**Unit 1 – The Mystery**

**Lesson 1.1: Investigating the Scene**

1. Why is it important to be careful and methodical when investigating a crime scene?

2. What are the main parts in the experimental design process?
   a. Define: Independent variable
   b. Define: Dependent variable

3. Give three examples of methods used to investigate crime scenes.

4. What is PPE and why is it important in crime scene investigations?

5. What were the pills found at the crime scene of Anna Garcia?
   a. What kind of method would be used to determine the identity of a mystery substance such as the pills?
   b. What kind of scientist would conduct this part of the investigation?

6. What type of evidence collected from a crime scene might contain DNA?

7. What information about a crime scene can be obtained by analyzing a bloodstain pattern?

8. How can height of a blood drop be determined?

9. What shape will be produced when a blood drop hits a surface from a 90 degree angle?
Principles of Biomedical Sciences Semester 1 Review

When an answer has more than one word leave a space (box) in the puzzle between each word.

1.1 Vocab

Across

3. The variable that is varied or manipulated by the researcher.
6. The application of scientific knowledge to questions of civil and criminal law.
8. The application of the principles of the natural sciences, especially biology and physiology, to clinical medicine.
10. 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.

Down

1. Specialized clothing or equipment, worn by an employee for protection against infectious materials (as defined by OSHA).
2. The measurable effect, outcome, or response in which the research is interested.
4. A research study conducted to determine the effect that one variable has upon another variable.
5. Group expected to have a positive result, allowing the researcher to show that the experimental set up was capable of producing results.
7. 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.
9. Clear prediction of the anticipated results of an experiment.
Lesson 1.2: DNA Analysis

1. What does DNA stand for?

2. What is the basic structural unit (monomer) of DNA?

3. What are the three components of a nucleotide? Draw the basic structure of the nucleotide and label each of the components.

4. What are the four bases in DNA?

5. What are Chargaff’s base pair rules?

6. Using the base pair rules determine the complimentary strand for the following sequence: AATGCAATGGCC

7. What is the shape of DNA?
   a. What are the names of the scientists that discovered this shape?

8. Why is DNA considered a polymer?

9. What type of chemical bond is found between the paired bases of the DNA double helix?

10. Genes contain the instructions to assemble what type of molecule?

11. What are restriction enzymes and how are they used in DNA analysis?

12. What is an RFLP?

13. What caused DNA to run across a gel in gel electrophoresis?
   a. What size pieces of DNA would you find travel the furthest down a gel?
Across
3 A simplified version of something complex used, for example, to analyze and solve problems or make predictions.
4 A discrete unit of hereditary information consisting of a specific nucleotide sequence in DNA.
8 A component of nucleic acids that carries hereditary information in DNA and RNA in cells. Chemically, it is a pyrimidine base.
11 Something spiral in form.
12 A written reference to a specific work
14 The separation of nucleic acids or proteins, on the basis of their size and electrical charge.
15 A component of nucleic acid that carries hereditary information in DNA in cells. Chemically, it is a pyrimidine base.
16 A block of DNA, consisting of a five-carbon sugar covalently bonded to a nitrogenous base and a phosphate group.
17 A component of nucleic acids, energy-carrying molecules such as ATP, and certain coenzymes. Chemically, it is a purine base.

Down
1 A double-stranded, helical nucleic acid molecule capable of replicating and determining the inherited structure of a cell’s proteins.
2 Degradative enzyme that recognizes specific nucleotide sequences and cuts up DNA.
4 A component of nucleic acids that carries hereditary information in DNA and RNA in cells. Chemically, it is a purine base.
5 The act of creating citations to identify resources used in writing a work.
6 Examination of the body after death.
7 A physician who performs an autopsy when death may be accidental or violent.
9 A document showing all the sources used to research information.
10 Any of the usually linear bodies in the cell nucleus that contain the genetic material.
13 Differences in DNA sequence on homologous chromosomes that can result in different patterns of restriction fragment lengths.
Unit 1.3 The Findings

10. What is an Autopsy?
   a. Who performs an autopsy?
   b. What situations always require an autopsy?

11. What is included in an autopsy report?

12. What is the difference between cause and manner of death?

13. What are three examples of manner of death?

14. What are two examples of cause of death?

15. What is the difference between a coroner and a medical examiner?

Unit 2 – Diabetes

Lesson 2.1: What is Diabetes?

1. What is the role of insulin in our body?
   a. Why is insulin needed in terms of cellular use of glucose?

2. How does insulin stimulate glucose to enter a cell within the body?

3. What is the protein channel called that allows glucose into the cell?

4. What is the difference between hyperglycemia and hypoglycemia?

5. How do Type 1 and Type 2 diabetes differ?
Lesson 2.2: The Science of Food

6. What is the role of a chemical bond in energy transfers?
   a. What does breaking these bonds provide for the body?
   b. How do we test for the heat energy contained in foods?
   c. What unit is food energy measured in?

7. What is the relationship between foods, nutrients, chemical reactions and energy?
Principles of Biomedical Sciences Semester 1 Review

a. Why do we eat food?
b. What is our main source of energy?
c. What food is a source of long term energy?

8. What are the main functions of
   a. Carbohydrates
   b. Proteins
   c. Lipids

9. What do the four macromolecules look like structurally? Identify the following molecules as carbohydrate, lipid, protein or nucleic acid. There WILL be pictures on the test.

10. Go back to the pictures in number 5: identify the monomer for each macromolecule. List it by the picture.
11. What types of foods supply
   a. Carbohydrates (sugars and starches)
   b. Proteins
   c. Lipids

12. Give two examples of foods that would provide more than one macromolecule.

13. How can macromolecules be detected in foods?

14. What are the basic recommendations for a diabetic diet?

15. What chemical reaction takes place to combine monomers to form a polymer?

16. What chemical reaction takes place to break apart a polymer?

17. What is the by-product of dehydration synthesis?

18. How is the amount of energy in food determined?
   a. What unit is used to measure food energy?
Principles of Biomedical Sciences Semester 1 Review

2.2 Vocab

Across:
3. amount of heat energy required to raise the temperature of 1 g of water by 1°C
8. polymer made of monomers of amino acids
10. substance consisting of two or more elements in a fixed ratio
12. double sugar molecule made of two monosaccharides bonded together through dehydration synthesis
15. smallest particle of a substance that retains all the properties of the substance and is composed of one or more atoms
16. Adenosine triphosphate
17. reaction in which two molecules are bonded together with the removal of a water molecule
19. organic monomer which serves as a building block of proteins
23. polymer of thousands of simple sugars formed by dehydration synthesis
24. strong chemical bond in which two atoms share one or more pairs of valence electrons
25. sugar in the form of a monosaccharide, disaccharide or polysaccharide
26. chemical bond resulting from the attraction between oppositely charged ions

Down:
1. single sugar molecule such as glucose or fructose, the simplest type of sugar
2. substance (i.e., dye) used to show visually usually by its capacity for color change, the condition of a solution with respect to the presence of free acid or alkali or some other substance
4. energy for many biochemical cellular processes by undergoing enzymatic hydrolysis
5. maintenance of relatively stable internal physiological conditions (as body temperature or the pH of blood) in higher animals under fluctuating environmental conditions
6. process that splits a molecule by adding water
7. subunit that serves as the building block of a polymer
9. needed by the body to maintain life and health
11. family of compounds including fats, phospholipids, and steroids that is insoluble in water
13. Chemical transformation or change; the interaction of chemical entities
14. molecule consisting of many repeating chemical units or molecules linked together
18. attractive force that holds together the atoms, ions, or groups of atoms in a molecule or compound
20. giant molecule formed by joining smaller molecules which includes proteins, polysaccharides, lipids, and nucleic acids
21. monomer of carbohydrate, simple sugar
22. two or more atoms held together by covalent bonds
Lesson 2.3: Life with Diabetes

19. What are the signs and symptoms for Type 1 and Type 2 Diabetes?

20. What are three possible complications resulting from diabetes?

21. What are the treatments for Type 1 and Type 2 Diabetes?

22. What is the normal level of glucose in the blood?

23. Why is it important for a diabetic to regularly check blood sugar levels?
Principles of Biomedical Sciences Semester 1 Review

2.3 Vocab

Across
4. excess of sugar in the blood.
6. movement of water across a selectively permeable membrane from an area of higher concentration to an area of lower concentration.
8. same solute concentration as another solution.
9. substance that is dissolved in a solution.

Down
1. In comparing two solutions, referring to the one with a greater solute concentration.
2. test that measures blood as a means of determining the average blood sugar concentrations for the preceding two to three months.
3. In comparing two solutions, referring to the one with a lower solute concentration.
4. Abnormal decrease of sugar in the blood.
5. liquid that is a homogeneous mixture of two or more substances.
7. dissolving agent of a solution. Water is the most versatile solvent known.
Unit 3 – Sickle Cell

Lesson 3.1: The Disease

1. What is sickle cell disease?
2. Describe what a sickle cell looks like.
3. What are the four parts of blood? List each and describe its function.