

- Restriction fragment length polymorphism (RFLP)
 - “Old School”
 - Used to determine paternity
 - Restriction enzymes cut DNA at specific sites generating different sized fragments for analysis
 - “Fingerprinting”: unique size of fragment pattern used to compare DNA from crime scene to suspect
 - Restriction Digest: DNA, enzyme, buffer, BSA (stabilizes), water
 - Fragments separated by agarose gel electrophoresis—smaller fragments go fast
 - Advantages: easy, using multiple REs=more accurate
 - Disadvantages: false positives, large sample size, DNA must be new/not degraded
- Short Tandem Repeats (STR)
 - “New School” (OR mtDNA analysis from mom, Y-chromosome from dad)
 - STRs=short DNA sequences that repeat along a chromosome, differs amongst individuals
 - Combined DNA Index System (CODIS) and Convicted Offender Index (COI)
 - National databases of DNA of individuals convicted of sexual/violent crimes
 - 13 core STR loci used to test all DNA samples
 - Probability of random match is less than 1 in 1 trillion
 - Amplified by polymerase chain reaction (PCR), gel electrophoresis analysis
 - Makes copies of STR, can be used with SMALL samples of DNA (only ONE molecule)
 - Primers bind specific DNA sequences to initiate transcription
 - Process
 - DNA extracted/isolated from crime scene and suspect
 - Primers (fluorescently labeled) recognize STR sequences and PCR amplifies DNA
 - Electrophoresed on agarose gel
 - Gel analyzed to quantify STR fluorescence (gives # of STRs)
 - Histogram of STR patterns generated
 - DNA profile indicates which STRs person has and how many
 - Reference to STRBase
 - Contains all STRs and information including primer sequences
 - Lists common alleles/frequencies (% of humans with each STR)
- Exclusion: DNA does not match other DNA at crime scene
- Inclusion: DNA is a match!!
 - Compared to DNA databases (CODIS/COI)

Questioned Documents (8 questions)

- Contains typewritten or handwritten info whose authenticity is not yet proven
- Handwriting
 - Block capitals: uppercase unjoined
 - Cursive: lowercase joined

- Script: lowercase unjoined
 - Slope/slant
 - Spacing: words and letters
 - Initial, connecting, terminal strokes
 - Blunt-end strokes: natural variation
- Signatures
 - Highly stylized, freehand
- Forgery Methods
 - Usually for financial gain
 - Must possess at least one example of authentic signature
 - Freehand Method: practice until accurate
 - Trace-Over Method: trace over so that signature indents onto real document, go over indentation in pen (UV light shows if pen and pencil used)
 - Light Box/Window Method: light placed underneath two sheets so signature can be seen
 - Erasable Ink Method: lift authentic signature of pen with erasable ink using tape and leaving it behind on another document (can look faded)
- Obliteration/Erasures
 - Rubber erasers, razor blades, sandpaper disturb document
 - Erasure: abrasion on surface of document from removal of writing
 - Chemical treatments can remove writing
 - Oxidizing agents bleach out ink — discolorations can be seen
 - Obliteration: blacking out an area to conceal original writing
- Infrared Luminescence
 - Ink gives off infrared radiation when irradiated with blue-green light that is optically analyzed
- Indented Writing
 - Impression left by the pen on a second sheet of paper below the page that contained the original writing
 - Pads of paper/notebooks
 - Microscopic fiber damage
 - Electrostatic detection apparatus (ESDA) detects it by covering page with cellophane and subjects document to high-voltage static charge
 - Toner sprinkled onto surface to fill indents
- Court Case Precedents:
 - To be presented as evidence, type/handwritten documents must be authenticated by a document examiner
 - NOT unlawful to search
 - Document examiner testimony has been accepted for almost 100 years