

Forensic and Criminal Investigation Diploma Level 3

What is Forensic Science?

- The term forensic science involves forensic (or forensics, in Latin), which means a public discussion or debate.
- In a more modern context forensic applies to courts or the judicial system.
- If you put that together with science, forensic science means applying scientific methods and processes to solving crimes.

A little bit of history.

- In the 16th century medical practitioners began using basic forensic science to solve crime.
- Documents from the 18th Century identify the first evidence and use of pathology to identify suspicious deaths.
- The first medical forensic science school was formed in 1909.
- The continuous development of forensic science has been used to uncover mysteries, solve crimes, and convict or exonerate suspects of crime for hundreds of years.

The extraordinary scientific innovations and advancements in forensic science have allowed it to become a highly developed science that involves a number of disciplines and thousands of forensic scientists specialising in everything from DNA and botany to dentistry and tool marks.

Task 1:

Identify 3 fields of forensic specialism (you are not allowed to use the above!)

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The Application of Forensic Science

- The field of forensic science is formed using a number of scientific branches, including physics, chemistry, and biology.
- Forensic Science focuses on the recognition, identification, and evaluation of physical evidence.
- It has become an essential part of the judicial system because it uses a broad spectrum of sciences to achieve information relevant to criminal and legal evidence.
- Forensic science may prove the existence of a crime, the perpetrator of a crime, or a connection to a crime through the:
 - Examination of physical evidence
 - Administration of tests
 - Interpretation of data
 - Clear and concise reporting
 - Testimony of a forensic scientist
- The testimony of forensic scientists has become a trusted component of many civil and criminal cases, as these professionals are concerned not with the outcome of the case; only with objective testimony based purely on scientific facts.

- Forensic scientists perform both physical and chemical analyses on physical evidence obtained by crime scene investigators and police officers at the crime scene.
- These scientific experts use microscopic examining techniques, complex instruments, mathematical principles, scientific principles, and reference literature to analyse evidence as to identify both class and individual characteristics.

Task 2

Please research the following words and their various meanings as these are important for this unit:

Objective

Class Characteristics

Give examples

Individual Characteristics

Give examples

Skilled Scientists

- Due to the complex nature of forensic science, forensic scientists are most often skilled in a particular area of forensic science, such as latent prints, questioned documents, trace evidence, or firearms for example.
- Forensic scientists can usually be divided into three, major groups:
 - **Forensic Pathologists:** These include medical examiners and other professionals who oversee autopsies and clinical forensic examinations
 - **Forensic Scientists:** These include forensic professionals working within police enforcement, government, or private forensic laboratories who are responsible for dealing with any number of specific tests and analyses, such as toxicology, ballistics, trace evidence.
 - **Associated Scientists:** These include scientific professionals lending their knowledge to forensic science, such as forensic odontologists, forensic botanists, forensic anthropologists for example. These scientists apply their knowledge to the forensic science field as to provide investigators with crucial information regarding everything from bite marks to insect infestation on the post-mortem body.

What is Crime Scene Investigation?

- Crime scene investigation is the use of physical evidence at the scene of the crime.
- An investigation uses deductive and inductive reasoning to gain knowledge of the events surrounding the crime.
- Crime scene investigation is multidisciplinary and involves a systematic search of the crime scene; meticulous observation and documentation of the scene; photography and sketching of the scene; the identification, processing and

collection of physical evidence such as fingerprints, footwear impressions, hair, fibres, biological fluids, and materials for DNA analysis.

- Perhaps most importantly, the application of careful reasoning to the facts.

What is a Crime Scene Investigator?

- A crime scene investigator can be a member of police enforcement, or a specifically trained scene examiner.
- They are responsible for taking photographic evidence, identifying, collecting, preserving and packaging physical evidence at the scene of a crime.
- A select few crime scene investigators may also perform laboratory forensic work, and these are known as the Scientific Support Unit.
- A crime scene investigator is a rather broad title, as this professional may be a:
 - Crime scene manager
 - Forensic photographer
 - Forensic sketch artist
 - Ballistics expert
 - Fingerprint expert
 - DNA expert

The Crime Scene Investigator is responsible for:

- Depending on the crime scene investigators job scope, activities and duties may vary significantly.
- Some crime scene investigators perform standard physical evidence collection and preservation duties, while other CSIs perform more specialised tasks, such as DNA and latent print recovery.
- In general, a CSI may be responsible for:
 - Working with police and other emergency services to secure the scene as to prevent the contamination of evidence
 - Identifying and marking the areas of the crime scene
 - Collecting, preserving, and packaging the physical evidence
 - Maintaining detailed reports, logs and other tracking data
 - Using scientific equipment to collect and analyse evidence
 - Maintaining and repairing scientific equipment
 - Testifying in court with regard to collected evidence
 - Transporting physical evidence to the forensic laboratory
- A crime scene investigator is called upon to utilise scientific data and technical expertise to:
 - Evaluate the crime scene without destroying evidence
 - Develop a plan for collecting physical evidence
 - Ensure evidence is properly documented
 - Ensure evidence is properly collected, handled, preserved, and transported to prevent the loss or contamination of evidence.

Task 3

Please research the roles and responsibilities of crimes scene and forensic staff and fill in the table below:

Personnel	Role and Responsibility
Police Officer First Responder	
CSI	
Major Investigation Team	
Scientific Support Unit	
Crime Scene Manager	
Exhibit Officers	

Family Liaison Officers	

Task 4

Answer the questions below:

Which of these tasks would be performed by any of the above?

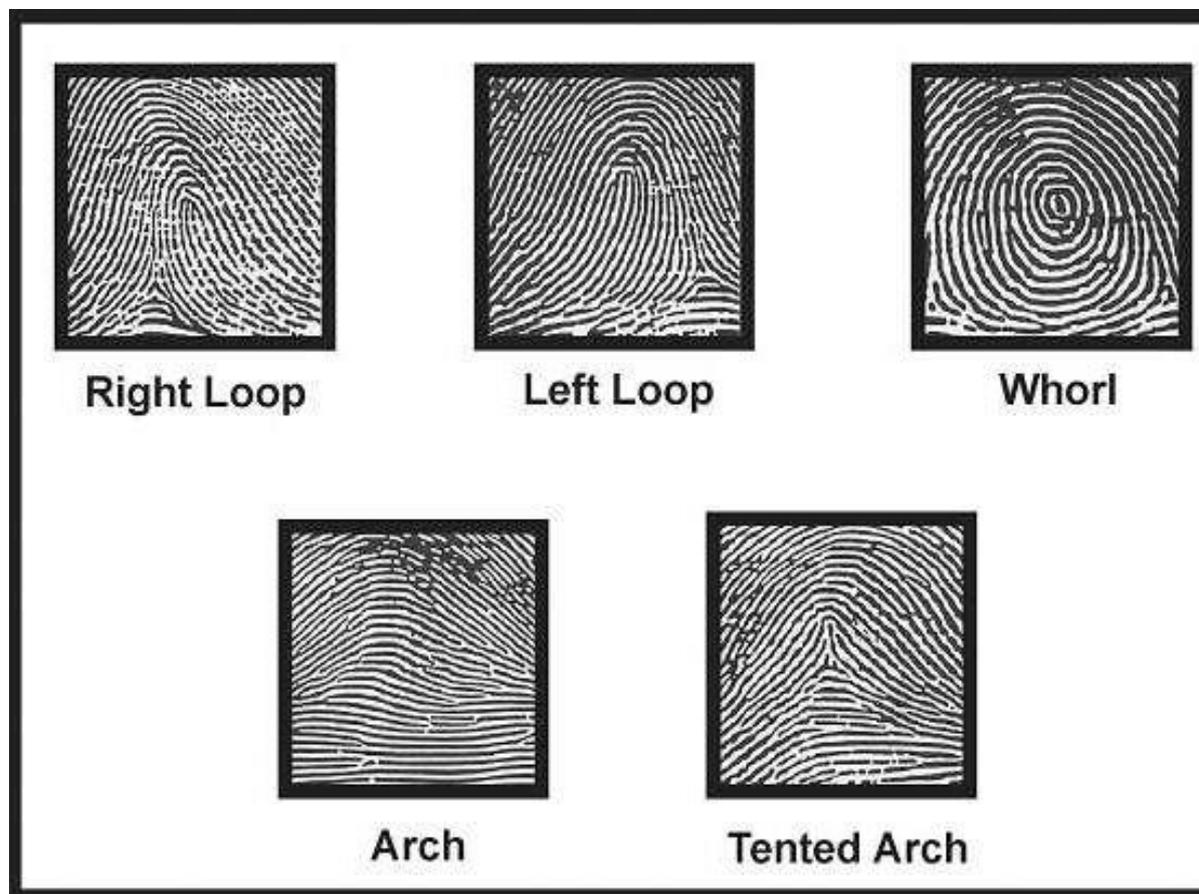
1. Look for fingerprints?
2. Check to see if a crime has taken place?
3. Preserve the crime scene?
4. Collect different types of evidence?
5. Make sure the evidence collected from the scene is stored securely?
6. Investigate the crime?
7. Interview the suspect?
8. Send the evidence to the forensic laboratory?
9. Perform a risk assessment of the scene?
10. Photograph the crime scene?
11. Collect and process fingerprints in blood?
12. Offer Support and counsel?

Fingerprints

A fingerprint is a distinct pattern of ridges and valleys on the finger surface of an individual. A ridge is defined to be a single curved segment whereas a valley is the area between two adjacent ridges. So the dark areas of the fingerprint are called ridges and white area that exists between them is known as valleys.

There are 3 basic types (known as classifications) of fingerprints, Loops, whorls and arches.

Fingerprint Characteristics and Minutiae



Loops

In a Loop pattern, the ridges will flow in one side, recurve, (loop around) touch or pass through an imaginary line drawn from the delta to the core and exit the pattern on the same side it entered.

- A loop pattern has only **one** delta

- There are two types of loop patterns
 - Ulnar loop – facing the Ulnar
 - Radial loop – facing the Radial

Loop patterns account for 70% of the population

Whorls

A Whorl pattern consists of a series of almost concentric circles.

- A whorl pattern has two deltas
- There are four types of whorl patterns
 - Plain whorl
 - Central Pocket Loop whorl
 - Double loop whorl
 - Accidental whorl

Whorl Patterns account for 25% of the population

Arches

In an Arch pattern, ridges flow in one side and flow out the opposite side. There are no deltas in an arch pattern.

- There are two types of arch patterns:
 - Plain arch
 - Tented arch

Arch patterns account for 5% of the population

Minutiae

Minutiae points are the major features of a fingerprint image and are used in the matching of fingerprints. These minutiae points are used to determine the uniqueness of a fingerprint image. Minutiae are the tiny characteristics or the points where the ridge lines end or fork on the print that give you the individualisation of your print.

Basic and composite ridge characteristics (minutiae)			
Minutiae	Example	Minutiae	Example
ridge ending		bridge	
bifurcation		double bifurcation	
dot		trifurcation	
island (short ridge)		opposed bifurcations	
lake (enclosure)		ridge crossing	
hook (spur)		opposed bifurcation/ridge ending	

Task 5

Using the above information, complete the tasks below:

First classify the type of print, and then try to find as many minutiae as you can in the following three prints:

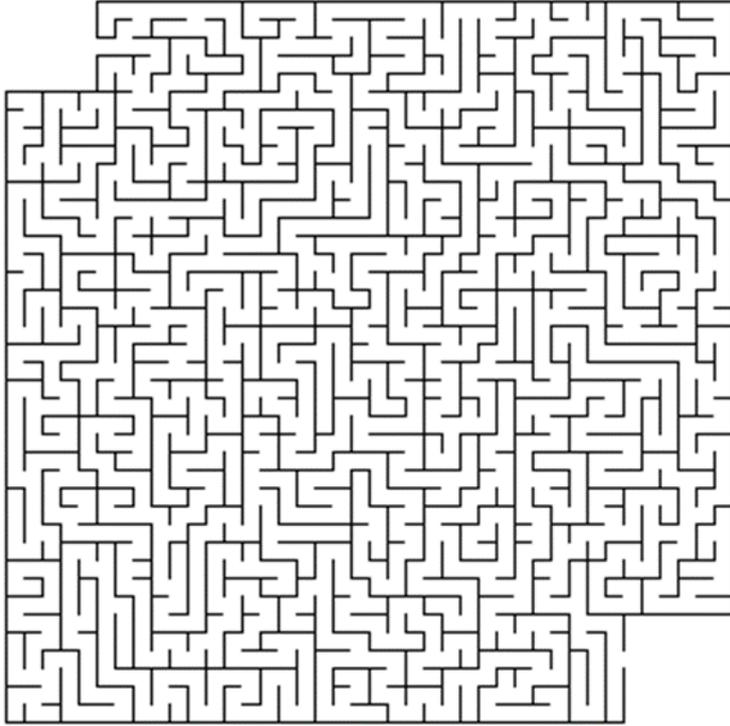


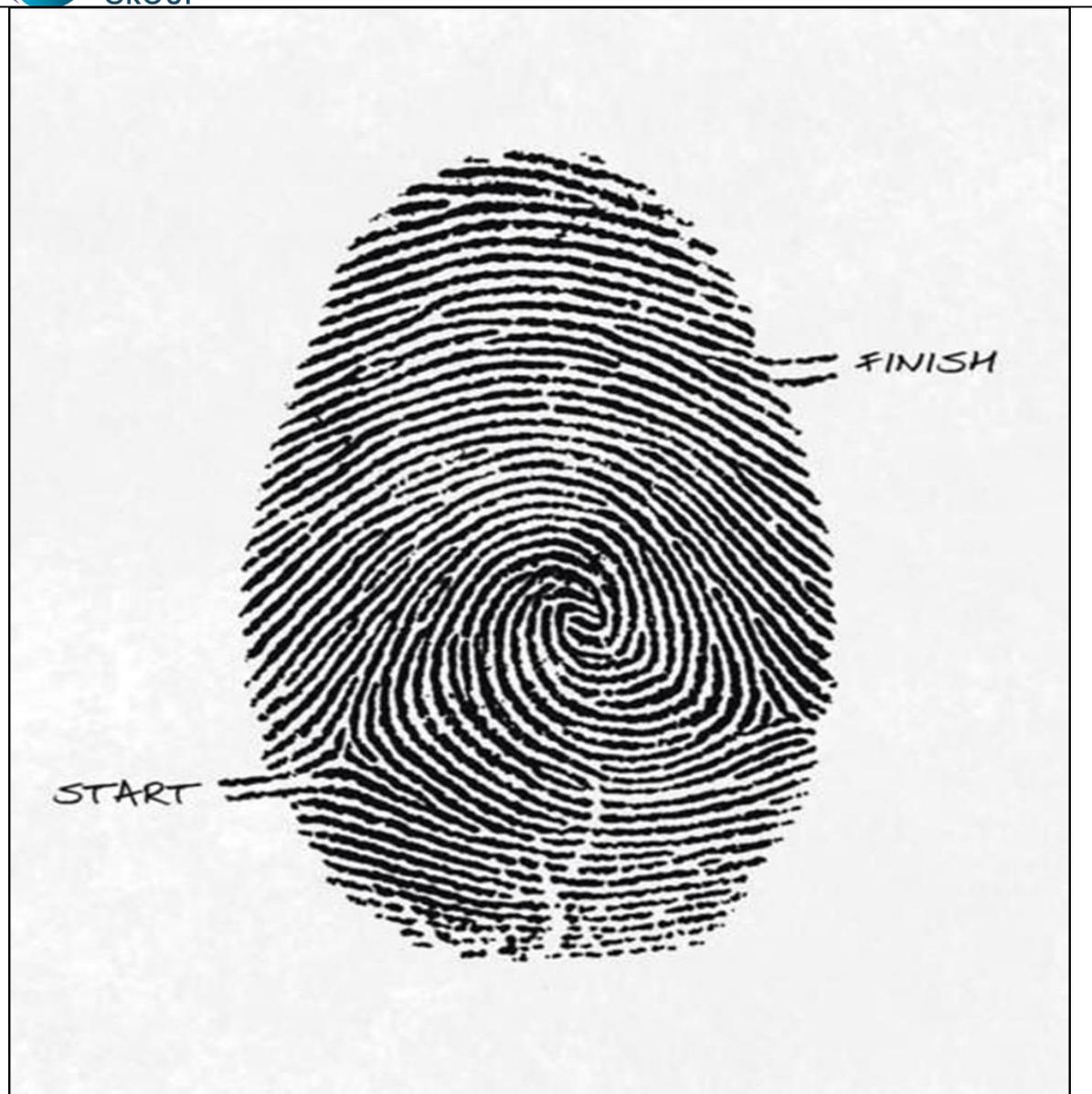
Print 1	Minutiae
Print 2	Minutiae
Print 3	Minutiae

Quick Puzzles

Follow the pathway from individuals to skeletal remains:







Additional Information

Today, to become either a forensic scientist or a CSI requires a university degree. There are many universities that offer either a degree specifically for those wanting to study the crime scene, and degree courses for those wishing to become a forensic scientist, but rarely one degree that covers both. It is therefore, a good idea for you to begin looking at the specific areas that you like.

The following sample of universities offer forensic science and CSI degree courses:

Forensic Science

Anglia Ruskin University – Cambridge

Nottingham Trent University – Nottingham

Kingston University – Kingston Upon Thames

University of Kent - Canterbury

Crime Scene Investigation

Anglia Ruskin University – Cambridge

University College London – London

Teesside University – Middlesbrough

University of Wales - Pontypridd

Useful Websites

Forensic Science

[Forensic scientist job profile | Prospects.ac.uk](#)

[Careers in forensic science | Department of Justice \(justice-ni.gov.uk\)](#)

[How To Become a Forensic Scientist: Requirements & Steps \(forensicscolleges.com\)](#)

Crime Scene Investigator

[Crime scene investigator job profile | Prospects.ac.uk](#)

[Scenes of crime officer | Explore careers | National Careers Service](#)

[How to Become a Crime Scene Investigator \(CSI\) - Steps & Requirements \(forensicscolleges.com\)](#)

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