Grade 8
MSA Science
Winter Break Packet
Teacher’s Guide
December 22, 2008 – January 5, 2009
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Note to Student

This Winter Break packet has been compiled to compliment middle school science, Grades 6 through 8, classroom instruction. It is intended to be used for review purposes in preparation for the Grade 8 Science Maryland State Assessment (MSA).

We strongly encourage you to work diligently to complete the activities in this packet. In addition, web codes for the on-line textbooks have been included for your reference. Note: BCR questions may receive a maximum score of three points.

Your teacher will assess your performance after you return from the winter break, remember to do your best!

<table>
<thead>
<tr>
<th>Number of Questions Correct</th>
<th>Grade</th>
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<tr>
<td>25 - 22</td>
<td>A</td>
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<td>21 - 20</td>
<td>B</td>
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<td>19 - 17</td>
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<td>16 - 15</td>
<td>D</td>
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<td>14 - 0</td>
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Parent’s Name

Parent’s Signature
# Timeframe for Winter Break Assignments

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<tr>
<th>Complete</th>
<th>Day</th>
<th>Assignment Date</th>
<th>Assignment to Complete</th>
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<tr>
<td>✔️</td>
<td>1</td>
<td>December 22</td>
<td>Pages 8 - 11</td>
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<tr>
<td></td>
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<td>Questions # 1 - 5</td>
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<td>3</td>
<td>December 23</td>
<td>Pages 11 - 13</td>
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<td>Questions # 6 - 10</td>
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<td>4</td>
<td>December 29</td>
<td>Pages 14 - 16</td>
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<td>Questions # 11 - 15</td>
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<td>5</td>
<td>December 30</td>
<td>Pages 16 - 18</td>
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<td>Questions # 16 – 17</td>
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<td>6</td>
<td>December 31</td>
<td>Pages 17 - 20</td>
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<td>Questions # 18 - 21</td>
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</table>
The events of photosynthesis are summarized by the following chemical equation:

\[
6 \text{CO}_2 + 6\text{H}_2\text{O} \xrightarrow{\text{light energy}} \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2
\]

The events of cellular respiration are summarized by the following chemical equation:

\[
\text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 \rightarrow 6\text{CO}_2 + 6\text{H}_2\text{O} + \text{energy}
\]

1. Plants transform some of the electromagnetic energy from the sun (sunlight) into
   a. nuclear energy stored in sugar.
   b. chemical energy stored in sugars.
   c. visible light released by leaves.
   d. chlorophyll stored in leaves.

2. A researcher places part of a plant in a beaker of water. She observes that the plant’s leaves release bubbles of gas when she shines a light on the beaker. The leaves do not release gas when the beaker is placed in the dark. Based on her observations when the plant is exposed to light, which of the following is the most logical inference?
   a. The plant is undergoing cellular respiration.
   b. The plant is breathing.
   c. Light is breaking down molecules of air.
   d. The plant is undergoing photosynthesis.
Use the following chart to respond to question # 3:

<table>
<thead>
<tr>
<th>Temperature (°C)</th>
<th>Length of Cell Cycle (hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>54.6</td>
</tr>
<tr>
<td>15</td>
<td>29.8</td>
</tr>
<tr>
<td>20</td>
<td>18.8</td>
</tr>
<tr>
<td>25</td>
<td>13.3</td>
</tr>
</tbody>
</table>

3. A scientist performed an experiment to determine the effect of temperature on the length of the cell cycle. On the basis of the data in the table above, how long would you expect the cell cycle to be at 5°C?

   a. less than 12.3 hours
   b. more than 54.6 hours
   c. between 29.8 hours and 54.6 hours
   d. about 20 hours
Although you probably can’t see most of them, you are surrounded by electric motors. They are found in such products as vacuum cleaners, electric drills, elevators, washing machines, air conditioners, factory robots, and huge railroad locomotives. As you can tell from the list above, the devices vary greatly in size and so do their functions. Whether large or small, whether cleaning or cooling, their actions are controlled by the same thing, the electric motor.

A hair dryer uses an electrical motor to operate. Cool air is moved over the back of the hair dryer by the turning fan blades. This cool air is moved over the heating element. The warmed air is blown out the front of the hair dryer.
4. What part of the hair dryer does the motor move?
   a. on/off switch
   b. heating element
   c. fan
   d. motor

5. Which appliance listed below is most like a hair dryer?
   a. factory robot
   b. vacuum cleaners
   c. electric drills
   d. washing machines

6. The newly discovered element which has not been named yet, had 118 protons and 176 neutrons in its nucleus. What was its mass number?
   a. 58
   b. 118
   c. 176
   d. 294
The following table shows the index of refraction of some common mediums. Use the table to answer questions 7 and 8.

<table>
<thead>
<tr>
<th>Medium</th>
<th>Index of Refraction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air (gas)</td>
<td>1.00</td>
</tr>
<tr>
<td>Water (liquid)</td>
<td>1.33</td>
</tr>
<tr>
<td>Ethyl alcohol (liquid)</td>
<td>1.36</td>
</tr>
<tr>
<td>Quartz (solid)</td>
<td>1.46</td>
</tr>
<tr>
<td>Corn Oil (liquid)</td>
<td>1.47</td>
</tr>
<tr>
<td>Glycerol (liquid)</td>
<td>1.47</td>
</tr>
<tr>
<td>Glass, crown (solid)</td>
<td>1.52</td>
</tr>
<tr>
<td>Sodium chloride (solid)</td>
<td>1.54</td>
</tr>
<tr>
<td>Zircon (solid)</td>
<td>1.92</td>
</tr>
<tr>
<td>Diamond (solid)</td>
<td>2.42</td>
</tr>
</tbody>
</table>

7. Which medium causes the greatest change in the direction of a light ray?
   a. Air
   b. Diamond
   c. Corn Oil
   d. Quartz

8. According to the table, which tends to bend light the least?
   a. Solid
   b. Liquid
   c. Gas
   d. Water
9. Circadian rhythms are an example of
   a. Learning cycles
   b. Daily cycles
   c. Competition cycles
   d. Aggression cycles

10. Which is not an example of behavior cycles?
    a. Hibernation
    b. Daily cycles
    c. Migration
    d. Learning
Use the following passage and chart to complete questions 11 – 13.

A scientist conducted an investigation in which a beaker with a sample of frozen ethanol was slowly heated over time. Ethanol is an alternative automotive fuel that is made from corn or grain and is usually blended with gasoline. The temperature inside the beaker was plotted as time increased.

11. What was happening to the ethanol at minute 4?

a. Melting
b. Freezing
c. Condensation
d. Evaporation
12. What was happening to the ethanol at minute 28?
   a. Melting
   b. Freezing
   c. Condensation
   d. Evaporation

13. Which tool would the scientist most likely have used during this investigation?
   a. Balance
   b. Microscope
   c. Thermometer
   d. Cover slip

Use the diagrams below to complete questions 14 and 15.

Human Biology and Health
Chapter 2, Section 1 and Chapter 4, Section 3
Reference: www.phschool.com (web code: cae-0615)
14. The waste substance that is least likely eliminated from the body organs in the excretory system is
   a. sweat.
   b. carbon dioxide.
   c. urea.
   d. excess water

15. The unidentified organ that is to the left side of organ A in the digestive system is called
   a. pancreas.
   b. stomach.
   c. liver.
   d. gall bladder.

16. Why is knowledge of the laboratory safety rules important?
   a. to share with your classmates before each lab
   b. to share with your lab partner as needed
   c. to discuss with the teacher for a better grade
   d. to respond to an emergency in a timely manner
Read the passage below.

Heredity and Genetics

Heredity is the passing of physical characteristics from parents to offspring. The study of heredity was begun by a scientist named Gregor Mendel. He began by studying the different characteristics, or traits, of pea plants. Mendel’s studies became the foundation of genetics, the scientific study of heredity.

Studying Genetics – Mendel used purebred pea plants with contrasting traits such as tall and short. A purebred organism is the offspring of many generations that always have the same trait. When he cross-fertilized the purebred tall and short pea plants, each offspring plant was tall. However, the offspring went on to produce both tall and short plants in later generations. By studying the frequency of tall and short plants, Mendel reasoned that each parent plant contributed some factors that controlled the inherited traits. Today, scientists call these factors genes and identify different forms of a gene as alleles.

Inherited Alleles – An organism’s traits are controlled by the alleles it inherits from its parents. A dominant allele is one whose trait always shows up in the organism when the allele is present. A recessive allele is hidden whenever a dominant allele is present. In Mendel’s cross, the purebred tall plant has two alleles for tall stems. The purebred short plant has two alleles for short stems. The offspring received one tall allele and one short allele. Since the tall allele was dominant, all plants in the first generation of offspring were tall.

Probability – Mendel wanted to find out how often the tall and short characteristics showed up in later generations of pea plants. He used probability to calculate the chance that the plants would be tall or short. Probability is a number that describes how likely it is an event will occur. When Gregor Mendel analyzed the results of his crossed pea plants, he carefully counted all the offspring and used the numbers to estimate the probability of the plants’ characteristics. A Punnett square is a chart that shows all the possible combinations of alleles that can result from a genetic cross. The possible alleles from one parent are written across the top and the possible alleles from the other parent are written down the left side. For example, in Figure 4-1 below, the Punnett square shows a cross between two black guinea pigs. The combined alleles in the boxes of the Punnett square represent all the possible combinations in the offspring. In a genetic cross, the allele that each parent will pass on to its offspring is based on probability.

Genes and Appearance – Two terms that scientists use to describe organisms are phenotype and genotype. An organism’s phenotype is its physical appearance, or visible traits. An organism’s genotype is its genetic makeup, or allele combinations. When an organism has two identical alleles for a trait, the organism is said to be homozygous for that trait. For example, white guinea pigs (bb) are homozygous for fur color. An organism that has two different alleles for a trait is said to be heterozygous for that trait. In the Punnett square below, the black parent guinea pigs (Bb) are heterozygous.
For all the traits in peas that Mendel studied, one allele was dominant while the other was recessive. Today, scientists have learned that there are also other factors and types of alleles that affect an organism’s traits. By understanding the alleles that make up a trait and how they act, scientists like Mendel can learn more about the genes of living things.

Figure 4-1
Punnett square showing the cross between two heterozygous black guinea pigs. Notice that the probability of their having a white (bb) offspring is one in four.

17. Use the guinea pig cross in Figure 4-1 to predict how many white guinea pigs would be produced if the two parents shown have 16 offspring. Be sure to
   • Compare the ratio of offspring shown in the figure to the final ratio estimated.

Since the heterozygous parents have produced one white offspring out of four offspring, then four white offspring will be produced out of 16 offspring. (The displayed ratio is 3:1.) 1 out of every 4 or ¼ of the population of the offspring would be white. Therefore, (1/4 X 16) 4 of the 16 offspring would be white.
18. The cross between a white egret and a black egret produces all offspring with black feathers. The white egret is homozygous for feather colors. Describe the offspring of the Punnett square. In your description, be sure to
- Give the genotype and phenotype
- Compare them to the parents

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The offspring are likely to be heterozygous for the feather color, because the only combination of alleles that will produce all black feathers in the offspring is BB (homozygous black) and bb (homozygous white).

The Punnett square shows:
- All offspring have black feathers (B_).
- The genotype of the offspring is Bb, indicating heterozygosity.
- There is no black egret (bb) offspring, as expected from the parents' genotypes.
19. Sara and David made this chart of chemical and physical changes.

<table>
<thead>
<tr>
<th>CHANGES OBSERVED</th>
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<tbody>
<tr>
<td>Chemical Changes</td>
</tr>
<tr>
<td>Silver tarnishing</td>
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<td>A cake baking</td>
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<td>Iron Rusting</td>
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Which of the following best explains why baking a cake is a chemical change?

a. Heat is needed to bake a cake.

b. Energy is needed to bake a cake.

c. Baking a cake is not reversible.

d. Cake batter changes color as it bakes.

20. In the diagram below, the dots represent valence electrons. Which element is the most likely to lose two electrons and form an ion with a charge of 2+?

a. sodium (Na)

b. magnesium (Mg)

c. fluorine (F)

d. Boron (B)

21. A chemist reacts carbon with oxygen to form carbon dioxide. The equation is

\[ C + O_2 \rightarrow CO_2 \]

The masses of the reactants are 24 grams of carbon and 32 grams of oxygen. What is the mass of the product, CO\(_2\)?

a. 24 grams

b. 32 grams

c. 44 grams

d. 56 grams
Grade 8 MSA Science
Winter Break Packet
Feedback Form

Please return this form to the Secondary Science Office by January 20, 2009.
You may pony, or fax (301-918-8753) your responses. Thank you!

<table>
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<th>School:</th>
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<table>
<thead>
<tr>
<th>Total number of students enrolled in all 8th grade science courses:</th>
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<th>How many students scored in the following ranges?</th>
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<tbody>
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<td>Module (or Class Period)</td>
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<td>-------------------------</td>
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<tr>
<td>Ex. Mod 1</td>
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Was the “Note to Student” helpful for the students in their preparations for completing the booklet? Please offer specific details.

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Were students able to respond to the BCRs using accurate details and examples? What factors contributed to the success or difficulty the students experienced in this process?

Did you utilize the scoring suggestions or did you use your own scoring system? Please offer a sample.

To what extent did you comply with the course pacing guide to complete classroom coverage of materials prior to the end of Quarter 2?

Please offer suggestions for updating or improving this booklet for next year’s distribution. Many thanks for all of your comments!
The Secondary Science Office would like to thank the following science teachers of Prince George's County Public Schools for their contributions to the Grade 8 Science MSA winter break packet:

Heather Anglin
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Shona Sandlin
Yves Francis Yee

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