

at two assessments

Use the data to assess
the quality of the program and the effectiveness
of the instruction
Use the data to
improve the program

Students

A way to measure
the effectiveness of the program

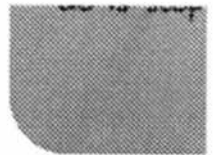


ment

represent
the student learning
experience and use of data
to inform instruction

Using Assessment Data for Learning

Making Assessment Work



Page

Objective #1 Exit Ticket--Cell Chemistry (#2)

Astute Student

Incorrect answers are shaded

C 1. Which of the following is the BEST analogy for the hierarchy of structure found in cells?

A)	A hill
B)	A bullseye
C)	A picture of a cell
D)	A diagonal line with a positive slope

B 2. Which of the following is NOT true about the hierarchy of structure found in cells?

A)	Cells are made of many organelles surrounded by a membrane.
B)	Molecules bond together to form cells.
C)	Atoms form bonds to make molecules found in cells--both small and large molecules.
D)	Tissues are many cells that all do the same job.

D 3. Which of the following is NOT true about the parts of an atom?

A)	Electrons can be found outside of the nucleus.
B)	Protons have a positive charge.
C)	Neutrons have a negative charge.
D)	Protons and neutrons are found in the nucleus.

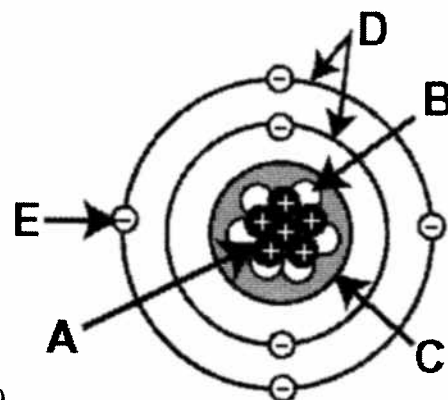
A 4. Which of the following is NOT true concerning the three types of bonds?

A)	Atoms are held together in ionic bonds because an electron was lost by one atom and gained by another.
B)	In a covalent bond, atoms are held together because electron (or electrons) are being shared between the atoms.
C)	In hydrogen bonds, molecules are held together because the charged ends of one molecule is attracted to the oppositely charged end of another molecules.
D)	The bonds, in order of strongest to weakest, are: Ionic, covalent, hydrogen.

A 5. Which of the following is NOT true about the functions of macromolecules?

A)	Proteins are used by cells as a quick source of energy.
B)	Lipids can be used as energy, and are a main component of cell membranes.
C)	Nucleic acids have the instructions on how to make and actually help make proteins in cells.
D)	Carbohydrates are the cell's main energy source.

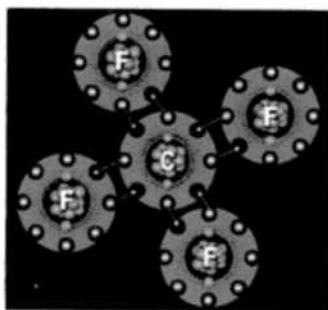
Matching



Match each part of the atom with its identity from the list below. (Objective #1b)

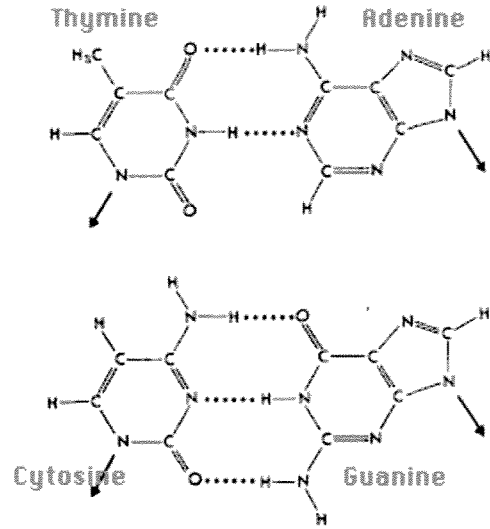
- E 6. neutron
- A 7. proton
- E 8. electrons
- C 9. nucleus

10. What type of bond is pictured below--covalent, ionic, or hydrogen? Explain your answer.



This is a covalent bond because there are 4 fluorine atoms sharing electrons with carbon to fill its outer electron ring, and carbon is sharing 1 electron with each of the fluorine molecules as demonstrated by the arrows.

11. What type of bond is pictured below--covalent, ionic, or hydrogen? (The names in red are the names of 4 different nucleotide molecules found in DNA.) Explain your answer.



This is a hydrogen bond because it is between covalently bonded molecules which all involve hydrogen, and either carbon, oxygen, or nitrogen.

2/3

12. Using the words below, you need to show the relationship between the words. You can do this in a variety of ways--drawing it on a piece of paper, a written paragraph, making a concept map, etc. It doesn't matter which way you choose, as long as you show the valid relationship between the words.

- carbon
- proteins
- lipids
- nucleotides
- amino acids
- hydrogen
- nucleic acids
- oxygen
- fatty acids
- carbohydrates
- nitrogen
- monosaccharides

Carbon, hydrogen, nitrogen, and oxygen are the 4 main atoms that make up all living things, and are found in all macromolecules. Carbon and hydrogen are found in all of the subunits of macromolecules, nucleotides, amino acids, fatty acids, and monosaccharides. Oxygen is also found in monosaccharides which make up carbohydrates, the main source of a cell's energy. Oxygen and Nitrogen are both found in amino acids which make up proteins which are like the cells employees. Nitrogen and Oxygen are also found in nucleotides along with Phosphorous, these make up nucleic acids which provide the blueprint as to how to put amino acids together to make protein. The final macromolecule is the lipid which contains only Carbon and Hydrogen, made of fatty acids, this macromolecule stores energy and makes up most of the cell membrane.

Good job; 9/10

Score = 20/25 80%

Objective #1 Exit Ticket--Cell Chemistry (#2)**Astute Student**

The I can statements are listed in the knowledge rater chart at the end of this exit ticket. As you answer each question, note what I can statement it is assessing and think about how well you are mastering the I can statement it is testing. Don't forget to rate your knowledge in the chart at the end.

(Wrong answers for multiple choice are shaded)

C 1. Which of the following is the BEST analogy for the hierarchy of structure found in cells? (1a)

A)	A hill
B)	A bullseye
C)	A picture of a cell
D)	A diagonal line with a positive slope

B 2. Which of the following is NOT true about the hierarchy of structure found in cells? (1a)

A)	Cells are made of many organelles surrounded by a membrane.
B)	Molecules bond together to form cells.
C)	Atoms form bonds to make molecules found in cells--both small and large molecules.
D)	Tissues are many cells that all do the same job.

D 3. Which of the following is NOT true about the parts of an atom? (1b)

A)	Electrons can be found outside of the nucleus.
B)	Protons have a positive charge.
C)	Neutrons have a negative charge.
D)	Protons and neutrons are found in the nucleus.

A 4. Which of the following is NOT true concerning the three types of bonds? (1c)

A)	Atoms are held together in ionic bonds because an electron was lost by one atom and gained by another.
B)	In a covalent bond, atoms are held together because electron (or electrons) are being shared between the atoms.
C)	In hydrogen bonds, molecules are held together because the charged ends of one molecule is attracted to the oppositely charged end of another molecules.
D)	The bonds, in order of strongest to weakest, are: Ionic, covalent, hydrogen.

A 5. Which of the following is NOT true about the functions of macromolecules? (1d)

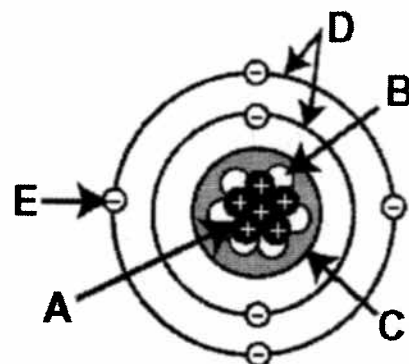
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A)	Proteins are used by cells as a quick source of energy.
B)	Lipids can be used as energy, and are a main component of cell membranes.
C)	Nucleic acids have the instructions on how to make and actually help make proteins in cells.
D)	Carbohydrates are the cell's main energy source.

Matching

Match each part of the atom with its identity from the list below. (Objective #1b)

- E 6. neutron
- A 7. proton
- E 8. electrons
- C 9. nucleus

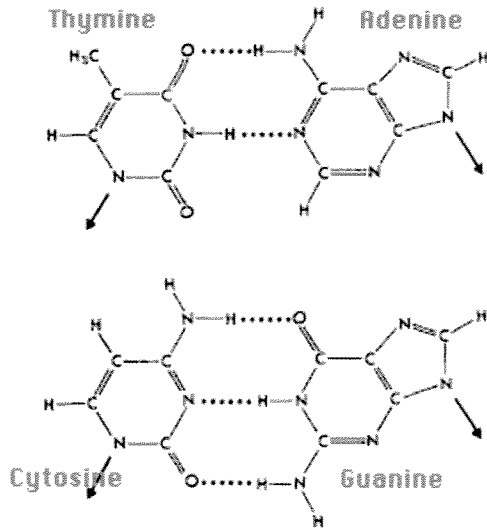


10. What type of bond is pictured below--covalent, ionic, or hydrogen? Explain your answer. (1c)



This is a covalent bond because there are 4 fluorine atoms sharing electrons with carbon to fill its outer electron ring, and carbon is sharing 1 electron with each of the fluorine molecules as demonstrated by the arrows.

11. What type of bond is pictured below--covalent, ionic, or hydrogen? (The names in red are the names of 4 different nucleotide molecules found in DNA.) Explain your answer. (1c)



This is a hydrogen bond because it is between covalently bonded molecules which all involve hydrogen, and either carbon, oxygen, or nitrogen.

****What's causing the hydrogen bonds?**

12. Using the words below, you need to show the relationship between the words. You can do this in a variety of ways--drawing it on a piece of paper, a written paragraph, making a concept map, etc. It doesn't matter which way you choose, as long as you show the valid relationship between the words.

The point of this is to show me you understand Objective #1e: *I can show the relationship between the four types of macromolecules and the elements and subunits that make them.*

carbon
 proteins
 lipids
 nucleotides
 amino acids
 hydrogen
 nucleic acids
 oxygen
 fatty acids
 carbohydrates
 nitrogen
 monosaccharides

Carbon, hydrogen, nitrogen, and oxygen are the 4 main atoms that make up all living things, and are found in all macromolecules. Carbon and hydrogen are found in all of the subunits of macromolecules, nucleotides, amino acids, fatty acids, and monosaccharides. Oxygen is also found in monosaccharides which make up

carbohydrates, the main source of a cell's energy. Oxygen and Nitrogen are both found in amino acids which make up proteins which are like the cells employees. Nitrogen and Oxygen are also found in nucleotides along with Phosphorous, these make up nucleic acids which provide the blueprint as to how to put amino acids together to make protein. The final macromolecules is the lipid which contains only Carbon and Hydrogen, made of fatty acids, this macromolecule stores energy and makes up most of the cell membrane.

****You're missing some of the elements that make up some of the macromolecules, and your last sentence is not entirely correct; look again at what makes up the majority of a cell's membrane--fatty acids are a part of this other molecule....**

I can statement	0 = No evidence of learning	1 = Beginning	2 = Progressing	3 = Proficient	4 = Advanced
Cell Chemistry					
1A. I can explain the hierarchy of structure found in cells.					x
1B. I can identify the parts of an atom from a diagram.					x
1C. I can list and describe the three type of bonds between atoms found in cells.				x	
1D. I can list the four main types of macromolecules found in cells.					x
1E. I can show the relationship between the four types of macromolecules and the elements and subunits that make them.				x	

After you get your scores, go back and adjust your rating of your understanding of each I can statement.

What do you not know yet? Why?

How can you fix your knowledge?

Photosynthesis & Cell Respiration Unit Objectives

1. Cell Metabolism

- A. I can connect anabolism, catabolism, and enzymes to the concept of cell metabolism.
- B. I can list the parts of an ATP molecule and draw them properly connected.
- C. I can demonstrate how an ATP molecule is made and broken down for energy.
- D. I can create an organizer that shows how anabolism, catabolism, cell metabolism, ATP, photosynthesis, and cell respiration are all connected.

Vocabulary: anabolism, catabolism, metabolism, ADP, ATP, Pi, photosynthesis, cell respiration

Illinois Assessment Framework: 12.11.09, 12.11.10

2. Anabolism—Photosynthesis

- A. I can state the overall goal of photosynthesis, the organelle in which it occurs, and its two main stages.
- B. I can list the beginning and ending molecules for each of the two stages of photosynthesis.
- C. I can create an analogy for what occurs in each stage of photosynthesis.

Illinois Assessment Framework: 12.11.07

3. Catabolism—Cell Respiration

- A. I can state the overall goal of cell respiration, the organelle in which it occurs, and its three main stages.
- B. I can list the beginning and ending molecules for each of the three stages of cell respiration.
- C. I can create an analogy for what occurs in each stage of cell respiration.

Illinois Assessment Framework: 12.11.08

4. Summary

- A. I can list similarities and differences between cell respiration and photosynthesis.
- B. I can design an experiment that answers a scientific question about cell respiration and photosynthesis.

Photosynthesis & Cell Respiration Unit

Objective #1 Rubric: Cell Metabolism

- A. I can connect anabolism, catabolism, and enzymes to the concept of cell metabolism.
- B. I can list the parts of an ATP molecule and draw them properly connected.
- C. I can demonstrate how an ATP molecule is made and broken down for energy.
- D. I can create an organizer that shows how anabolism, catabolism, cell metabolism, ATP, photosynthesis, and cell respiration are all connected.

Score:	What the score looks like:
4	⇒ Design a lab that incorporates all concepts from this objective, and synthesizes these concepts with all other understandings and concepts from Objectives #2,3,& 4 (Lab write-up)
3	<ul style="list-style-type: none"> ⇒ From a given scenario or example, infer connections between anabolism, catabolism, enzymes, and cell metabolism. (MC or SA) ⇒ Create a model of an ATP molecule that shows the parts and can be used to show how ATP is made and broken down for energy. (Before test—mini-activity) ⇒ From a diagram of ATP synthesis and breakdown, predict the effects on ATP synthesis and breakdown if a change to the reaction is given. (MC or SA) ⇒ Using a student-generated organizer, evaluate it and draw conclusions from it about how anabolism, catabolism, cell metabolism, ATP, photosynthesis, and cell respiration are all connected. (MC or SA)
2	<ul style="list-style-type: none"> ⇒ In a few sentences, state the basic connection between anabolism, catabolism, enzymes, and cell metabolism. (MC or SA) ⇒ Write a list of the parts or recognize the parts of the ATP molecule. (MC or SA) ⇒ Draw or recognize the three parts of an ATP molecule properly connected together. (MC or SA) ⇒ From a diagram of ATP synthesis and breakdown, describe in words the chemical reactions that occur when ATP is made and when it is broken down. (MC or SA) ⇒ From a teacher-made organizer, draw basic conclusions about how anabolism, catabolism, cell metabolism, ATP, photosynthesis, and cell respiration are all connected. (MC or SA)
1	With help, can do some of 2 and/or 3
0	Even with help, cannot do any of 2 or 3

Photosynthesis & Cell Respiration Unit

Objective #2 Rubric: Photosynthesis

BIG Question:

What happens in photosynthesis that makes it an anabolic process?

I can statements:

2a. I can state the overall goal of photosynthesis, the organelle in which it occurs, and its two main stages.

2b. I can list the beginning and ending molecules for each of the two stages of photosynthesis.

2c. I can create an analogy for what occurs in each stage of photosynthesis.

Score	How to get the score:
4	Design a lab that incorporates all concepts from this objective, and synthesizes these concepts with all other understandings and concepts from Objectives #1, 3, & 4 (Lab write-up)
3	If given a scenario, make or identify valid and accurate connections (not listing the answer to the I can statement in a sentence or two) between the following concepts: --the overall goal of photosynthesis --the structure of the chloroplast --the two main stages of photosynthesis (where they occur, the molecules needed and made by them, and what happens during each stage) Create an original analogy for what happens in the light reactions and the Calvin cycle.
2	Correctly list what the goal of photosynthesis is Correctly list where photosynthesis occurs Correctly list the two main stages of photosynthesis Correctly list what molecules the light reactions start with and end with. Correctly list what molecules the Calvin cycle starts with and ends with. Describe, using simpler terms, what happens in the light reactions. Describe, using simpler terms, what happens in the Calvin cycle.
1	With help, can do some of 2 or 3
0	Even with help, cannot do any of 2 or 3

1. Which of the following is FALSE about photosynthesis? (2a, 2) *

- The calvin cycle is the second stage of photosynthesis that occurs in the stroma of chloroplasts.
- Photosynthesis occurs in the chloroplast cells of plant cells.
- The light reactions are the first stage of photosynthesis that occur in the thylakoids of chloroplasts.
- The goal of photosynthesis is to make sugars such as glucose.

2. Which of the following is NOT a molecule that the light reactions start with? (2b, 2) *

- ATP
- NADP+
- ADP
- H₂O

3. Which of the following is NOT a molecule the light reactions ends with? (2b, 2) *

- NADPH
- ATP
- O₂
- CO₂

4. Which of the following is NOT a molecule the Calvin cycle starts with? (2b, 2)*

- glucose (C₆H₁₀O₆)
- CO₂
- ATP
- NADPH

5. Which of the following BEST describes what occurs in the light reactions in simple terms without leaving any major concepts out? (2c, 2) *

- The energy of light is transferred to water's electrons, which are then passed down an electron transport chain to make ATP and NADPH.
- Light is converted to the energy in the bonds of ATP and NADPH.
- Light hits chlorophyll and then electrons help make ATP and NADPH for water, creating oxygen gas.
- Electrons are transported down an electron transport chain which then makes ATP and NADPH.

6. Which of the following BEST describes what occurs in the Calvin cycle in simple terms without leaving any major concepts out? (2c, 2) *

- The energy in ATP and the electrons in NADPH are used to modify CO₂ in order to make a glucose molecule.
- CO₂ is involved in a series of chemical reactions to make glucose.
- Carbon dioxide is combined with ADP and NADP+ to make glucose molecules.
- The electrons in NADPH are used as energy to modify carbon dioxide and other molecules to make glucose.

7. Which of the following is NOT an accurate connection that can be made regarding photosynthesis? (2a, 3) *

- The light reactions occur in the thylakoids because that is where the stacks of grana are.
- Glucose is made in the stroma because that is where the Calvin cycle takes place.
- Thylakoids are green because chlorophyll molecules are embedded (stuck) in their membranes.
- Some of the products of the light reactions are used as the starting molecules of the Calvin cycle.

8. Before a cell divides, it needs to duplicate all of its organelles so that each new cell has all of the organelles it needs. When chloroplasts replicate, they divide just like bacterial cells do, and basically divide in half after doubling in size and replicating their own single circular chromosomes. Suppose that, when the chloroplast replicates, some of its DNA is mutated (changed) so that the chlorophyll (a protein) is made incorrectly. Which of the following is an accurate and logical prediction of what could happen? (2b, 3) *

- The light reactions wouldn't get the oxygen they needed.
- ATP and NADPH wouldn't be made.
- The cell would die from lack of carbon dioxide.
- There wouldn't be enough water available to make glucose.

9. The enzymes needed to catalyze the reactions that take place during the Calvin cycle are located in the stroma. If the chloroplast stopped making these enzymes, which of the following would happen? (2b, 3) *

- ATP and NADPH would not be made.
- Electrons would not flow down the electron transport chain.
- ATP and NADPH would not be used by the Calvin cycle.
- The thylakoids would be damaged and the light reactions could not take place.

10. Write an analogy for what occurs in the light reactions. (2c, 3) *Write your analogy in this format: (Stage) works like _____ because _____.

11. Write an analogy for what occurs in the Calvin cycle. (2c, 3) *Write your analogy in this format: (Stage) works like _____ because _____.

Photosynthesis & Cell Respiration Test 10-11

Multiple Choice

Identify the choice that best completes the statement or answers the question.

1. Which of the following is FALSE about photosynthesis? (2a, 2)

A)	The goal of photosynthesis is to break down sugars.
B)	Photosynthesis occurs in the chloroplasts of plant and protist cells.
C)	Photosynthesis has two main stages--the light reactions and the Calvin cycle.
D)	The light reactions occur in the thylakoids, and the Calvin cycle occurs in the stroma.

2. Which of the following is NOT a molecule that the light reactions ENDS with? (2b, 2)

A)	O ₂
B)	NADPH
C)	ATP
D)	CO ₂

3. Which of the following correctly lists the molecules the Calvin cycle STARTS with? (2b, 2)

A)	CO ₂ , NADPH, ATP
B)	ADP, NADP ⁺ , H ₂ O
C)	CO ₂ , NADH, ATP
D)	H ₂ O, NADH, O ₂

4. Which of the following is a molecule made by the Calvin cycle? (2b, 2)

A)	oxygen gas
B)	ATP
C)	sugar
D)	carbon dioxide gas

5. Which of the following most accurately describes the light reactions in simple terms (without leaving anything out)? (2c, 2)

A)	The kinetic energy of the sun is converted to the potential energy of molecules.
B)	The sun's energy is transferred to water's electrons, making them go down a transport chain and using that energy to make ATP and NADPH.
C)	The energy from the sun is absorbed by chlorophyll, and ATP and NADPH is made.
D)	The sun's energy is transferred to chlorophyll, which is then used to transport H ⁺ to help make ATP and NADPH at the end of a transport chain.

6. Which of the following most accurately describes the Calvin cycle in simple terms (without leaving anything out)? (2c, 2)

A)	The energy from ATP and NADPH are used to rearrange and form bonds between carbon dioxide and other organic molecules to form sugars.
B)	ATP and NADPH help make molecules of glucose at the end of the Calvin cycle.
C)	A molecule of glucose is rearranged to release carbon dioxide and oxygen gas, and help transfer energy into ATP and NADPH.
D)	Carbon dioxide is combined with water to make molecules of glucose and oxygen gas in a series of enzyme-catalyzed chemical reactions.

7. Plants that grow in very acidic, clay, or chalky soils often have a hard time obtaining phosphorus from the soil. Plants suffering from phosphorus deficiency will have stunted growth, and appear sickly.

Which of the following is an accurate connection you can make between the information given above and the process of photosynthesis? (2, 3)

A)	A phosphorus-deficient plant cannot make enough ATP for anabolism.
B)	The plant's growth is stunted because the plant needs phosphorous to grow and be healthy.
C)	Plants can't grow well in acidic, clay, or chalky soils.
D)	Plants that don't get enough phosphorus cannot properly run the Krebs cycle and make sugars.

8. Sometimes, corn plants inherit a gene that makes them albino--meaning they are all white. Which of the following is a connection you can make between this information and the process of photosynthesis? (2, 3)

A)	They will die because they are white and not green.
B)	They do not have chloroplasts, and will be unable to photosynthesize.
C)	They don't have any pigments, so therefore the Calvin cycle cannot take place.
D)	They can still make sugars, but cannot do it using the light reactions.

Short Answer

9. Write an analogy for the following stages of photosynthesis. (2c, 3)

Your analogy MUST be written in this format: (Stage) works like _____ because _____.

Stage of photosynthesis	Creative and original and analogy
Light reactions	
Calvin cycle	

Intentional Assessment Planning Sheet

Unit:

Topic:

Level descriptors: (0-5; Below basic, Basic, Proficient, Advanced, etc.)

Learning Goal #1:

More complex content/skills:

Less complex content/skills:

Learning Goal #2:

More complex content/skills:

Less complex content/skills:

(Add Learning Goals if necessary)

Based on what you listed above, decide what skills and content go at each level of mastery in your learning rubric. This is where you need to think about what each level of mastery looks like in terms of student work and what evidence of mastery will look like on assessments.

Rubric:

Scale	Students can..... (What will the learning look like?)

Formative & Summative Assessments: (Remember, assessments can be formal or informal)

Assessment Description	Formative/Summative	Format (MC, SA, Verbal, Performance Task, Exit Slip, etc.)	Which goal(s) will be assessed:

Learning Activities:

List what you will have students do in order to construct and create the learning required to demonstrate your listed evidence of mastery (what the learning will look like on the assessments).