Layered Curriculum Lessons, Aligned with the Ohio Science Content Standards, for use in the High School Science Classroom

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Summary of Project

Rationale

While teaching High School Science students, we have noticed a wide range of different learning styles present throughout our classes. In order to accommodate the multitude of learning styles our students possess, we intend to create layered curriculum lessons.

Our goal is that by creating lessons that employ layered curriculum in our classrooms we can satisfy the needs of our students and strengthen their understanding of science content. Layered curriculum will allow our students to learn science concepts potentially utilizing a learning style with which they are comfortable. Also, by aligning layered curriculum lessons with the Ohio Academic Science Content Standards, we hope to raise our students knowledge in those areas identified by those Standards and increase our schools overall success rate on the science portion of the Ohio Graduation Test (OGT). Finally, our layered curriculum lessons will give our students more choice and responsibility in their own learning, thus creating ownership in their scholastics.

As previously stated, in employing layered curriculum, our students will be given a choice of lessons to complete to earn their desired grade. Our project will focus on developing lessons for a physical science unit pertaining to chemical reactions, a life science unit pertaining to biomes, and an Ohio Graduation Test (OGT) unit pertaining to life science topics and test taking strategies. Lessons can include but are not limited to include the following choices for students to earn their grade while developing a solid foundation of content knowledge: 1) listening to a lecture and taking notes (notes will be
graded), 2) watching a video and completing an activity, 3) reading an article and giving a synopsis, 4) drawing a poster and presenting it to classmates, 5) vocabulary exercises (such as flashcards), 6) song writing pertaining to the topic, 7) hands on activities (such as model building and experiments), 8) watching or creating a powerpoint presentation, 9) traditional worksheets or book work, 10) research on a topic covered in a previous activity, etc. Based upon their desired grade, students will have to complete both a certain amount of C level topics and potentially higher level activities at the B and A levels. Students will be graded by their instructor more on content knowledge obtained by completing the activities, rather than the overall product.

**What is Layered Curriculum?**

Layered curriculum was developed in the later 1980’s by Dr. Kathie Nunley. Dr. Nunley developed this approach to her class curriculum to help teach a wide variety of abilities, cultures, and languages and put emphasis on the students learning accountability and, in turn, gave them ownership of their class work. To include all types of learners, layered curriculum takes the approach of modifying the entire curriculum rather than making individual accommodations (Nunley, 2004, p.7). In layered curriculum, students are presented with many different activities from which to choose to earn their chosen grade. For example, students would be presented with a list of six potential activities to complete to earn their grade. These activities would incorporate a multitude of learning styles. To earn their grade, students would have to potentially watch a video, listen to a lecture, build a model, draw a poster, and/or research a topic of interest (Nunley, 2004, p.11). The entire curriculum is presented in three layers, where each layer represents a different type of thinking or depth of understanding of a topic and correlates with a grade
(A, B, C). The first layer, the C layer, the student works to gain a basic knowledge and understanding of the topic, while building on his/her current level of core information. The next layer, the B layer, has the student applying or manipulating the information learned in the C layer. Problem solving tasks are common in this layer. The final layer, the A layer, has the student completing tasks that involve critical thinking and analysis activities. This layer requires the most complex thought (Nunley, 2004, p. 8). With the teachers’ assistance, students work their own way through each layer, while gathering information, applying information, and critically thinking about the information related to each topic. The grade the student receives correlates with the depth of understanding the student demonstrates about the topic.

**Alignment of Lessons with Ohio Academic Content Standards**

The layered curriculum units created for this paper were created with two main purposes or goals behind them. The first goal was to create and implement units in a fashion that allows the student to have a deeper understanding of the topic, rather than having the student just memorize information. The second goal was to align these units with the State of Ohio’s science academic content standards and indicators, to help better prepare our students for the OGT.

The Ohio science academic content standards are broken up into grade-level indicators, standards, and benchmarks. A grade-level indicator is a specific expectation of knowledge or skills that a student should be able to demonstrate at a specific grade. A standard is a broad goal of what a student should know for each grade. A benchmark is a specific statement of knowledge or skills a student should be able to demonstrate or
explain at each grade (Ohio Department of Education, 2003, p. 3). For this paper we will be looking at what standards and grade-level indicators are met for each unit. In table 2, the Ohio science academic content standards and grade-level indicators aligned with each unit is listed.

**Table 1.0 - Ohio science academic content standards and indicators**

<table>
<thead>
<tr>
<th>Ohio science content grade level</th>
<th>Ohio standard or grade-level indicator met</th>
<th>Explanation of standard or indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical Science, Chemical Reaction Unit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9th grade</td>
<td>Physical Sciences - Standard B</td>
<td>Explain how atoms react with each other to form other substances and how molecules react with each other or other atoms to form even different substances</td>
</tr>
<tr>
<td>9th grade</td>
<td>Physical Sciences - Standard F</td>
<td>Explain how energy may change form or be redistributed but the total quantity of energy is conserved</td>
</tr>
<tr>
<td>9th grade</td>
<td>Physical Sciences – Indicator # 16</td>
<td>Illustrate that chemical reactions are either endothermic or exothermic (e.g., cold packs, hot packs and the burning of fossil fuels)</td>
</tr>
<tr>
<td>9th grade</td>
<td>Scientific Inquiry – Indicator # 3</td>
<td>Construct, interpret and apply physical and conceptual models that represent or explain systems, objects, events or concepts</td>
</tr>
<tr>
<td>9th grade</td>
<td>Scientific Inquiry – Indicator #5</td>
<td>Develop oral and written presentations using clear language, accurate data, appropriate graphs, tables, maps and available technology.</td>
</tr>
<tr>
<td>Grade</td>
<td>Standard</td>
<td>Description</td>
</tr>
<tr>
<td>-------</td>
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<td>-------------</td>
</tr>
<tr>
<td>10th</td>
<td>Standard F</td>
<td>Explain how the structure and function of ecosystems and relate how ecosystems change over time</td>
</tr>
<tr>
<td>10th</td>
<td>Standard G</td>
<td>Describe how human activities can impact the status of natural systems</td>
</tr>
<tr>
<td>10th</td>
<td>Indicator # 16</td>
<td>Relate how distribution and abundance of organisms and populations in ecosystems are limited by the ability of the ecosystem to recycle materials and the availability of the ecosystem to recycle materials and the availability of matter, space and energy</td>
</tr>
<tr>
<td>10th</td>
<td>Indicator # 17</td>
<td>Conclude that ecosystems tend to have cyclic fluctuations around a state of approximate equilibrium that can change when climate changes, when one or more new species appear as a result of immigration or when one or more species disappear</td>
</tr>
<tr>
<td>10th</td>
<td>Indicator # 18</td>
<td>Describe ways that human activities can deliberately or inadvertently alter the equilibrium in ecosystems. Explain how changes in technology/biotechnology can cause significant changes, either positive or negative, in environmental quality and carrying capacity</td>
</tr>
<tr>
<td>Grade</td>
<td>Subject</td>
<td>Indicator</td>
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<tr>
<td>-------</td>
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</tr>
<tr>
<td>10th</td>
<td>Life Sciences – Indicator # 19</td>
<td>Illustrate how uses of resources at local, state, regional, national, and global levels have affected the quality of life (e.g., energy production and sustainable vs. nonsustainable agriculture)</td>
</tr>
<tr>
<td>10th</td>
<td>Earth and Space Sciences – Indicator #1</td>
<td>Summarize the relationship between the climatic zone and the resultant biomes. (This includes explaining the nature of the rainfall and temperature of the mid-latitude climatic zone that supports the deciduous forest.)</td>
</tr>
<tr>
<td>10th</td>
<td>Scientific Inquiry – Indicator # 2</td>
<td>Present scientific findings using clear language, accurate data, appropriate graphs, tables, maps and available technology.</td>
</tr>
<tr>
<td>10th</td>
<td>Scientific Inquiry – Indicator # 4</td>
<td>Draw conclusions from inquiries based on scientific knowledge and principles, the use of logic and evidence (data) from investigations.</td>
</tr>
<tr>
<td>10th</td>
<td>Scientific Ways of Knowing – Indicator # 3</td>
<td>Recognize that science is a systematic method of continuing investigation, based on observation, hypothesis testing, measurement, experimentation, and theory building, which leads to more adequate explanations of natural phenomena.</td>
</tr>
<tr>
<td>OGT Preparatory</td>
<td>Life Sciences – Indicator # 1-4</td>
<td>Characteristics and Structure of Life</td>
</tr>
<tr>
<td>10th</td>
<td>Life Sciences – Indicator # 5-8</td>
<td>Heredity</td>
</tr>
</tbody>
</table>
Physical Science Layered Curriculum Lessons

Chemical Reactions Unit Overview

The physical science layered curriculum lessons created were made regarding the topic of chemical reactions. This chemical reaction unit was made with a focus on the ninth grade Ohio science academic content standards and grade-level indicators. The standards and indicators specifically met for this unit are the ninth through tenth grade physical science standards B and F, the ninth grade physical science indicator number sixteen, and the ninth grade scientific inquiry indicator numbers three and five.

The chemical reaction layered curriculum unit was made with “C”, “B”, and “A” layers. The “C” layer focused on the basic knowledge of the unit and involved lessons that included lectures, outlining readings, chemical equation diagrams, worksheets, flashcards, concept maps, Venn diagrams, and Frayer models. The “B” layer, for this unit, has the student applying the information learned in the “C” layer. This layer has students choose from three research projects involving chemical reaction, which are researching the chemical reactions involved with a “biodegradable” item, researching an animal that uses chemical reactions, and research the chemical reactions involved with cigarette smoke. The “A” layer has tasks that involve critical thinking and demand the highest depth of understanding of the topic. The activities for this layer have the students choosing between making a poster and giving a presentation about that poster or choosing between two labs that look at different chemical reactions.
Chemical Reaction Unit Student Handout

In table 1, an example of the student handout is given for teaching a chemical reaction unit using layered curriculum. This chemical reaction student handout lists all the expectations of a student that need to be completed, with comprehension, in order to receive a grade of an “A”, “B”, or “C”. Also, this handout outlines to the student all the dates of lectures and activities during the course of this unit.

Table 2.0 – Chemical Reaction Student Handout

Name ________________________________ Period ____________

Final Due Date: Friday, 3/10/08

Chemical Reactions

Objectives:
Students will be able to:

A. Explain how atoms react with each other to form other substances and how molecules react with each other or other atoms to form even different substances - Physical Science (P.S.) 9th grade standard B.

B. Explain how energy may change form or be redistributed but the total quantity of energy is conserved - P.S. 9th standard F.

C. Illustrate that chemical reactions are either endothermic or exothermic (e.g., cold packs, hot packs and the burning of fossil fuels) – P.S. 9th grade indicator #16.

D. Construct, interpret and apply physical and conceptual models that represent or explain systems, objects, events or concepts – Scientific Inquiry 9th grade indicator #3

E. Develop oral and written presentations using clear language, accurate data, appropriate graphs, tables, maps and available technology – Scientific Inquiry 9th grade indicator #5

F. Be able to balance a chemical equation.

G. Identify the parts of a chemical equation.

H. Explain the difference between a catalyst and an inhibitor.

Lectures:
Monday, 2/27/08 – Chemical Reactions/Equations
Tuesday, 2/28/08 – No Lecture
Wednesday, 3/1/08 – Law of Conservation of Mass
Thursday, 3/2/08 – Balancing Equations, Part 1
Friday, 3/3/08 - No Lecture

Monday, 3/6/08 – No Lecture
Tuesday, 3/7/08 – C. Reactions & Energy
Wednesday, 3/8/08 - No Lecture
Thursday, 3/9/08 - No Lecture
Friday, 3/10/08 – ALL LAYERS DUE!!!!
C Layer Activities:
Students must earn at least 100 points to receive a grade of a “C” for this unit on Chemical reactions. You must complete 100 points of a C-layer activities to advance to B-layer activities. You MUST complete activities with a “*”.

<table>
<thead>
<tr>
<th>Points Possible</th>
<th>Points Earned</th>
<th>Assignment Description</th>
<th>Date Due</th>
<th>Teacher Initial</th>
</tr>
</thead>
<tbody>
<tr>
<td>*5</td>
<td></td>
<td>Complete KWL chart about chemical reactions.</td>
<td>2/27/08</td>
<td></td>
</tr>
<tr>
<td>*10</td>
<td></td>
<td>Read chapter 24, section 1 &amp; outline notes.</td>
<td>2/27/08</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Turn in notes.</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>(see rubric for notes)</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>OR</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Listen to lecture, participate, &amp; take notes on 2/27/08. Turn in your notes.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>*5</td>
<td></td>
<td>Make a diagram showing the “parts” of a chemical equation</td>
<td>2/28/08</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(label and explain what all parts are)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(for evaluation, see rubric for diagrams)</td>
<td></td>
<td></td>
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<tr>
<td>*10</td>
<td></td>
<td>Complete worksheet “Chemical Changes”</td>
<td>2/28/08</td>
<td></td>
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<td></td>
<td></td>
<td>OR</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Complete Chapter 24, Section 1 Assessment questions p. 742</td>
<td></td>
<td></td>
</tr>
<tr>
<td>*10</td>
<td></td>
<td>Read chapter 24, section 1 “Conservation of Mass/Lavoiser’s Contribution” &amp; outline notes.</td>
<td>3/1/08</td>
<td></td>
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<td></td>
<td></td>
<td>Turn in notes.</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>(see rubric for notes)</td>
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<td></td>
<td></td>
<td>OR</td>
<td></td>
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<td></td>
<td></td>
<td>Listen to lecture, participate, &amp; take notes on 3/1/08. Turn in your notes.</td>
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<tr>
<td>*10</td>
<td></td>
<td>Read chapter 24, section 2 &amp; outline notes.</td>
<td>3/2/08</td>
<td></td>
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<td></td>
<td></td>
<td>Turn in notes.</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>(see rubric for notes)</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td>OR</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Listen to lecture, participate, &amp; take notes on 3/2/08. Turn in your notes.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>*10</td>
<td></td>
<td>Complete Balancing Equations Worksheet</td>
<td>3/3/08</td>
<td></td>
</tr>
<tr>
<td>*10</td>
<td></td>
<td>Complete open-note quiz</td>
<td>3/3/08</td>
<td></td>
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<td></td>
<td></td>
<td>OR</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Create flashcards for Chapter 24, Sections 1 &amp; 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>*10</td>
<td></td>
<td>Complete worksheet “Chemical Equations” and (Complete Balancing Equations Worksheet #2</td>
<td>3/6/08</td>
<td></td>
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<td></td>
<td>OR</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Complete Chapter 24, Section 2 Assessment questions 1-4 p. 745)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
*10

Read chapter 24, section 4 & outline notes. Turn in notes. 
(see rubric for notes)

OR

Listen to lecture, participate, & take notes on 3/7/08. Turn in your notes.

5

Create flashcards of the key terms for Chapter 24, Sections 1, 2, & 4

3/10/08

5

Make a Concept Map about Chemical Reactions 
(see concept foldable)

3/10/08

5

Use a Venn Diagram to compare and contrast a catalyst and an inhibitor

3/10/08

5

Create Frayer Models of the vocabulary for Chapter 24, Section 4

3/10/08

**B Layer Activities:**

Students choose 1 only (20 points). You MUST complete 20 points of B-layer activities to receive a "B" and advance to the A-layer.

<table>
<thead>
<tr>
<th>Points Possible</th>
<th>Points Earned</th>
<th>Assignment Description</th>
<th>Date Due</th>
<th>Teacher Initial</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td></td>
<td>Research: Choose an item labeled “biodegradable”, and research the decomposition reactions involved. Write balanced chemical reactions for the decomposition reactions. Be sure to note any conditions that must occur for the substance to biodegrade. Is this product good for the environment? (see rubric for research paper)</td>
<td>3/10/08</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td></td>
<td>Research: Choose an animal and describe some of the chemical reactions that take place in that animal. Are the reactions exo- or endothermic? What are the reactants and products of each chemical reaction? Summarize your findings in a one-page paper. (see rubric for research paper)</td>
<td>3/10/08</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td></td>
<td>Research: Research Carbon monoxide from cigarette smoke. Why do you think carbon monoxide is in the smoke? Why do you think smoking is bad for your health? Summarize your findings into a one-page paper. (see rubric for research paper)</td>
<td>3/10/08</td>
<td></td>
</tr>
</tbody>
</table>
**A Layer Activities:**
Students choose 1 only (30 points). You MUST complete 30 points of A-layer activities to receive an "A".

<table>
<thead>
<tr>
<th>Points Possible</th>
<th>Points Earned</th>
<th>Assignment Description</th>
<th>Date Due</th>
<th>Teacher Initial</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td></td>
<td>Complete “Shiny Coins” and “Green Penny” labs and answer questions. What is the chemical reaction(s) taking place? What are the products and reactants?</td>
<td>3/10/08</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td></td>
<td>Make a poster showing different chemical reactions you might encounter throughout your day. Present your findings and poster to the class. (see poster rubric)</td>
<td>3/10/08</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td></td>
<td>Complete “Chemical Reaction in a Bag” lab and answer questions. What is the chemical reaction(s) taking place? What are the products and reactants?</td>
<td>3/10/08</td>
<td></td>
</tr>
</tbody>
</table>

You need 100 points for a “C” in this unit.
You need 120 points for a “B” in this unit.
You need 150 points for an “A” in this unit.

**Chemical Reaction Unit Activities**

The following items are the activities that correspond with each layer of the chemical reaction layered curriculum listed in the chemical reaction unit student handout.

KWL Chart
Chemical Changes Worksheet

**Chemical Changes**

**Directions:** *Use the equations below to answer the following questions.*

**Zn(s) + S(s) → ZnS(s)**
1. What are the reactants in this chemical reaction?
   - Zn(s) and S(s)
2. What is the product?
   - ZnS(s)
3. What is the physical state of both the reactants and the products?
   - Both reactants and products are in the solid state (s).
4. According to the law of conservation of mass, if the total mass of the product in this chemical reaction is 14 g, what must the combined masses of the reactants be?
   - The total mass of ZnS is 14 g, so the combined masses of Zn and S must be 14 g.

**2H2(g) + O2(g) → 2H2O**
5. What name describes the product in this reaction?
   - H2O
6. What names describe the reactants?
   - H2(g) and O2(g)
7. What are the physical states of the reactants in this reaction?
   - H2(g) and O2(g) are gases (g).
8. What is the physical state of the product?
   - H2O is a liquid (l).
9. What do the coefficients tell you about the ratio of the reactants?
   - The ratio of H2 to O2 is 2:1.
10. How many units of the product are produced?
    - 2 units of H2O

**Directions:** *Write chemical equations for the following reactions.*
11. One unit of methane gas, CH\textsubscript{4}, plus two units of oxygen gas, O\textsubscript{2}, produce one unit of carbon dioxide gas, CO\textsubscript{2}, and two units of liquid water.

12. One unit of aqueous aluminum sulfate plus three units of aqueous barium chloride yield two units of aqueous aluminum chloride plus three units of solid barium sulfate.

13. Two units of solid sodium plus one unit of chlorine gas produce two units of sodium chloride, a solid.
Balancing Equations Worksheet

**Balancing Equations Sheet!**

**Balance these equations!**

1) \[ \_ \text{AlBr}_3 + \_ \text{K} \rightarrow \_ \text{KBr} + \_ \text{Al} \]
2) \[ \_ \text{FeO} + \_ \text{PdF}_2 \rightarrow \_ \text{FeF}_2 + \_ \text{PdO} \]
3) \[ \_ \text{P}_4 + \_ \text{Br}_2 \rightarrow \_ \text{PBr}_3 \]
4) \[ \_ \text{LiCl} + \_ \text{Br}_2 \rightarrow \_ \text{LiBr} + \_ \text{Cl}_2 \]
5) \[ \_ \text{PbBr}_2 + \_ \text{HCl} \rightarrow \_ \text{HBr} + \_ \text{PbCl}_2 \]
6) \[ \_ \text{Na}_3\text{P} + \_ \text{CaF}_2 \rightarrow \_ \text{NaF} + \_ \text{Ca}_3\text{P}_2 \]
7) \[ \_ \text{Mn} + \_ \text{HI} \rightarrow \_ \text{H}_2 + \_ \text{MnI}_3 \]
8) \[ \_ \text{Li}_3\text{PO}_4 + \_ \text{NaBr} \rightarrow \_ \text{Na}_3\text{PO}_4 + \_ \text{LiBr} \]
9) \[ \_ \text{CaF}_2 + \_ \text{Li}_2\text{SO}_4 \rightarrow \_ \text{CaSO}_4 + \_ \text{LiF} \]
10) \[ \_ \text{AgNO}_3 + \_ \text{Li} \rightarrow \_ \text{LiNO}_3 + \_ \text{Ag} \]
11) \[ \_ \text{Si(OH)}_4 + \_ \text{NaBr} \rightarrow \_ \text{SiBr}_4 + \_ \text{NaOH} \]
12) \[ \_ \text{NaCN} + \_ \text{CuCO}_3 \rightarrow \_ \text{Na}_2\text{CO}_3 + \_ \text{Cu(CN)}_2 \]
Chemical Equations Worksheet

Chemical Equations

Directions: Answer the following questions using complete sentences.
1. Describe, in words, a balanced chemical equation. Give an example.

2. Use the law of conservation of mass to explain why a chemical equation must be balanced.

Directions: Balance the following equations. If you need help, review the steps for balancing equations in your textbook. Use the space below for your work.
3. \( \text{H}_2(\text{g}) + \text{Cl}_2(\text{g}) \rightarrow \text{HCl}(\text{aq}) \)

4. \( \text{N}_2(\text{g}) + \text{H}_2(\text{g}) \rightarrow \text{NH}_3(\text{g}) \)

5. \( \text{Li}(\text{s}) + \text{FeBr}_2(\text{aq}) \rightarrow \text{LiBr}(\text{aq}) + \text{Fe}(\text{s}) \)

6. \( \text{Al}(\text{s}) + \text{HCl}(\text{aq}) \rightarrow \text{AlCl}_3(\text{aq}) + \text{H}_2(\text{g}) \)

7. \( \text{Li}(\text{s}) + \text{N}_2(\text{g}) \rightarrow \text{Li}_3\text{N}(\text{s}) \)
Balancing Equations #2 Worksheet

1)   \( \text{____ Na}_3\text{PO}_4 + \text{____ KOH} \rightarrow \text{____ NaOH} + \text{____ K}_3\text{PO}_4 \)

2)   \( \text{____ MgF}_2 + \text{____ Li}_2\text{CO}_3 \rightarrow \text{____ MgCO}_3 + \text{____ LiF} \)

3)   \( \text{____ P}_4 + \text{____ O}_2 \rightarrow \text{____ P}_2\text{O}_3 \)

4)   \( \text{____ CF}_4 + \text{____ Br}_2 \rightarrow \text{____ CBr}_4 + \text{____ F}_2 \)

5)   \( \text{____ GaF}_3 + \text{____ Cs} \rightarrow \text{____ CsF} + \text{____ Ga} \)

6)   \( \text{____ BaS} + \text{____ PtF}_2 \rightarrow \text{____ BaF}_2 + \text{____ PtS} \)

7)   \( \text{____ N}_2 + \text{____ H}_2 \rightarrow \text{____ NH}_3 \)

8)   \( \text{____ NaF} + \text{____ Br}_2 \rightarrow \text{____ NaBr} + \text{____ F}_2 \)

9)   \( \text{____ CH}_4 + \text{____ O}_2 \rightarrow \text{____ CO}_2 + \text{____ H}_2\text{O} \)

10)  \( \text{____ K} + \text{____ Cl}_2 \rightarrow \text{____ KCl} \)

11)  \( \text{____ Al} + \text{____ HCl} \rightarrow \text{____ H}_2 + \text{____ AlCl}_3 \)

12)  \( \text{____ N}_2 + \text{____ F}_2 \rightarrow \text{____ NF}_3 \)

13)  \( \text{____ SO}_2 + \text{____ Li}_2\text{Se} \rightarrow \text{____ SSe}_2 + \text{____ Li}_2\text{O} \)
Venn Diagram
The Frayer Model

**Frayer Model**

<table>
<thead>
<tr>
<th>Definition</th>
<th>Characteristics</th>
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</thead>
<tbody>
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</table>

<table>
<thead>
<tr>
<th>Examples</th>
<th>Non-examples</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tr>
</tbody>
</table>

WORD
Shiny Coins Lab

Shiny Coins

Materials you will need:
- Paper Towel
- Lemon Juice
- Plastic Cup/Bowl
- Dirty/Old Copper Coins

Steps:

1. Fill the cup/bowl with some lemon juice.

2. Put the dirty copper coins in the juice and let them soak for a few minutes.

3. Remove the coins from the cup/bowl and place on the paper towel.

Questions (Answer in the space below each question):

1. What is the chemical reaction(s) occurring?

2. What are the reactants and products?

3. Write the chemical reaction of this lab as a chemical equation.
Green Penny Lab

Green Penny

Materials you will need:
- Saucer
- Vinegar
- A Penny
- Kitchen/Paper Towel

Steps:

1. Fold the kitchen/paper towel a few times to get a bit of thickness.

2. Lay the kitchen/paper towel on top of the saucer and pour out some vinegar until it is soaked up by the kitchen/paper towel.

3. Place the penny on the kitchen/paper towel and leave it there.

4. Keep a check on the penny and observe the chemical reaction.

5. Leave it for a full day to get the best results.

Questions (Answer in the space below each question):

1. What is the chemical reaction(s) occurring?

2. What are the reactants and products?

3. Write the chemical reaction of this lab as a chemical equation.

4. What is an example of this type of chemical reaction elsewhere?
Chemical Reaction in a Bag Lab

Chemical Reaction in a Bag

Materials Needed:

Road salt (calcium chloride)
Baking soda (sodium hydrogen carbonate)
Indicator (phenol red or bromthymol blue work well)
Baggies, sandwich size (regular and ziplock)
Spatulas or plastic spoons
10 ml graduated cylinders

Procedure:

1. Put two scoops of road salt and one scoop of baking soda into a ziplock bag.

2. In another baggie (not ziplock) put 10 ml of indicator.

3. Place the baggie containing indicator inside the ziplock bag with salt and soda. Be sure the indicator baggie is completely stuffed into the ziplock bag.

4. Carefully squeeze all air out of the ziplock bag.

5. Zip the top of the ziplock bag.

6. Invert the bag so that all contents of both bags combine. Make observations.

Questions (Answer in the space below each question):

1. What is some evidence that a chemical reaction took place?

2. Make a list of all the observations you can gather. These include mass changes (if any), color changes, temperature of materials, sounds, and any other change you may note.

3. What is the chemical reaction(s) taking place?
4. What are the products and reactants?

5. Is the chemical reaction exo- or endothermic? Why?
Biology Layered Curriculum Lessons

Biomes Unit Overview

The biology layered curriculum lessons created were made regarding the topic of biomes. This biomes unit was made with a focus on the tenth grade Ohio science academic content standards and grade-level indicators. The standards and indicators specifically met for this unit are the ninth through tenth grade life science standards F and G, the tenth grade life science indicator numbers sixteen, seventh, eighteen, and nineteen, and the ninth and tenth grade scientific inquiry standard A.

The biomes layered curriculum unit was made with “C”, “B”, and “A” layers. The “C” layer focused on the basic knowledge of the unit and involved lessons that included lectures, outlining readings, diagrams, flashcards, powerpoint presentations, concept maps, KWL charts, foldables, and videos. The “B” layer, for this unit, has the student applying the information learned in the “C” layer. This layer has students choose from four research projects involving biomes. Students will be able to explain why the processes such as biogeochemical cycles are important. The “A” layer has tasks that involve critical thinking and demand the highest depth of understanding of the topic. Students will be able to learn about biomes and research occurring within their community.

Biomes Unit Student Handout

In table 3 is an example of the student handout is given for teaching a biomes unit using layered curriculum. This biomes student handout lists all the expectations of a student
that need to be completed, with comprehension, in order to receive a grade of an “A”, “B”, or “C”. Also, this handout outlines to the student all the dates of lectures and activities during the course of this unit.

*Table 3.0 – Biomes Student Handout*
Final Due Date: Monday, 2/25/08

Biomes

Objectives:
Students will be able to:
I. Explain how the structure and function of ecosystems and relate how ecosystems change over time—L.S. 10th grade standard F.
J. Describe how human activities can impact the status of natural systems—L.S. 10th grade standard G.
K. Relate how distribution and abundance of organisms and populations in ecosystems are limited by the ability of the ecosystem to recycle materials and the availability of the ecosystem to recycle materials and the availability of matter, space and energy—L.S. 10th grade indicator #16.
L. Conclude that ecosystems tend to have cyclic fluctuations around a state of approximate equilibrium that can change when climate changes, when one or more new species appear as a result of immigration or when one or more species disappear—L.S. 10th grade indicator #17.
M. Describe ways that human activities can deliberately or inadvertently alter the equilibrium in ecosystems. Explain how changes in technology/biotechnology can cause significant changes, either positive or negative, in environmental quality and carrying capacity—L.S. 10th grade indicator #18.
N. Illustrate how uses of resources at local, state, regional, national, and global levels have affected the quality of life (e.g., energy production and sustainable vs. nonsustainable agriculture)—L.S. 10th grade indicator #19.
O. Identify the major biomes of the world and explain their significance.

Lectures:
Monday, 2/04/08 - Energy Flow
Tuesday, 2/05/08 - No Lecture (work on projects)
Wednesday, 2/06/08 - Cycles of Matter
Thursday, 2/07/08 - No Lecture (work on projects) Growth
Friday, 2/08/08 - No Lecture (presentations and work on projects)
Monday, 2/11/08 - What Shapes an Ecosystem?
Tuesday, 2/12/08 - No Lecture (work on projects)
Wednesday, 2/13/08 - No Lecture (presentations and work on projects)
Thursday, 2/14/08 - Aquatic Ecosystems
Friday, 2/15/08 - No Lecture (work on projects)
Monday, 2/18/08 - No School
Tuesday, 2/19/08 - Limits to Population Growth
Wednesday, 2/20/08 - No Lecture (presentations and work on projects)
Thursday, 2/21/08- Biodiversity
Friday, 2/22/08 - No Lecture (work on projects)
Monday, 2/25/08 - ALL LAYERS DUE
**C Layer Activities:**
Students must earn at least 180 points to receive a grade of a “C” for this unit on Biomes. Individual students must complete 180 points of a C-layer activities to advance to B-layer activities. Activities with an “*” MUST be completed. *Projects may become partner or group projects with teacher’s prior approval.*

<table>
<thead>
<tr>
<th>Points Possible</th>
<th>Points Earned</th>
<th>Assignment Description</th>
<th>Date Due</th>
<th>Teacher Initial</th>
</tr>
</thead>
<tbody>
<tr>
<td>*10</td>
<td></td>
<td>Listen to introductory lecture on energy flow and turn in notes OR read Chapter 3 Section 2 and write down vocabulary, key concepts and answer section questions (see notes rubric for evaluation)</td>
<td>2/04/08</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td></td>
<td>Draw a diagram pertaining to energy flow in an ecosystem (see diagram rubric for evaluation)</td>
<td>2/08/08</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td></td>
<td>Create a concept map foldable using the main ideas and vocabulary from Chapter 3 Section 2 “Energy Flow” (see foldable instructions)</td>
<td>2/08/08</td>
<td></td>
</tr>
<tr>
<td>*10</td>
<td></td>
<td>Watch powerpoint presentation pertaining to cycles of matter OR read Chapter 3 Section 3 and write down vocabulary, key concepts and answer section questions</td>
<td>2/06/08</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td></td>
<td>Research and write a report pertaining to one of the biogeochemical cycles OR draw a diagram of one of the biogeochemical cycles (see report or diagram rubric for evaluation)</td>
<td>2/08/08</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td></td>
<td>Create a model, draw a diagram, or write a report pertaining to either the greenhouse effect or winds and ocean currents (see report rubric or diagram rubric for evaluation)</td>
<td>2/13/08</td>
<td></td>
</tr>
<tr>
<td>*10</td>
<td></td>
<td>Listen to introductory lecture on what shapes an ecosystem and turn in notes OR read Chapter 4 Section 2 and write down vocabulary, key concepts and answer section questions (see notes rubric for evaluation)</td>
<td>2/11/08</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td></td>
<td>Create foldables pertaining to community interactions within ecosystems (See fifths foldable for directions)</td>
<td>2/13/08</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td></td>
<td>Draw a poster illustrating ecological succession (see poster rubric for evaluation)</td>
<td>2/20/08</td>
<td></td>
</tr>
<tr>
<td>Points</td>
<td>Activity Description</td>
<td>Due Date</td>
<td></td>
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<tr>
<td>30+</td>
<td>Create a powerpoint presentation covering the ten major biomes (be sure to include pictures and text)</td>
<td>2/20/08</td>
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<tr>
<td>30+</td>
<td>Create a “Biome in a Box” (see model rubric for scoring)</td>
<td>2/20/08</td>
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<tr>
<td>15</td>
<td>Watch the Planet Earth Video “From Pole to Pole” and fill out a KWL Chart (see video rubric for evaluation)</td>
<td>2/20/08</td>
<td></td>
<td></td>
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<tr>
<td>*10</td>
<td>Listen to introductory lecture on aquatic ecosystems and turn in notes OR read Chapter 4 Section 4 and write down vocabulary, key concepts and answer section questions (see notes rubric for evaluation)</td>
<td>2/14/08</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Watch a second Planet Earth Video and fill out a KWL chart (see video rubric for evaluation)</td>
<td>2/20/08</td>
<td></td>
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<tr>
<td>*10</td>
<td>Listen to a lecture on limits to population growth and take notes or read Chapter 5 Section 2 and write down vocabulary, key concepts and answer section questions (see notes rubric for evaluation)</td>
<td>2/19/08</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Create a timeline detailing humans’ interactions within ecosystems throughout the years (see timeline rubric for evaluation)</td>
<td>2/25/08</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Generate a project depicting the different types of environmental resources</td>
<td>2/25/08</td>
<td></td>
<td></td>
</tr>
<tr>
<td>*10</td>
<td>Listen to a lecture and take notes on biodiversity or read Chapter 6 Section 3 and write down vocabulary, key concepts and answer section questions (see notes rubric for evaluation)</td>
<td>2/21/08</td>
<td></td>
<td></td>
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<tr>
<td>15</td>
<td>Create foldables pertaining to the different threats to biodiversity (see layered-look foldable for instructions)</td>
<td>2/25/08</td>
<td></td>
<td></td>
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<tr>
<td>20</td>
<td>Write a report pertaining to local conservation efforts in the area (see report rubric for evaluation)</td>
<td>2/25/08</td>
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</tbody>
</table>

+Students can do only one of the activities denoted with this “+” symbol
**B Layer Activities:**
Students choose 1 only (25 points). You MUST complete 25 points of B-layer activities to receive a “B” and advance to the A-layer.

<table>
<thead>
<tr>
<th>Points Possible</th>
<th>Points Earned</th>
<th>Assignment Description</th>
<th>Date Due</th>
<th>Teacher Initial</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td></td>
<td>Explain why the biogeochemical cycles are important to life</td>
<td>2/25/08</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td></td>
<td>Create a project explaining how humans are contributing to the greenhouse effect?</td>
<td>2/25/08</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td></td>
<td>Generate a project which educates people about the negative effects of urban sprawl</td>
<td>2/25/08</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td></td>
<td>Create your own project detailing something of interest you have learned in this unit</td>
<td>2/25/08</td>
<td></td>
</tr>
</tbody>
</table>

**A Layer Activities:**
Students choose 1 only (35 points). You MUST complete 35 points of A-layer activities to receive an “A”.

<table>
<thead>
<tr>
<th>Points Possible</th>
<th>Points Earned</th>
<th>Assignment Description</th>
<th>Date Due</th>
<th>Teacher Initial</th>
</tr>
</thead>
<tbody>
<tr>
<td>35</td>
<td></td>
<td>Research both the fragile nature of food webs, give examples of healthy and unhealthy food webs, and describe how humans have affected these food webs (see report rubric)</td>
<td>2/25/08</td>
<td></td>
</tr>
<tr>
<td>35</td>
<td></td>
<td>Research what biome and aquatic ecosystem our school is located closest to and describe current issues occurring locally in each (see report rubric)</td>
<td>2/25/08</td>
<td></td>
</tr>
<tr>
<td>35</td>
<td></td>
<td>Write a report detailing the invasive species effecting the ecosystem in which you live (see report rubric)</td>
<td>2/25/08</td>
<td></td>
</tr>
</tbody>
</table>

You need 180 points for a “C” in this unit.
You need 205 points for a “B” in this unit.
You need 240 points for an “A” in this unit.
Biomes in a Box

Objective:

Students will construct a model of a biome which will illustrate the various biotic and abiotic factors unique to that biome.

Procedure:

Students are asked to build a three-dimensional model of a biome in a box (larger than a shoebox) using everyday materials. Included in the model should be representative examples of flora and fauna, and it should show the terrain (mountainous, flat, shoreline, etc.). The inside walls of the box should be decorated (painted, collaged with photos, etc.). Taped onto one side of the box should be a written description of all of the characteristics of the biome (elevation, precipitation levels, temperature, flora, fauna, etc). Taped onto the other side of the box is a world map indicating (by color, outline, etc.) the locations of this biome. Additionally, students should be familiar with issues occurring within the biome.

Extension:

(5 points extra credit toward C layer)

Creative writing:

- Choose an animal or plant in your biome of study that you might like to become. Write an autobiography about yourself as that organism in which you tell about your life history from birth or germination to death. Describe your interactions with abiotic and biotic factors in your environment. Include a discussion of your daily routine. Explain WHY you chose the biome and the organism that you wrote about. (Paper should be one and a half to two pages double spaced with 12 point font)
KWL Chart for Planet Earth videos

<table>
<thead>
<tr>
<th>What do I KNOW?</th>
<th>What do I WANT to know?</th>
<th>What did I LEARN?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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</tbody>
</table>
Layered-Look Book

1. Stack two sheets of paper (8 1/2" × 11") so that the back sheet is one inch higher than the front sheet.
2. Bring the bottom of both sheets upward and align the edges so that all of the layers or tabs are the same distance apart.
3. When all tabs are an equal distance apart, fold the papers and crease well.
4. Open the papers and glue them together along the valley, or inner center fold, or staple them along the mountain.

When using more than two sheets of paper, make the tabs smaller than an inch.
**Vocabulary Book**

1. Fold a sheet of notebook paper in half like a hotdog.
2. On one side, cut every third line. This results in ten tabs on wide ruled notebook paper and twelve tabs on college ruled.
3. Label the tabs.

---

**Vocabulary List**

- Capital goods
- Consumer goods
- Consumers
- Factors of production
- Human capital
- Opportunity cost
- Security
- Services
- Utility
- Value

---

Use for recording student questions and answers.

---

Use to take notes and record data. Leave the notebook holes uncovered and it can be stored in a notebook.
Sentence Strips

1. Take two sheets of paper (8 1/2" × 11") and fold into hamburgers. Cut along the fold lines making four half-sheets. (Use as many half-sheets as necessary for additional pages to your book.)

2. Fold each sheet in half like a hot dog.

3. Place the folds side-by-side and staple them together on the left side.

4. One inch from the stapled edge, cut the front page of each folded section up to the mountain top. These cuts form flaps that can be raised and lowered.

To make a half-cover, use a sheet of construction paper one inch longer than the book. Glue the back of the last sheet to the construction paper strip leaving one inch, on the left side, to fold over and cover the original staples. Staple this half-cover in place.
Folding into Fifths

1. Fold a sheet of paper in half like a hot dog or hamburger for a five-tab book, or leave it open for a folded table or chart.
2. Fold the paper so that one-third of the hot dog is exposed and two-thirds is covered.
3. Fold the two-thirds section in half.
4. Fold the one-third section (single thickness) backward to form a fold line.

The paper will be divided into fifths when opened.
Ohio Graduation Test (OGT) Preparatory Layered Curriculum Lessons
OGT Prep Layered Curriculum Lessons

OGT Unit Overview

The OGT Life Sciences layered curriculum lessons created were made regarding the overall topic of biology. This OGT Prep unit was made with a focus on the tenth grade Ohio science academic content standards and grade-level indicators. The standards and indicators specifically met for this unit are the tenth grade life science standards A through I, and the tenth grade life science indicator numbers one through twenty-five.

The OGT Prep layered curriculum unit was made with “C”, “B”, and “A” layers. The “C” layer focused on the basic knowledge of the unit and involved lessons that included powerpoint presentations, practice tests, short answer/extended response practice, flashcards, making an OGT game, and playing students OGT games. The “B” layer, for this unit, has the student applying the information learned in the “C” layer. This layer gives the student the opportunity to earn a B by reviewing the results of their practice OGT and figuring out why they missed certain questions. Students will then be able to research any questions they did not know in order to figure out the right answers. The “A” layer has tasks that involve critical thinking and demand the highest depth of understanding of the topic. Students will be able to learn about the OGT and why it is administered.

OGT Prep Unit Student Handout

In table 4 is an example of the student handout is given for teaching an OGT Prep unit using a layered curriculum. The OGT student handout lists all the expectations of the
student that need to be completed, with comprehension, in order to receive a grade of an “A”, “B”, or “C”. Also, this student handout outlines all the dates of lectures and activities during the course of this unit.

Table 4.0 – OGT Prep Student Handout

Name ___________________________________________________ Period ____________

Final Due Date:  Friday, 3/10/08

Life Science Ohio Graduation Test Preparation

Objectives:

Students will be able to:

P. Explain that cells are the basic unit of structure and function of living organisms, that once life originated all cells come from pre-existing cells, and that there are a variety of cell types. –L.S. 10th grade standard A.
Q. Explain the characteristics of life as indicated by cellular processes and describe the process of cell division and development. -L.S. 10th grade standard B.
R. Explain the genetic mechanisms and molecular basis of inheritance. -L.S. 10th grade standard C.
S. Explain the flow of energy and the cycling of matter through biological and ecological systems (cellular, organismal, and ecological). -L.S. 10th grade standard D.
T. Explain how evolutionary relationships contribute to an understanding of the unity and diversity of life -L.S. 10th grade standard E.
U. Explain the structure and function of ecosystems and relate how ecosystems change over time. -L.S. 10th grade standard F.
V. Describe how human activities can impact the status of natural systems. -L.S. 10th grade standard G.
W. Describe a foundation of biological evolution as the change in gene frequency of a population over time. Explain the historical and current scientific developments, mechanisms and processes of biological evolution. Describe how scientists continue to investigate and critically analyze aspects of evolutionary theory. (The intent of this benchmark does not mandate the teaching or testing of intelligent design.) -L.S. 10th grade standard H.
X. Explain how natural selection and other evolutionary mechanisms account for the unity and diversity of past and present life forms. -L.S. 10th grade standard I.

Lectures:
Monday, 2/27/08 – Life Science PowerPoint
Tuesday, 2/28/08 – OGT Practice Tests
Wednesday, 3/1/08 – Test Taking PowerPoint
Thursday, 3/2/08 – Design a Game
Friday, 3/3/08 – Flashcards/Projects

Monday, 3/6/08 – OGT Practice Tests
Tuesday, 3/7/08 – Short /Long answer W.S.
Wednesday, 3/8/08 – Play Games
Thursday, 3/9/08 - Flashcards
Friday, 3/10/08 – ALL LAYERS DUE!!!!

C Layer Activities:
Students must earn at least 160 points to receive a grade of a “C” for this unit on OGT Prep. Individual students must complete 160 points of a C-layer activities to advance to B-layer activities. Activities with a “*” MUST be completed. Projects may become partner or group projects with teacher’s prior approval.

<table>
<thead>
<tr>
<th>Points Possible</th>
<th>Points Earned</th>
<th>Assignment Description</th>
<th>Date Due</th>
<th>Teacher Initial</th>
</tr>
</thead>
<tbody>
<tr>
<td>*10</td>
<td></td>
<td>View the Life Science Standards powerpoint presentation and take notes (see note scoring rubric for scoring)</td>
<td>3/1/08</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td>Review five Life Science OGT flashcards with a partner (see participation rubric for scoring)</td>
<td>2/28/08</td>
<td></td>
</tr>
<tr>
<td>*20</td>
<td></td>
<td>Design a game utilizing life science standards (see game rubric for scoring)</td>
<td>3/6/08</td>
<td></td>
</tr>
<tr>
<td>*10</td>
<td></td>
<td>View the OGT Test taking Skills powerpoint presentation and take notes (see note scoring rubric for scoring)</td>
<td>3/2/08</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td>Review five Life Science OGT flashcards with a partner (see participation rubric for scoring)</td>
<td>3/3/08</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td>Look at the Short and Long OGT Response Worksheet</td>
<td>3/7/08</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td>Review five Life Science OGT flashcards with a partner (see participation rubric for scoring)</td>
<td>3/9/08</td>
<td></td>
</tr>
</tbody>
</table>
As a class, view short and long scoring answers on ODE website 3/8/08

*15 per game

Play at least 3 different OGT Games with a group of at least 3 people.
(see participation rubric) 3/10/08

**B Layer Activities:**
Students choose 1 only (15 points). You MUST complete 15 points of B-layer activities to receive a “B” and advance to the A-layer.

<table>
<thead>
<tr>
<th>Points Possible</th>
<th>Points Earned</th>
<th>Assignment Description</th>
<th>Date Due</th>
<th>Teacher Initial</th>
</tr>
</thead>
<tbody>
<tr>
<td>*15</td>
<td></td>
<td>Analyze your OGT practice test results and explain the answers to the questions missed</td>
<td>3/10/08</td>
<td></td>
</tr>
</tbody>
</table>

**A Layer Activities:**
Students choose 1 only (20 points). You MUST complete 20 points of A-layer activities to receive an “A”.

<table>
<thead>
<tr>
<th>Points Possible</th>
<th>Points Earned</th>
<th>Assignment Description</th>
<th>Date Due</th>
<th>Teacher Initial</th>
</tr>
</thead>
<tbody>
<tr>
<td>*20</td>
<td></td>
<td>Research and write an essay on the importance of the OGT. (see science report rubric for scoring)</td>
<td>3/10/08</td>
<td></td>
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<td>Analyze your school’s OGT scores and compare them with other local schools/districts. Draw a conclusion on your schools achievement and how it can improve. (see science report rubric for scoring)</td>
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You need 160 points for a “C” in this unit.
You need 175 points for a “B” in this unit.
You need 195 points for an “A” in this unit.
Ohio Graduation Test (OGT)
Short and Extended Response Question Practice

Read the following OGT short or extended response questions. Then read each actual response to each question. Score each of the following statements and justify your score. Really focus on what the question is asking of the test taker and see if they completely answered the question.

1) Earth’s crust is divided into many crustal plates. Their activity is described as plate tectonics. List two effects of plate tectonic and explain how plate tectonics cause each effect. (4 points)

A. “Earthquakes”

B. “The tectonic plates are plates of earth that move. One can either move up and down, another can split in half.”

C. “The movement of plates causes earthquakes when they rub against each other. When plates move and cause magma to be release, a volcano occurs.”

D. “Plate tectonics’ cause the crust plats to move a little bit each day. Which grows more rapidly each day?

2) Biotechnology is the science of manipulating biological components to develop products that may be beneficial to humans. Identify two different industries in which biotechnology has made major contributions. Describe one contribution for each industry. (4 points).

A. “It has developed cares and new resources for energy or recycling. It has made electric cars. And for recycling it has made more options to use recyclable materials, or how to dispose of them.”

B. “Biotechnology has made major contributions to the medical and agricultural industries. Gene therapy can help many sick people and can help produce
higher-yielding and higher quality crops.”

C. “In the food production industry, new kinds of foods are developed that increases the quality of the food so that it is healthier for us.”

3) Our country depends on energy use. Choose one alternative energy source from among wind power, nuclear power, geothermal power, and biomass. Identify your choice and describe one potential benefit and one potential disadvantage if its use is significantly increased. (2 points)

A. “I think we should use nuclear power because we have a lot of it.”

B. “The choice I picked is wind power. Advantages of having wind power are that it is really cheap and it is extremely clean. Disadvantages are when it is not a windy day, you will not get any energy.”

C. One alternative to wind power would be electricity. This would benefit the environment because when a day isn’t windy, the source can still be used easily. The disadvantage to this would be that powering something would cost more and the taxpayers may not want to support it. It may also be dangerous to use electricity.

Now that you have completed this activity, compare your scoring with that of a partner. See if both of your scores are similar and if you both have similar justifications.
References

History Room is a website with foldable instructions

(historyroom.org/foldable%20pdf.pdf)


Columbus, OH: Author.

Ohio Department of Education (http://www.ode.edu)

Kids Science Experiments is a Web site resource for school children (http://www.kids-science-experiments.com)

Teachers.Net is a Web site designed to assist teachers (http://www.teachers.net/lessons/posts/108.html)

Rubistar is a website used to create free rubrics (www.rubistar.4teachers.org)

Appendices

Appendix A Attached in a separate folder

Appendix B Attached in a separate folder