fluid and tissues from crime scenes.	

Lesson number	Specification coverage	GLH	Lesson aims and outcomes	Lesson ideas, key words and activities	Useful resources	Student independent learning – ideas and useful resources
29	4.1.1 Types of observational evidence 141. Hair identification 142. Bone, teeth and skeletal anatomy	1	By the end of the lesson, students should understand: 143. the types of information that can be observed by comparing trace and hair samples 144. how human and animal hair differ 145. the types of evidence bones and skeletons can reveal 146. the advantages and disadvantages of using teeth to identify individuals 147. the limitations of	Key words: Ancestry, Comparative analysis, Corroboration, Fragment, Pigmentation Activity 1: Human vs. animal: Provide prepared microscope slides of human and animal hair. Students can use these to examine and compare structures such as medulla patterns, pigmentation, and cuticle scales. Using their observations students can create a comparison chart of the differences between human and animal hair. Activity 2: Skeleton puzzle: Provide students with a puzzle or diagram of a human skeleton with missing or displaced bones. Students can then work in pairs or groups to assemble the skeleton correctly and identify missing bones that are useful for age or sex determination and label these on the diagram / puzzle. Activity 3: Quiz: either a paper, white board or online style quiz to address the limitation of observational evidence techniques. Provide students with a statement of a limitation belonging to a type of observational evidence and students must answer which evidence technique relates to the limitation.	Hair Analysis in Forensic Science (news-medical.net) This article details how hair at a crime scene can be used and may help provide information for Activity 1. Analysing the bones: what can a skeleton tell you? (nhm.ac.uk) The Natural History Museum details some information that the skeleton can provide, which may help with Activity 2. A Look at Forensic Dentistry & How Teeth Are Used to Identify a Person (todaysrdh.com) This article discusses several different methods of using	Students can make posters on the differences between human and animal hair and how this information is important in forensic contexts.

Lesson number	Specification coverage	GLH	Lesson aims and outcomes	Lesson ideas, key words and activities	Useful resources	Student independent learning – ideas and useful resources
			observational evidence techniques 148. when it is appropriate to use each technique.		teeth in a forensic setting and may help with Activity 2.	
30	4.1.1 Types of observational evidence 149. Plant material 150. Insects 151. Flies (Diptera) 152. Beetles (Coleoptera)	1	By the end of the lesson, students should understand: 153. the use of combining evidence collected from different plant regions, including roots, stems, leaves, flowers and seeds 154. ways insect identification and life cycle can be used	Key words: Collaboration, Observational bias, Recovery Activity 1: Plant evidence analysis: Provide samples of plant parts (roots, stems, leaves, flowers, seeds). Assign small groups of students to examine a specific plant part and document their observations like texture, colour, and structural features. Students then need to work collaboratively as a class to determine how the evidence might link a victim, suspect, or location in a hypothetical case. Activity 2: Life cycle poster: Provide images or videos of insect life stages (egg, larva, pupa, adult) to students. Students can then use these to create a	Common and much less common scenarios in which botany is crucial for forensic pathologist and anthropologists: a series of eight case studies (link.springer.com) This article contains a series of case studies on forensic botany which may be useful in Activity 1. Stages of decomposition	Students can make their own evidence tables to condense and consolidate their learning from the topic so far. Students can create a table with two columns. In the first column, list parts of plants (roots, stems, leaves, flowers, seeds) and insects (e.g. fly larvae, beetles). In the second column students can describe one type of forensic evidence they can provide (e.g. plant seeds can indicate geographical location,

Lesson number	Specification coverage	GLH	Lesson aims and outcomes	Lesson ideas, key words and activities	Useful resources	Student independent learning – ideas and useful resources
			to estimate the post-mortem interval 155. the limitations of observational evidence techniques 156. when it is appropriate to use each technique.	timeline or poster showing the life cycle of a forensic insect (e.g. blowfly). Students can then connect each stage to post-mortem interval estimation by matching life stages with environmental conditions (temperature, humidity). Activity 3: Observation limitations: Show students ambiguous images of plants or insects and ask them to individually describe what they see. Collect the individual descriptions and display them. Ask students to highlight the differences between their observations and descriptions. Use these differences to highlight how interpretation could vary and discuss the importance of combining observational data with scientific analysis. Activity 4: Quiz: Create a short, multiple choice knowledge check quiz to formatively assess student's learning at this point in the topic.	(australian.museum, 11 min read) This article shows images of the decomposition of a piglet, and the insects involved which may be useful in Activity 2. Forensic Botany Quizizz (quizizz.com) This short quiz contains some pre-made questions that may be useful in Activity 4.	insect larvae can suggest time of death).
31	4.1.1 Types of observational evidence	1	By the end of the lesson, students should understand:	Key words: Natural, Synthetic, Weave pattern		'When to use' list Student's task is to make a list of situations where

Lesson number	Specification coverage	GLH	Lesson aims and outcomes	Lesson ideas, key words and activities	Useful resources	Student independent learning – ideas and useful resources
	157. Fingernail clippings and scrapings 158. Skin 159. Fibres		160. how to use microscopy to detect the presence of cells and tissues in recovered evidence 161. fibres are an important sources of forensic evidence 162. the limitations of observational evidence techniques 163. when it is appropriate to use each technique.	Activity 1: Fibre / cell matching exercise: Provide both 'crime scene' samples and reference samples of fibres or cells. Students should examine and compare samples using microscopes to find matches. After completing the matches, students should list limitations of using microscopy as an observational evidence technique. Activity 2: Trace Evidence Case Study: To explore how fibres, skin, or fingernail scrapings are used in real-world investigations, present a case study where trace evidence linked a suspect to a crime (e.g. fibre match or DNA from fingernails), this could be real or fictional. Students can work through the case in pairs to identify which observational techniques were used and evaluate their effectiveness.	Indiana University virtual microscopy (vmicro.iumi.iu.edu) This site provides a virtual microscope with slides of many types of skin cells that may be used in Activity 1. DNA Analysis of Fingernail Clippings An Unusual Case Report (journals.lww.com) This case report shows how fingernail clippings were used in a forensic case and may be useful in Activity 2. The link goes to an abstract, which gives an overview of the case study, which can be adapted if the article cannot be purchased. Fibres under spotlight as evidence	microscopy or fibre analysis would be appropriate in forensic investigations and when it would not be sufficient. Students could extend this list to include other forensic analysis techniques in the unit.

Lesson number	Specification coverage	GLH	Lesson aims and outcomes	Lesson ideas, key words and activities	Useful resources	Student independent learning – ideas and useful resources
					re-examined in murder appeal (theguardian.com) This article gives a case study of fibres used in forensics and their possible limitations which may be used with Activity 2.	
32	4.1.2 Analysing observational evidence 164. Microscopy 165. Observing 166. Measuring 167. Drawing 168. Photography 169. Electron micrographs 170. DNA identification	1.5	By the end of the lesson, students should understand: 171. how to perform observational analysis safely and skilfully 172. the difference between DNA sequencing and profiling 173. the principles and application	Key words: Amplification, Electrophoresis, Profiling, Restriction, Sequencing Activity 1: Enzyme puzzle: To demonstrate the principle of restriction enzyme analysis, provide paper strips representing DNA sequences. Students 'cut' the DNA using 'restriction enzymes' (scissors) at specified sequences. They then assemble the fragments on a 'gel' grid to visualise band patterns. Activity 2: Teacher-led discussion. This could follow an outline such as: 177. Observational analysis (3 min) Definition: Microscopic analysis	GCSE Biology - What is DNA? (Structure and Function of DNA) (youtube.com, 6 mins) A recap of the structure and function of DNA which may be used to prime learning. Gel Electrophoresis (youtube.com, 5 min) This video explains how gel electrophoresis works.	Students can create a 'DNA in forensics' fact file and include: A short paragraph explaining the differences between DNA sequencing and DNA profiling. Include examples of when each might be used in forensic investigations. Research and summary of a real-world example where restriction enzyme analysis was used in a forensic case.

Lesson number	Specification coverage	GLH	Lesson aims and outcomes	Lesson ideas, key words and activities	Useful resources	Student independent learning – ideas and useful resources
			of restriction enzyme analysis 174. the principles and application of gel electrophoresis 175. why polymerase chain reaction (PCR) is important to DNA profiling material 176. the analysis of observational evidence from microscopy, drawing and photography.	of evidence, ensuring safety and accuracy. Key points: Use PPE, avoid contamination, and focus on detail. 178. DNA sequencing vs. DNA profiling (4 min) DNA sequencing: Reads entire DNA sequence, useful for genetic disorders. DNA profiling: Focuses on genetic markers for identification. 179. Restriction enzyme analysis (4 min) Explanation: Enzymes cut DNA at specific sequences, enabling comparison. Application: Used to analyse DNA from mixed samples at crime scenes. 180. Gel electrophoresis (4 min) Explanation: Separates DNA fragments based on size using	How to determine DNA fragment sizes from plasmid digested with restriction enzymes (youtube.com, 5 min) This video explains how restriction enzyme analysis works and may help teach Activity 1. Polymerase Chain Reaction (PCR) Fact Sheet (genome.gov) This factsheet from the National Human Genome Research Institute gives a short overview of the key points surrounding PCRs. DNA Profiling (thesciencehive.co.uk) This post contains a diagram and step-	Explanations of the principles and application of restriction enzyme analysis and gel electrophoresis. Flipped learning. Students can review their knowledge from GCSE and create an A4 infographic or poster about blood groups and the rhesus system. This should include: 188. The four main blood types. 189. How blood type is determined (antigens). 190. Where blood type comes from (inheritance). 191. What rhesus positive/negative means.

Lesson number	Specification coverage	GLH	Lesson aims and outcomes	Lesson ideas, key words and activities	Useful resources	Student independent learning – ideas and useful resources
				an electric current. Application: Compares DNA samples from crime scenes and suspects. 181. PCR (5 min) Explanation: Amplifies small DNA samples to make them analysable. Significance: Crucial for working with small or degraded DNA samples. Activity 3: Knowledge check: To check for understanding conduct a quiz. This could include a combinations of true / false questions such as: 182. PCR can be used to amplify DNA for forensic analysis. (True) 183. Gel electrophoresis is used to create copies of a DNA sample. (False) 184. Restriction enzymes are used to cut DNA at specific sequences. (True) And multiple choice questions, for example:	by-step of PCR analysis that may be useful in Activity 2.	

Lesson number	Specification coverage	GLH	Lesson aims and outcomes	Lesson ideas, key words and activities	Useful resources	Student independent learning – ideas and useful resources
				185. What is the primary purpose of gel electrophoresis? 186. What is the key difference between DNA sequencing and DNA profiling? 187. Which technique amplifies small amounts of DNA? As a stretch task, you could also include a section on matching definitions. Activity 4: Light vs electron microscopy: Give students paired images of the same structure (e.g. a cheek cell) under light and electron microscopy. Students need to observe and note the differences between the electron micrograph and the image from the light microscope. Students can evaluate the two methods to determine situations where using a light microscope would be better for analysing observational evidence compared to an electron micrograph. Students can then work out the size of the structures in the images by being given the magnification and using a ruler and the magnification formula.		

Lesson number	Specification coverage	GLH	Lesson aims and outcomes	Lesson ideas, key words and activities	Useful resources	Student independent learning – ideas and useful resources
				Activity 5: Drawing vs photographs: provide students with a drawing of a crime scene and a photograph of a crime scene. This could be images from the internet or images taken of a mock crime scene used earlier in the scheme of work (lesson 25). Students would then compare the usefulness of these sources of observational evidence and create a comparison chart. Students can then reflect on the question 'What can we not tell from observation alone?'		
33	4.1.2 Analysing observational evidence 192. Presumptive tests 193. Luminol 194. Leucomalachite green (LMG) 195. Blood groups and 196. Rhesus system 197. Blood splatter identification 198. X-rays 199. CT scans	1	By the end of the lesson, students should understand: 200. the value of presumptive tests in identification of blood 201. the limitations of blood group analysis alone for identification 202. how blood patterns can provide	Key words: Leucomalachite green, Luminol, Velocity, Rhesus Activity 1: Presumptive testing: Provide students with simulated 'blood' samples (e.g. water and iron supplement mixed with food colouring or cornstarch). Conduct luminol and leucomalachite green (LMG) tests using safe substitutes, with students following a printed method or teacher-led demonstration. Following the tests, discuss how presumptive tests work and why they are used before confirmatory tests.	Luminol Test - How the Luminol Reaction works with Blood (youtube.com, 3 min) This video explains the chemical reaction and why the luminol test works and may be useful before Activity 1. Chemiluminescence of luminol: a cold light experiment (edu.rsc.org) The RSC provides	Case study research: Students can independently research a real-life forensic case where blood evidence or imaging techniques played a key role in forensic analysis. Students can then write a brief summary explaining how the evidence contributed to solving the case.

Lesson number	Specification coverage	GLH	Lesson aims and outcomes	Lesson ideas, key words and activities	Useful resources	Student independent learning – ideas and useful resources
			indications about how blood was shed 203. when the use of X-rays and CT scans is appropriate and their value for forensic biology.	Activity 2: Spatter simulation: Simulate blood spatters using diluted red paint or water with red dye on different surfaces and under different scenarios. Have students observe and sketch spatter patterns, noting direction, angle, and velocity for each scenario. Point out how blood spatter analysis can be useful for crime scene reconstruction. Activity 3: X-ray and CT use: Present students with case studies where X-rays or CT scans revealed forensic evidence (e.g. fractures, embedded objects). These case studies could be real or fabricated. Using the case studies, ask students to write a mock report on when x-rays and CT scans are appropriate to use and what they reveal in forensic biology. Activity 4: Students to peer review each other's flipped learning activity. This could be in groups or pairs or against a checklist provided to them.	resources detailing how to conduct a luminol experiment in the school laboratory, for Activity 1. The Luminol Test: Forensic Science (youtube.com, 3 min) This video shows the luminol test on a trainer, demonstrating what a positive test may look like on a common forensic item. How to conduct the LMG presumptive blood test (youtube.com, 4 min) This video shows how the LMG test would be carried out at a crime scene.	

Lesson number	Specification coverage	GLH	Lesson aims and outcomes	Lesson ideas, key words and activities	Useful resources	Student independent learning – ideas and useful resources
					How Bloodstain Pattern Analysis Works (science.howstuffworks.com) This article details how bloodstain pattern analysis works and may help with Activity 2.	
34		0.75	By the end of the lesson, students should understand: 204. how to approach assessment material for the unit 205. command words used in assessment.	Theme words: Elaboration, Time Management Activity 1: Practice: Provide students with some sample assessment material. Talk through what the assessment material looks like and what it contains (number of tasks, reading all information on a task, assessment criteria and assessment guidance). Choosing one task, talk through how you would approach reading the information, including the assessment criteria and assessment guidance. Students should then draft an approach to one task, outlining how they would attempt the task and explain their reasoning.	OCR provides sample assessment material for this unit (ocr.org.uk). For more information on the assessment of this unit, see section 6.4 of the Applied Science specification (ocr.org.uk).	Students may want to independently familiarise themselves with and read sample assessment material from OCR to feel more confident approaching the assessed component (ocr.org.uk).

Lesson number	Specification coverage	GLH	Lesson aims and outcomes	Lesson ideas, key words and activities	Useful resources	Student independent learning – ideas and useful resources
				Activity 2: You may want to split this over two lessons to give time to prepare feedback. After receiving feedback, either from you as the teacher or by sharing work with peers, students should provide a response in the form of an improved task plan. Feedback may include whether students have addressed or interpreted the keywords correctly or whether their response idea could be reasonably completed in the time limit. While giving feedback on the work produced using the sample assessment material, remind students that this cannot be done on the real assessment material.		

Subject knowledge support for this area of study

Subject knowledge enhancement	Details
Underlying knowledge and understanding	Cell structures: Students need a knowledge of cell structures (e.g. nucleus, cytoplasm, membrane) and an understanding that DNA is found in the nucleus of cells and can be used for identification. Microscopy: Students need familiarity with using a microscope, including focusing techniques and magnification levels and an understanding of the types of biological materials that can be examined under a microscope. DNA: Students should be aware of basic principles of DNA structure and function (e.g. genetic uniqueness). Students should also be aware of sequencing and genetic modification.
Common misconceptions	Fingerprint consistency: Students might believe that fingerprint patterns are unique to each finger but identical across all fingers of the same person.

Subject knowledge enhancement	Details
	Lip and ear prints are as commonly used as fingerprints in forensic investigations: Students may assume all three print types are equally common. All cells in recovered evidence can provide useful DNA: Students may confuse this with the idea that only intact cells with nuclei can provide DNA suitable for analysis. DNA sequencing and profiling are interchangeable terms: Students might confuse the terms, not understanding DNA sequencing deciphers the exact genetic code, while DNA profiling identifies specific markers for comparison.
Key concepts	Types of observational evidence: Bodily fluids. Students should know the components of bodily fluids and their role in matching to individuals, and how forensic biologists make use of bodily fluids to support an investigation. The bodily fluids students should be familiar with are blood, saliva and urine. Types of observational evidence: Fingerprints, footprints and other forms of print. Students should know the use of fingerprint patterns, ridge characteristics and ridge counting in forensic analysis. Students should know the types of information available from finger, foot and shoe prints and how to use them for identification, and how lip and ear prints, among others, can also be used to confirm identity. Types of observational evidence: Hair identification. Students should know the types of information that can be observed by comparing trace and hair samples and know how human and animal hair differ. Types of observational evidence: Bone, teeth and skeletal anatomy. Students should know the types of evidence bones and skeletons can reveal and understand the advantages and disadvantages of using teeth to identify individuals. Types of observational evidence: Fingernail clippings and scrapings and skin. Students should know how to use microscopy to detect the presence of cells and tissues in recovered evidence. Types of observational evidence: Insects; flies (Diptera) and beetles (Coleoptera). Students should know the ways that insect identification and life cycle can be used to estimate the post-mortem interval. Types of observational evidence: Fibres; Students should understand fibres as important sources of forensic evidence. Students should understand the limitations of observational evidence techniques and when each technique is appropriate to use. Analysing observational evidence: Students should know how to perform observational analysis safely and skilfully, including: Microscopy, observing, measuring, drawing, photography and electron micrographs

Subject knowledge enhancement	Details
	DNA identification: Students should know the difference between DNA sequencing and profiling. They should also know the principles and application of restriction enzyme analysis and the principles and application of gel electrophoresis. Students should know why polymerase chain reaction (PCR) is important to DNA profiling material. Presumptive tests: Luminol and leucomalachite green (LMG): Students should understand the value of presumptive tests in identification of blood. Blood groups and Rhesus system: Students should know the limitations of blood group analysis alone for identification. Blood spatter identification: Students should know how blood patterns can provide indications about how blood was shed. X-rays and CT scans: Students should know when the use of X-rays and CT scans is appropriate and their value for forensic biology.
Subject knowledge enhancement for teachers	Splatter or spatter may be used to indicate any form of blood dispersal or pattern. To read more about plant evidence in forensics, Plant forensics: Cracking criminal cases, from Kew Gardens details their involvement in forensic cases (kew.org). Unlocking the Science of Cheiloscopy: Lip Prints Forensics: This article provides a comprehensive read, detailing the use of lip prints in forensics (simplyforensic.com). To read more about DNA in forensics, DNA Profiling in Forensic Science: A Review, is an article that gives the history of DNA in forensics and details its extraction (pmc.ncbi.nlm.nih.gov). For more information on decomposition, these books are useful: <i>Death's Acre</i> and <i>Beyond the Body Farm</i>, by Bill Bass and Jon Jefferson

Area of study: 4.2 Microbiological analytical techniques

Lessons

Lesson number	Specification coverage	GLH	Lesson aims and outcomes	Lesson ideas, key words and activities	Useful resources	Student independent learning – ideas and useful resources
35	4.2.1 Microbes (bacteria, fungi, algae and diatoms) and viruses	1	By the end of the lesson, students should understand: 206. how to use microscopy to detect the presence of microbes in recovered evidence 207. the role of microbiological evidence in forensic biology and identification 208. the importance of diatoms in forensic investigations 209. how to perform microbiological	Key words: Biohazards, Diatoms, Forensic limitations Activity 1: Gap fill: Provide students with a worksheet covering all safety procedures for safe handling during microbial analysis. Key words from the safety instructions are missing and the student's task is to fill in the gaps to create a complete safety procedure. Activity 2: Importance of diatoms: Present the role of diatoms in determining whether someone drowned in a specific body of water. Provide students with a simplified case study, e.g. matching diatoms found in a victim's lungs to those in a river. The student's task is to work in pairs to analyse the diatom patterns and match them to water sample data provided in the worksheet. Activity 3: Limitations of school techniques: Provide students with a list of	Safety Procedures for the Microbiology Laboratory (bio.libretexts.org, 3 min read) These safety procedures for laboratories may be useful when creating Activity 1. Everything You Need to Know About Diatoms in Forensics (alectoforensics.com, 4 min read) This article provides an overview of diatoms in forensics and may be useful for teaching Activity 2.	To ensure students have understood key terms they can create a glossary and define the following terms: microbiology, diatoms, microscopy, safety protocols, biohazards, contamination. Students can then also use the terms in sentences related to forensic investigations.

Lesson number	Specification coverage	GLH	Lesson aims and outcomes	Lesson ideas, key words and activities	Useful resources	Student independent learning – ideas and useful resources
			al analysis safely and skilfully 210. the limitations of techniques available in schools.	equipment available in schools (e.g. light microscopes, basic stains) versus professional labs (e.g. electron microscopes, advanced sequencing tools). Have students brainstorm how the limitations in school equipment might affect their ability to identify microbes accurately. You could provide an extension to the activity by challenging students to suggest workarounds or alternative methods that could be used in a school setting to approximate professional results.	Diatoms in Forensics (PBS Nature) (youtube.com, 2 min) This video explains how diatoms were used in a real forensic case. This could be used to explain to students the importance of diatoms.	
36	4.2.1 Culturing microbiological evidence samples on agar plates for identification	1	By the end of the lesson, students should understand: 211. how to analyse colony morphology using: 212. size 213. shape 214. colour 215. surface appearance	Key words: Incubation, Morphology, Sterilisation Activity 1: Creating colony morphology sketches: Assign each group a pre-prepared agar plate containing microbial growth. Have students sketch individual colonies, noting their size (using graph paper for scale), shape, and colours. Students should then label the sketches with descriptive terms (e.g. circular, filamentous, smooth, wrinkled). You may wish to scaffold the activity by providing a list of terms for students to use in their labelling.	Bacterial Colony Description (youtube.com, 2 min) This video shows examples of different morphologies of colonies and may help students in Activity 1. Ready for The Count? Back-To-Basics Review Of Microbial Colony Counting (researchgate.net)	Students can use a virtual microbiology lab to create a streak plate and then sketch their plate and describe the morphology of the colony they created. Virtual lab (learn.chm.msu.edu)

Lesson number	Specification coverage	GLH	Lesson aims and outcomes	Lesson ideas, key words and activities	Useful resources	Student independent learning – ideas and useful resources
			216. the limitations of using agar plates in schools and the impact of following safety protocols for microbial identification.	Activity 2: Matching microbial evidence: Provide mock evidence showing microbial growth patterns (e.g. plate photographs or digital mock-ups). Give students reference data for microbes found at different locations. Ask students to match the evidence to a location and explain their reasoning. They should make note of the size, shape, colour and surface appearance of the microbes when justifying their match. Activity 3: Benefits and limitations of using agar plates in schools: Students can work in pairs to brainstorm as many benefits and limitations as they can to using agar plates in schools. Then students can create a table of benefits and limitations. You can then provide a series of points (e.g. low cost, species ambiguity) and students can decide whether this is a limitation or benefit and list it in their table.	This resource contains many images of agar plates with microbial growth which may be useful for Activity 1. Interpreting Plates (sciencebuddies.org) This resource provides a guide on interpreting growth on plates and how to describe it which may be useful for Activities 1 and 2.	

Subject knowledge support for this area of study

Subject knowledge enhancement	Details
Underlying knowledge and understanding	Definition of microorganisms: Students will need a basic understanding of what bacteria, fungi, algae, and viruses are. Classification of microbes: students should know how prokaryotes (e.g. bacteria) and eukaryotes (e.g. fungi, algae) and viruses can be classified. Microbial structure: students will have a general familiarity with microbial cell structures (e.g. cell wall, membrane, nucleus in eukaryotes, or nucleoid in prokaryotes). Microscope basics: students should have an understanding of the use of light microscopes (magnification, focusing, preparation of slides).
Common misconceptions	All microbes are harmful: Students may assume that all microbes are pathogens and fail to recognise their role as forensic evidence or their potential neutrality in certain contexts. Viruses can be cultured like bacteria or fungi: Students might incorrectly think viruses can grow on agar plates, not understanding the need for host cells for viral replication. Microscopy provides all the necessary information: Students might overestimate the usefulness of microscopes and assume they can identify microbes without additional biochemical or genetic tests. Agar plates in schools are the same as those in professional labs: Students may think that the agar plates used in schools are equivalent to professional forensic settings and ignore limitations such as nutrient richness and sterility. Larger colonies mean more dangerous microbes: Students might equate colony size with the pathogenicity of the microbe.
Key concepts	Microbes (bacteria, fungi, algae and diatoms) and viruses: Students should be able to use microscopy to detect the presence of microbes in recovered evidence. Students should understand the role of microbiological evidence in forensic biology and identification and the importance of diatoms in forensic investigations. Students should know the limitations of techniques available in schools and understand how to perform microbiological analysis safely and skilfully. Culturing microbiological evidence samples on agar plates for identification: Students should know how to analyse colony morphology using: • Size • Shape • Colour • Surface appearance. Students should also understand the limitations of using agar plates in schools and the impact of following safety protocols for microbial identification.
Subject knowledge enhancement for teachers	Forensics & Diatoms: Body On The Beach, listen to this interview on diatoms and their importance in forensics (18 min).

Subject knowledge enhancement	Details
	To read more about colony morphology and how new technology may digitise its recognition: Colony Morphology Definition: What It Is And How To Identify gives more detail. Analysis of Microbial Communities: An Emerging Tool in Forensic Sciences: this article provides in depth information on the use of microbiology in forensics to enhance your depth of knowledge.

Area of study: 4.3 Reviewing evidence

Lessons

Lesson number	Specification coverage	GLH	Lesson aims and outcomes	Lesson ideas, key words and activities	Useful resources	Student independent learning – ideas and useful resources
37	4.3.1 Interpreting results of analyses 217. Conclusions from observations of circumstances of the crime scene 218. Justification for conclusions 219. Unbiased expert opinion 220. Quality of data collected from the analytical techniques	1	By the end of the lesson, students should understand: 221. the limitations of individual pieces of evidence 222. ways that evidence can be tampered with or destroyed deliberately 223. how to evaluate how effective the chain of evidence has been throughout the investigation	Key words: False negative, False positive, Interpretation, Justification, Observation Activity 1: Identifying false positives and negatives: Provide short descriptions of some testing scenarios (e.g. a chemical test for blood on a surface). Include details where one result is a false positive or negative. Students can individually explain why the test could be incorrect and what should be done to confirm the result. Activity 2: Analysing evidence: Provide individual students with photos of a mock crime scene containing various evidence types (e.g. footprints, fingerprints, tools). Ask students to record what they observe (e.g. type of evidence), whether the evidence is reliable and why and any limitations of the evidence (e.g. could it have been tampered with or destroyed).	False Positives, False Negatives & Type I & II Errors (youtube.com, 2.5 min) This video visually explains false positives and negatives and might be useful for teaching Activity 1. Crime scene simulation (booksite.elsevier.com) This resource provides a series of images of mock crime scenes which may be useful for Activity 2.	Students can create a glossary of key terms for the lesson including; reliability, accuracy, false positive, false negative, precision. Students may find this resource useful to create their glossary: Validity, Accuracy and Reliability Explained with Examples (scienceready.com.au)

Lesson number	Specification coverage	GLH	Lesson aims and outcomes	Lesson ideas, key words and activities	Useful resources	Student independent learning – ideas and useful resources
			224. the existence of false positives and negatives in forensic tests and how the identification of individuals from false positive evidence can be avoided 225. how to assess the quality of the data collected in terms of accuracy, validity, and precision.	Activity 3: Data analysis: Present students with mock data sets with varying degrees of accuracy and precision (e.g. inconsistent measurements, valid but imprecise results). The student's task is to analyse the mock data and categorise results based on quality metrics. They can complete their analysis on a worksheet to guide them with prompts such as; is the data reliable? How accurate is the data? What tells you this is not reliable?	Biostatistics - Precision & Accuracy (youtube.com, 4 min) This video explains the difference between precision and accuracy and may be useful when teaching Activity 3.	
38	4.3.2 Communicating results of analysis 226. Role of forensic biologist in	0.75	By the end of the lesson, students should understand: 227. how a forensic	Key words: Bias, Communication, Impartiality, Judgement, Objectivity, Stakeholders	Forensic Science Regulator Act 2021 and the Forensic Science Regulator's	Ask students to research a forensic biologist's role in court proceedings. They should write one or two paragraphs

Lesson number	Specification coverage	GLH	Lesson aims and outcomes	Lesson ideas, key words and activities	Useful resources	Student independent learning – ideas and useful resources
	crime scene investigations		biologist communicates the results of the analyses and for whom 228. how a forensic biologist makes judgements 229. what a forensic biologist does not make judgements on.	Activity 1: 'Judgement or No Judgement' Sorting Game: Provide students with cards with various scenarios or statements (e.g. 'This DNA belongs to the suspect' or 'The suspect is guilty') and two sorting boxes labelled 'Judgement' and 'No Judgement'. Working in pairs, students decide whether the statement represents a judgement that forensic biologists are qualified to make or not and place their cards in the appropriate box. You can cold call on students to explain their reasoning for placing a card in a certain box. Activity 2: Role play a Forensic biologist report presentation: Divide the class into small groups, assigning each group the role of forensic biologists. Provide students with fictional case file data and task them to prepare a summary report of the findings. Each group presents their findings to a 'panel' (students role-playing different audiences). The panel asks questions, and the presenting group must respond while maintaining their role as objective forensic experts.	Code of Practice 2023 (cps.gov.uk) This code of practice provides detail on the code of practice for forensic scientists. Expert Witness Experience: A Forensic Scientist's Guide to Court (bericon.co.uk) This article provides a step-by-step guide to how a forensic scientist can act as an expert witness which may be useful for Activity 2. Job profile: Forensic scientist (prospects.ac.uk) This profile details the job of a forensic scientist, including who they may work	explaining: What the forensic biologist's main responsibilities are. Why they must remain unbiased in their communication. Biases in forensic experts, this article may provide a useful starting point for the second question (science.org).

Lesson number	Specification coverage	GLH	Lesson aims and outcomes	Lesson ideas, key words and activities	Useful resources	Student independent learning – ideas and useful resources
					with which could be useful in Activity 2.	

Subject knowledge support for this area of study

Subject knowledge enhancement	Details
Underlying knowledge and understanding	Types of forensic evidence: Students should be familiar with physical, biological, and trace evidence (e.g. fingerprints, DNA, hair, fibres). Scientific methods: Students need to understand the importance of hypothesis testing, data collection, and analysis in scientific inquiry. Role of probability in identification: Students should know how likelihood ratios or statistical probabilities contribute to conclusions (e.g. matching DNA profiles).
Common misconceptions	Evidence always leads to definitive conclusions: Students may think forensic evidence always provides a clear and unambiguous answer, not recognising the need for interpretation and context. Correlation equals causation: Students are likely to misinterpret coincidental connections as definitive proof, such as assuming two events occurring together always have a direct link. False positives and negatives are rare or negligible: Students might not realise how common false results are and the need for thorough validation. Forensic biologists determine guilt: Students may incorrectly assume that forensic biologists decide who is guilty or innocent, rather than providing unbiased evidence. Forensic biologists testify in all cases: Thinking that forensic experts are always required to present findings in court.
Key concepts	Interpreting results of analyses: Students should know how to draw conclusions from observations of circumstances of the crime scene and understand possible justification for conclusions. Quality of data collected from the analytical techniques: Students should know the limitations of individual pieces of evidence and ways that evidence can be tampered with or destroyed deliberately. Students should know how to evaluate how effective the chain of evidence has been throughout the investigation and identify how well the preservation methods prevented contamination and / or destruction of the evidence from the point of recovery. Students should be aware of the existence of false positives and negatives in forensic tests and know how the identification of individuals from false positive evidence can be avoided. Students should know how to assess the quality of the data collected in terms of accuracy, validity, and precision.

Subject knowledge enhancement	Details
	Role of forensic biologist in crime scene investigations: Students should know how a forensic biologist communicates the results of the analyses and for whom. Students should also know how a forensic biologist makes judgements and what a forensic biologist does not make judgements on. This topic also links closely with Unit F181, Topic 4; communicating science.
Subject knowledge enhancement for teachers	Practices of Science: False Positives and False Negatives, this article explains more about false positives and negatives and gives examples that may be useful when teaching (manoa.hawaii.edu). What Happens if a Chain of Custody is Broken? Everything You Need to Know, in this article you can read more about the impact of a broken chain of evidence (connoverpackaging.com). Navigating the Seas of Clinical Research: Accuracy vs. Precision vs. Reliability, accuracy research explains the differences between these key terms and their interplay (accuracyresearch.com).

Area of study: Assessment

Lessons

Lesson number	Specification coverage	GLH	Lesson aims and outcomes	Lesson ideas, key words and activities	Useful resources	Student independent learning – ideas and useful resources
39	Assessment Task 1	5	P1, P2, P3, P4 M1, M2	Assessment Task 1: Plan the crime scene investigation and evidence analysis. Students will explain the biological disciplines needed to investigate the crime scene in their given scenario and produce a plan to preserve the scene and collect and analyse the evidence. Ensure that students fully understand that the assessment criteria and assessment guidance (where given) tell them in detail what they need to do in each task. They may use their class notes during these assessment lessons, and should be referenced accordingly. Following Task 1, you (the teacher) must ensure that student's planned investigations are appropriate in terms of safety and for the circumstances of the centre.	Before beginning the assignment, make sure you have read and understood all the rules in section 6 of the Applied Science specification. (ocr.org.uk) It may also be helpful to read Understanding the assessment: examined and moderated. (ocr.org.uk)	Students can use their independent learning time to review their learning and plan their approach to the task. For example, understanding what is needed of the command words. No response can be written towards the task outside of supervision, however.
40	Assessment Task 2	4	P5, P6 M3	Assessment Task 2: Investigate the crime scene and collect evidence.		Students can use their independent learning time to review and revise topic area three.

Lesson number	Specification coverage	GLH	Lesson aims and outcomes	Lesson ideas, key words and activities	Useful resources	Student independent learning – ideas and useful resources
				During this task, students will produce written and visual evidence demonstrating how the crime scene was preserved and how the evidence was collected, recorded, packed, labelled and stored. As part of Task 2 you must complete a Teacher Observation Record form.		No response can be written towards the task outside of supervision, however.
41	Assessment Task 3	5	P7, P8, P9, P10 M4 D1, D2	Assessment Task 3: Analyse the evidence. Students will select and perform the appropriate tests for the evidence collected in their given scenario. As part of Task 3 you must complete a Teacher Observation Record form.	Students may find it useful to review some resources: Evidence Collection & Storage (youtube.com, 7 min) Chain of Custody (youtube.com, 2 min) Roles and Responsibilities (crime-scene-investigator.net) Securing the scene (college.police.uk) Crime Scene Safety Manual (sbsheriff.org)	Students can use their independent learning time to review their learning and notes from throughout the course to help them understand assessment criteria, command words and the assessment guidance. No response can be written towards the task outside of supervision, however.

Lesson number	Specification coverage	GLH	Lesson aims and outcomes	Lesson ideas, key words and activities	Useful resources	Student independent learning – ideas and useful resources
42	Assessment Task 4	4	P11 M5, M6 D3, D4, D5	Assessment Task 4: Review the evidence. Students will use the processed evidence to produce written evidence making a reasoned judgement about each piece of evidence from the crime scene.		Students can use their independent learning time to review their learning and notes from throughout the course, particularly areas 2 and 4, to assess how they will approach the task. No response can be written towards the task outside of supervision, however.

Tell us what you think

Your feedback plays an important role in how we develop, market, support and resource qualifications now and into the future. We want you and your students to enjoy and get the best out of our qualifications and resources, but to do that we need your honest opinions to tell us whether we're on the right track or not.

You can email your thoughts to resources.feedback@ocr.org.uk or visit our [feedback page](#) to learn more about how you can help us improve our resources.



Designing and testing in [collaboration with teachers](#) and students



Helping young people develop an [ethical view of the world](#)



Equality, diversity, inclusion and belonging (EDIB) are [part of everything we do](#)

Contact the team at:

- 01223 553998
- ocr.org.uk

To stay up to date with all the relevant news about our qualifications, register for email updates at ocr.org.uk/updates

Visit our Online Support Centre at support.ocr.org.uk



OCR is part of Cambridge University Press & Assessment, a department of the University of Cambridge.

OCR is a Company Limited by Guarantee and an exempt charity. Registered in England. Registered office: The Triangle Building, Shaftesbury Road, Cambridge, CB2 8EA. Registered company number: 3484466.

We operate academic and vocational qualifications regulated by Ofqual, Qualifications Wales and CCEA as listed in their qualifications registers.

We are committed to providing a fully accessible experience across all our products, platforms, and websites. Find out more about our [accessibility standards](#).

© OCR 2025. All rights reserved. We retain the copyright on all our publications. However, our registered centres are permitted to copy and distribute our material for their own internal use, in line with any specific restrictions detailed in the publication. Find out more about our [copyright policies](#).

We update our publications regularly so please check you have the most up-to-date version.

We cannot be held responsible for the persistence or accuracy of URLs for external or third-party internet websites referred to in this publication and do not guarantee that any content on such websites is, or will remain, accurate or appropriate.

When we update our specifications, you'll see a new version number and a summary of the changes. While we do our best to reflect these changes in all associated resources on [Teach Cambridge](#), if you notice any discrepancies, please refer to the latest specification on our website and [let us know](#).

Our resources do not represent any teaching method we expect you to use. We cannot be held responsible for any errors or omissions in our resources.