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**Unit 1 Review Guide**

**Key Concepts**

* Recognize that processing a crime scene involves purposeful documentation of the conditions at the scene and the collection of any physical evidence.
* Describe how evidence at a crime scene, such as blood, hair, fingerprints, and shoeprints can help forensic investigators determine what might have occurred and help identify or exonerate potential suspects.
* Recognize that bloodstain patterns left at a crime scene can help investigators establish the events that took place during the crime.
* Recognize that all external variables in an experiment need to be controlled.
* Analyze key information gathered at a simulated crime scene.
* Design a controlled experiment.
* Graph and analyze experimental data to determine the height associated with bloodstain patterns.
* Describe the relationship between DNA, genes, and chromosomes.
* Describe the structure of DNA.
* Describe the structure of a nucleotide.
* Explain how restriction enzymes cut DNA.
* Describe how gel electrophoresis separates DNA fragments.
* Recognize that gel electrophoresis can be used to examine DNA differences between individuals.
* Demonstrate how restriction enzymes work.
* Demonstrate the steps of gel electrophoresis and analyze the resulting restriction fragment length polymorphisms (RFLPs).
* Describe how an autopsy is performed and the types of information it provides to officials regarding the manner and cause of death.
* Recognize that a variety of biomedical science professionals are involved in crime scene analysis and determination of manner of death in mysterious death cases.
* Interpret information from an autopsy report to predict the manner of death.
* Explain the importance of confidentiality when dealing with patients, and describe the major patient protections written into the Health Insurance Portability and Accountability Act (HIPAA).
* Analyze patient confidentiality scenarios.

**Essential Questions**

1. What can be done at a scene of a mysterious death to help reconstruct what happened?
2. How do the clues found at a scene of a mysterious death help investigators determine what might have occurred and help identify or exonerate potential suspects?
3. How do scientists design experiments to find the most accurate answer to the question they are asking?
4. How are bloodstain patterns left at a crime scene used to help investigators establish the events that took place during a crime?
5. What is DNA?
6. How do scientists isolate DNA in order to study it?
7. How does DNA differ from person to person?
8. How can tools of molecular biology be used to compare the DNA of two individuals?
9. What are restriction enzymes?
10. What are restriction fragment length polymorphisms?
11. What is gel electrophoresis and how can the results of this technique be interpreted?
12. What is an autopsy and how can it be used to determine the cause of death?
13. How can the manner of death be determined?
14. Why is confidentiality of patient information important?
15. Who should keep patient information confidential?
16. Is there ever a time when patient confidentiality should be broken?
17. What biomedical science professionals are involved in crime scene analysis and determination of manner of death?

Key Terms

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| Biomedical Science | The application of the principles of the natural sciences, especially biology and physiology, to clinical medicine. |
| Control Group | The group in an experiment where the independent variable being tested is not applied so that it may serve as a standard for comparison against the experimental group where the independent variable is applied. |
| Dependent Variable | The measurable effect, outcome, or response in which the research is interested. |
| Experiment | A research study conducted to determine the effect that one variable has upon another variable. |
| Forensic Science | The application of scientific knowledge to questions of civil and criminal law. |
| Hypothesis | Clear prediction of the anticipated results of an experiment. |
| Independent Variable | The variable that is varied or manipulated by the researcher. |
| Negative Control | Control group where conditions produce a negative outcome. Negative control groups help identify outside influences which may be present that were not accounted for when the procedure was created. |
| PPE | Specialized clothing or equipment, worn by an employee for protection against infectious materials (as defined by OSHA). |
| Positive Control | Group expected to have a positive result, allowing the researcher to show that the experimental set up was capable of producing results. |
| Adenine | A component of nucleic acids, energy-carrying molecules such as ATP, and certain coenzymes. Chemically, it is a purine base. |
| **Chromosome** | Any of the usually linear bodies in the cell nucleus that contain the genetic material. |
| Cytosine | A component of nucleic acids that carries hereditary information in DNA and RNA in cells. Chemically, it is a pyrimidine base. |
| DNA | A double-stranded, helical nucleic acid molecule capable of replicating and determining the inherited structure of a cell’s proteins.  |
| Gel Electrophoresis | The separation of nucleic acids or proteins, on the basis of their size and electrical charge, by measuring their rate of movement through an electrical field in a gel. |
| Gene | A discrete unit of hereditary information consisting of a specific nucleotide sequence in DNA (or RNA, in some viruses). |
| Guanine | A component of nucleic acids that carries hereditary information in DNA and RNA in cells. Chemically, it is a purine base. |
| Helix | Something spiral in form. |
| Model | A simplified version of something complex used, for example, to analyze and solve problems or make predictions. |
| Nucleotide | A building block of DNA, consisting of a five-carbon sugar covalently bonded to a nitrogenous base and a phosphate group. |
| Restriction Enzyme | A degradative enzyme that recognizes specific nucleotide sequences and cuts up DNA. |
| **RFLPs**  | Differences in DNA sequence on homologous chromosomes that can result in different patterns of restriction fragment lengths (DNA segments resulting from treatment with restriction enzymes). |
| Thymine | A component of nucleic acid that carries hereditary information in DNA in cells. Chemically, it is a pyrimidine base. |
| Autopsy | An examination of the body after death usually with such dissection as will expose the vital organs for determining the cause of death. |
| Bibliography | A document showing all the sources used to research information. |
| Citation | A written reference to a specific work (book, article, dissertation, report, musical composition, etc.) by a particular author or creator which identifies the document in which the work may be found. |
| Documentation | The act of creating citations to identify resources used in writing a work. |
| HIPAA | A comprehensive set of standards and practices designed to give patients specific rights regarding their personal health information. |
| Medical Examiner | A physician who performs an autopsy when death may be accidental or violent. He or she may also serve in some jurisdictions as the coroner. |

Other study tools:

* Lab Notes
* Conclusions questions
* Activity Introductions
* Career journals
* Online Tools form Website

You should be able to:

1. Discuss forensic science
2. Define PPE
3. Discuss the differences between presumptive and confirmatory tests
4. Set up experiment to identify an unknown substance
5. Define reliability an validity in an experiment
6. List and describe the steps of an experimental design
7. Write a good hypothesis/question/if…then…statement
8. Discuss control variables and control groups (and positive and negative controls)
9. Determine DVs and IVs
10. Graph IVs and DVs from a data set
11. Label the parts of a microscope and complete a magnification table
12. Use the Glaister Equation to determine approximate hours since death
13. Diagram the structure of DNA and know who discovered it
14. Discuss the six steps of DNA fingerprinting
15. Explain DNA extraction, including the necessary ingredients
16. Explain PCR, what it is and it’s associated steps
17. Discuss restriction enzymes, RFLPs and Gel Electrophoresis
18. Discuss all the uses for DNA fingerprinting
19. Discuss DNA, genes and chromosomes
20. Discuss the difference between highly conserve and unique DNA
21. List all the human body systems we studied? Can you describe their function? Can you list their major organs/components?
22. Discuss autopsies and the tools used by Dr. G
23. List all the human body systems we studied
24. Describe their functions and list their major organs/components
25. Explain HIPPA, what does it stand for? What is PHI? What’s the privacy rule? When can HIPAA be broken?
26. Read scenarios an decide if HIPAA was violated
27. Discuss all the evidence from Anna’s case…who’s hair, footprint, blood, DNA? What were the pills? How far was the blood dropped? When did she die? etc…
28. Explain the various careers we’ve studied in Unit 1