

Biology Basics Unit Review Guide – Teachers Edition

I. Write the scientific term for each of the following statements:

1. The concise description which is universally true under specific conditions. (_____)
2. The sciences that are mainly concerned with the study of non-living objects. (_____)
3. A proposed explanation based on evidence that can be investigated to prove whether it is right or wrong. (_____)
4. A scientific procedure that is carried out to validate whether a hypothesis is correct. (_____)
5. The series of steps that engineers follow to come up with a solution to a problem. (_____)
6. The first step in the technological design process in which the engineers highlight the problem. (_____)
7. The smallest building block of matter. (_____)
8. The bond in which the electrons are unequally shared between the two atoms of different elements. (_____)
9. The process in which the chemical bonds between atoms are formed or broken. (_____)
10. The type of bond that is responsible for the unique properties of water. (_____)
11. A long chain of repeating molecules. (_____)
12. The molecule that forms when two monosaccharides join via a condensation reaction. (_____)
13. The chemical signals that are released by endocrine glands. (_____)
14. The building blocks of nucleic acids. (_____)
15. A chemical reaction which breaks down the polymer. (_____)

II. Multiple Choice: Select the best answer.

1. Which of the following is not a feature of scientific theory? _____.
 - a) It is usually formed from multiple hypotheses.
 - b) It is more certain than a scientific law or hypothesis
 - c) It has been extensively tested
 - d) It is dynamic

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2. Which of the following does not mean that an experiment is valid?
 - a) Only one variable has been changed
 - b) All other variables have been controlled
 - c) Accurate measuring instruments were used
 - d) The hypothesis was incorrect

3. Which of the following is not a feature of a hypothesis?
 - a) It is supported by scientific evidence
 - b) It can form a testable question called an aim.
 - c) It must be correct in order to be valid
 - d) It provides the experiment with direction

4. _____ are mainly concerned with the study of living organisms.
 - a) Social sciences
 - b) Formal sciences
 - c) Life sciences
 - d) Physical sciences

5. _____ is the final step of the scientific method that justifies the results and the reliability of the investigation.
 - a) Evaluation
 - b) Hypothesis
 - c) Interpretation
 - d) Observation

6. _____ are macromolecules that are able to transfer information from one parent to offspring.
 - a) Carbohydrates
 - b) Proteins
 - c) Lipids
 - d) Nucleic acids

7. _____ is the property that makes water able to dissolve many compounds.
 - a) Polarity
 - b) High boiling point
 - c) Neutral
 - d) High melting point

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8. _____ are the monomers of the protein molecules.
- a) Nucleic acids
 - b) Amino acids
 - c) Monomers
 - d) Nucleotides
9. What is the function of enzymes?
- a) Quick energy
 - b) Movement
 - c) Serve as thermal insulator
 - d) Speeding up biochemical reactions
10. _____ functions as energy storage molecule in mammalian muscles.
- a) Starch
 - b) Glucose
 - c) Glycogen
 - d) Cellulose

III. Compare:

1. Monosaccharides and disaccharides.

2. Polar covalent bonds and ionic bonds.

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3. Science and technology.

4. Social sciences and formal sciences.

5. Saturated and unsaturated fatty acids.

IV. Outline the steps in the technological design process.

V. What is the relationship between glucose, fructose, and sucrose?

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VI. Each sentence below describes a step of the scientific method. **Match each sentence from column A with a step of the scientific method listed in column B.**

Column A	Column B
1. Stephen predicted that seeds would start to grow faster if an electric current traveled through the soil in which they were planted. _____	A. Recognize a problem
2. Jonathan’s data showed that household cockroaches moved away from raw cucumber slices. _____	B. Form a hypothesis
3. Kathy used a survey to determine how many of her classmates were left-handed and how many were right-handed. _____	C. Test the hypothesis with an experiment
4. Justin wondered if dyes could be taken out of plant leaves, flowers, and stems. _____	D. Draw conclusions

VII. **Draw the general chemical structure of an amino acid and describe how the structure of an amino acid determines its function.**

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VIII. Why is the water molecule polar? What are the consequences of this property?

IX. Explain how a hypothesis can become a theory, and then a scientific law.

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Answers

I. Write the scientific term for each of the following statements:

1. The concise description which is universally true under specific conditions. (Scientific law)
2. The sciences that are mainly concerned with the study of non-living objects. (Physical sciences)
3. A proposed explanation based on evidence that can be investigated to prove whether it is right or wrong. (Hypothesis)
4. A scientific procedure that is carried out to validate whether a hypothesis is correct. (Experiment)
5. The series of steps that engineers follow to come up with a solution to a problem. (Technological design process)
6. The first step in the technological design process in which the engineers highlight the problem. (Identify the problem)
7. The smallest building block of matter. (Atom)
8. The bond in which the electrons are unequally shared between the two atoms of different elements. (Polar bond)
9. The process in which the chemical bonds between atoms are formed or broken. (Chemical reaction)
10. The type of bond that is responsible for the unique properties of water. (Hydrogen bond)
11. A long chain of repeating molecules. (Polymer)
12. The molecule that formed when two monosaccharides join via a condensation reaction. (Disaccharide)
13. The chemical signals that released by endocrine glands. (Hormones)
14. The building blocks of the nucleic acids. (Nucleotides)
15. A chemical reaction which breaks down the polymer. (Hydrolysis)

II. Multiple Choice: Select the best answer.

1. Which of the following is not a feature of scientific theory? _____.
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- Starch
 - Glucose
 - Glycogen
 - Cellulose

III. Compare:

1. Monosaccharides and disaccharides.

Monosaccharides are the simplest type of carbohydrates which have one 3-7 carbon sugar. The most common examples are glucose and fructose.

Disaccharides are two-sugar molecules that are formed when two monosaccharides join via a condensation reaction an example is sucrose.

2. Polar covalent bonds and ionic bonds.

Polar covalent bond: The type in which the electrons are unequally shared between the two atoms of different elements. As the result of this unequal distribution of the electrons, a slightly negative charge (δ^-) and slightly positive charge (δ^+) develop in the molecule.

Ionic bond: These type of bonds occur when electrons are lost or gained by atoms. A metal atom such as sodium forms a cation and loses an electron to a non-metal atom such as chlorine, which gains it, forming an anion.

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3. Science and technology.

Science is a process of analysis and examination that identifies relationships between variables while

Technology is the application of scientific discoveries to meet a human need through the development of a product or process.

4. Social sciences and formal sciences.

Social Sciences: These sciences that are mainly concerned with the study of human behavior and their relationship with their environment. They include Sociology and Psychology.

Formal Sciences: These sciences study formal systems such as Mathematics and Logic.

5. Saturated and unsaturated fatty acids.

Saturated fatty acids contain single bonds between their carbon atoms.

Unsaturated fatty acids contain a double bond in one location of the carbon chain.

IV. Outline the steps in the technological design process.

1. Identify the problem
2. Research and gathering information
3. Brainstorm possible solutions
4. Generate possible ideas
5. Explore possibilities
6. Select the best approach
7. Build a test model or prototype
8. Refine and retest the model as needed

V. What is the relationship between glucose, fructose, and sucrose?

Glucose and fructose are monosaccharides meaning that they both have one sugar .

Glucose and fructose can bond together by a condensation reaction to form a molecule of sucrose which is known as table sugar.

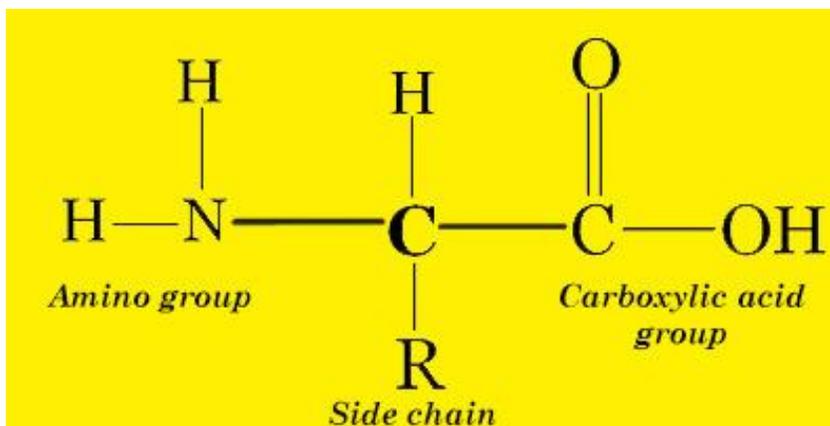
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4. Justin wondered if dyes could be taken out of plant leaves, flowers, and stems. (A)	D. Draw conclusions

- VII. **Draw the general chemical structure of an amino acid and describe how the structure of an amino acid determines its function.**



The R group varies between amino acids giving them different chemical properties and giving rise to different types of amino acids.

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VIII. Why is the water molecule polar? What are the consequences of this property?

The electronegativity of oxygen is much higher than the electronegativity of hydrogen which means that the oxygen attracts the negative electrons of the bond towards itself more than the hydrogen.

As a result, the oxygen acquires a partial negative charge and the hydrogen acquires a partial positive charge resulting in the polarity of the water molecules. This means that water is able to dissolve other polar molecules as well as other covalent molecules such as glucose. Therefore, water is considered as a universal polar solvent.

IX. Explain how a hypothesis can become a theory, and then a scientific law.

A hypothesis is a suggestion which is come about because of background research. It tested through making observations or conducting an experiment. A hypothesis once established to be right or wrong and independently reviewed can contribute to a scientific theory. These are made of many hypotheses and provide an in-depth explanation into why or how something occurs. Like a hypothesis, a theory is tested rigorously by many experts in the field to ensure that is as correct as possible and is consistent with current scientific knowledge. Once tested and universally accepted by the scientific community, a theory can become a scientific law. Laws are much more concise than theories and do not contain the same amount of detail as they only predict the results of phenomena under specific conditions.