Grade 8 Science

WINTER BREAK PACKET

Student Name

Class Mod

December 2012 – January 2013

[Student Book]
Note to Student and Parents

This homework packet for the Winter Break has been created to provide practice for students to work through selected response and brief constructed response items related to previously learned skills and processes and physical science concepts and current earth/space science. It is intended to be used for review purposes in preparation for the Maryland State Assessment (MSA) in Science and therefore students are encouraged to return a completed packet to their science teacher when they return from winter break.

The Winter Break Packet contains a technical passage, selected and brief constructed response items (SRs and BCRs), graphs, charts and a scoring rubric for brief constructed response items (BCRs).

Please write your response to the SRs and BCRs on the space provided in this booklet.

Enclosed in this packet, is a copy of the Maryland State Assessment Rubric for scoring BCRs. It can also be found online at Maryland State Department of Education (MSDE) website mdk12.org. It is highly recommended that this rubric be used when responding to BCRs.

<table>
<thead>
<tr>
<th>Grading Scale</th>
<th>Overall Score</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>34 - 26</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>27 - 24</td>
<td>B</td>
</tr>
<tr>
<td></td>
<td>23 - 16</td>
<td>C</td>
</tr>
<tr>
<td></td>
<td>15 - 10</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td>9 - 0</td>
<td>E</td>
</tr>
</tbody>
</table>

*Each Selected Response question is worth 1 point. The Brief Constructed Response Questions (numbers 6, 13, 17 and 23) are worth a maximum of 3 points each.

Approximate time: The allocated amount of time required to complete this Winter Break Packet is 120 minutes.

Parent’s Name

Parent’s Signature
Directions

Use The Periodic Table of the Elements and the information below to answer Number 1.

Magnesium metal (Mg) is grayish-white in color and reacts actively with water. Fluorine (F₂) is a greenish-yellow gas at room temperature and is a member of the halogen family. These two elements react to produce magnesium fluoride (MgF₂), a chemical commonly used in making windows and lenses.

1. How do the elements magnesium (Mg) and fluorine (F₂) produce the compound magnesium fluoride (MgF₂)?
   A. by nuclear connection
   B. by physically combining
   C. by magnetic connection
   D. by chemically combining

2. Scientists perform experiments to test hypotheses. How do scientists try to remain objective during experiments?
   A. Scientists analyze all results.
   B. Scientists use safety precautions.
   C. Scientists conduct experiments once.
   D. Scientists change at least two variables.
3. A student has one liter of feathers and one liter of iron nails.

Which statement best compares the masses of the two samples?

A. The masses cannot be compared without a balance.
B. The mass of the feathers is less than the mass of the nails.
C. The mass of the feathers is the same as the mass of the nails.
D. The mass of the feathers is greater than the mass of the nails.

4. The diagram below shows the relative positions of Earth and the Sun at a certain time of year.

Based on the diagram, which season is occurring in the Southern Hemisphere of Earth?

A. winter
B. spring
C. summer
D. fall
5. Which of the following diagrams best represents the relationship between galaxies, the universe, and solar systems?

A. [Diagram A]

B. [Diagram B]

C. [Diagram C]

D. [Diagram D]
6. Compare the properties of oil to the properties of the elements in oil.

In your comparison, be sure to include

- the properties of oil
- the properties of the elements in oil
- the motion of the molecules in oil, carbon, and hydrogen
Write your answer in the space provided.
7. When 1 gram of water is evaporated, the volume of the water vapor increases but the mass remains constant.

Why does the mass of the water remain constant?

A. The temperature of the water remains constant.
B. The pressure acting on the water remains constant.
C. The number of atoms in the water remains constant.
D. The distance between water molecules remains constant.

8. A student is given a sample of an unknown liquid to test in the laboratory. The student thinks that the liquid is water.

Which of the following physical properties of the sample is most helpful to determine if the liquid is water?

A. color of the liquid
B. mass of the liquid
C. volume of the liquid
D. boiling point of the liquid
9. What is the smallest unit of a chemical compound that still has the properties of that compound?

A. a nucleus
B. a molecule
C. an element
D. an atom
10. Which of the following diagrams best shows the relative positions of Earth, the Moon, and the Sun during a lunar eclipse?

A.  

B.  

C.  

D.
11. Which of the following correctly lists the structures in space from smallest to largest?

A. star, galaxy, solar system, universe
B. star, solar system, galaxy, universe
C. star, solar system, universe, galaxy
D. star, universe, solar system, galaxy

12. Which of the following is produced when two or more elements combine in a chemical reaction?

A. atom
B. compound
C. mixture
D. solution
13. The table and descriptions below show some of the characteristics of the planets in our solar system.

<table>
<thead>
<tr>
<th>Planet</th>
<th>Mass ((10^{24} \text{ kg}))</th>
<th>Diameter (km)</th>
<th>Density ((\text{kg/m}^3))</th>
<th>Length of Day (^1) (hours)</th>
<th>Distance from Sun ((10^6 \text{ km}))</th>
<th>Orbital Period (^2) (days)</th>
<th>Orbital Velocity (^3) (km/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mercury</td>
<td>0.330</td>
<td>4879</td>
<td>5427</td>
<td>4222.6</td>
<td>57.9</td>
<td>88.0</td>
<td>47.9</td>
</tr>
<tr>
<td>Venus</td>
<td>4.87</td>
<td>12,104</td>
<td>5243</td>
<td>2802.0</td>
<td>108.2</td>
<td>224.7</td>
<td>35.0</td>
</tr>
<tr>
<td>Earth</td>
<td>5.97</td>
<td>12,756</td>
<td>5515</td>
<td>24.0</td>
<td>149.6</td>
<td>365.2</td>
<td>29.8</td>
</tr>
<tr>
<td>Mars</td>
<td>0.642</td>
<td>6794</td>
<td>3933</td>
<td>24.7</td>
<td>227.9</td>
<td>687.0</td>
<td>24.1</td>
</tr>
<tr>
<td>Jupiter</td>
<td>1899</td>
<td>142,984</td>
<td>1326</td>
<td>9.9</td>
<td>778.6</td>
<td>4331</td>
<td>13.1</td>
</tr>
<tr>
<td>Saturn</td>
<td>568</td>
<td>120,536</td>
<td>687</td>
<td>10.7</td>
<td>1433.5</td>
<td>10,747</td>
<td>9.7</td>
</tr>
<tr>
<td>Uranus</td>
<td>86.8</td>
<td>51,118</td>
<td>1270</td>
<td>17.2</td>
<td>2872.5</td>
<td>30,589</td>
<td>6.8</td>
</tr>
<tr>
<td>Neptune</td>
<td>102</td>
<td>49,528</td>
<td>1638</td>
<td>16.1</td>
<td>4495.1</td>
<td>59,800</td>
<td>5.4</td>
</tr>
<tr>
<td>Pluto (dwarf)</td>
<td>0.0125</td>
<td>2390</td>
<td>1750</td>
<td>153.3</td>
<td>5870.0</td>
<td>90,588</td>
<td>4.7</td>
</tr>
</tbody>
</table>

* Numerical data based on NASA information.

\(^1\)Length of Day (hours) – This is the average time in hours that it takes for the Sun to move from the noon position in the sky at a point on the equator back to the same position.

\(^2\)Orbital Period (days) – This is the time in Earth days that it takes for the planet to orbit the Sun.

\(^3\)Orbital Velocity (km/s) – This is the average velocity, or speed, of the planet in kilometers per second as it orbits the Sun.

a. Identify the planet that has the greatest density. Include data from the table to support your answer.

b. Describe the relationship between a planet’s distance from the Sun and its orbital period. Include data from the table for at least two planets to support your answer.

c. Identify the planet that rotates the fastest on its axis. Include data from the table to support your answer.
Write your answer in the space provided.
14. A teacher asks her students the following question: How does the air pressure inside a soccer ball affect the distance the soccer ball travels after the ball is kicked?

Which statement below is the best hypothesis for this investigation?

A. If a soccer ball is large, then the soccer ball will travel a farther distance than a small soccer ball.

B. If a soccer ball has a high internal air pressure, then the ball will travel a farther distance than a soccer ball with less internal air pressure.

C. If a soccer ball travels a distance of 15 meters, then the ball is traveling faster than a soccer ball that travels a distance of 20 meters.

D. If a soccer ball has 0.5 atmospheres of internal pressure, then the ball will travel slower than a ball with 0.8 atmospheres of internal pressure.

15. The period of rotation for each planet in our solar system is different.

The period of rotation for Earth is

A. 24 hours

B. 28 days

C. 13 weeks

D. 1 year
16. The diagram below shows the relative positions of Earth and the Moon and rays of sunlight.

Based on the diagram, which of the following best represents how the Moon would appear as seen from Earth?

A. 

B. 

C. 

D. 

17. A student mixed two substances together and concluded that a chemical reaction had taken place.

Explain how the student was able to conclude that a chemical reaction occurred. In your explanation, be sure to include

• evidence that would support the student’s conclusion

Write your answer on the next page.
Write your answer in the space provided.
18. When Chemical X is added to a certain liquid, the chemical breaks into Substances Y and Z. It is not possible to break Substances Y and Z into simpler particles.

Which statement is best supported by this evidence?

A. Chemical X is an element.

B. Chemical X is soluble in water.

C. Substances Y and Z are elements.

D. Substances Y and Z are compounds.

19. The two beakers below contain pure water.

Which of the following properties is the same for both of these samples?

A. mass

B. weight

C. volume

D. boiling point
20. During an investigation, students were given chemical data for several common household products, as shown in the data table below. Students were to determine if a substance was an acid or base by using litmus paper. Litmus paper turns red in an acid and turns blue in a base.

<table>
<thead>
<tr>
<th>Substance</th>
<th>Color of Solution</th>
<th>Melting Point (°C)</th>
<th>Boiling Point (°C)</th>
<th>Soluble in Water</th>
<th>Odor</th>
<th>Litmus Paper Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carpet cleaner</td>
<td>Clear</td>
<td>0</td>
<td>100</td>
<td>Yes</td>
<td>Weak</td>
<td>Blue</td>
</tr>
<tr>
<td>Vinegar</td>
<td>Clear</td>
<td>-2</td>
<td>118</td>
<td>Yes</td>
<td>Strong</td>
<td>Red</td>
</tr>
<tr>
<td>Oven cleaner</td>
<td>Clear</td>
<td>-1</td>
<td>93</td>
<td>Yes</td>
<td>Weak</td>
<td>Blue</td>
</tr>
<tr>
<td>Bleach</td>
<td>Clear, light yellow</td>
<td>0</td>
<td>100</td>
<td>Yes</td>
<td>Strong</td>
<td>Blue</td>
</tr>
</tbody>
</table>

Which conclusion is supported by the data from the investigation?

A. Many cleaning supplies are soluble in water.

B. Cleaning solutions with a weak odor are acids.

C. Water is the main ingredient in many cleaning supplies.

D. A substance changes from a gas to a liquid as the temperature of the substance increases.
21. Silver nitrate (AgNO₃) a colorless powder consists of the metallic element silver (Ag) and two non-metallic elements, nitrogen and oxygen (N and O). Silver nitrate mixed with water (H₂O) forms a clear solution. When a piece of copper wire (Cu) is put into a silver nitrate solution, the clear solution turns blue. A silvery white substance forms on the wire and falls to the bottom of the solution.

Which statement best explains why silver nitrate (AgNO₃) is classified as a compound?

A. Silver nitrate contains a metal.

B. Silver nitrate chemically reacts with copper.

C. Silver nitrate forms when three elements chemically combine.

D. Silver nitrate forms a solution when mixed with water.
22. Biologists conduct investigations to learn about living organisms.

Which method helps reduce bias during an investigation?

A. developing a hypothesis after collecting data in the Investigation.

B. limiting the amount of background research before the Investigation.

C. designing an investigation with repeated trials during the Investigation.

D. obtaining other opinions concerning what should happen during the investigation.
23. A science class is studying physical and chemical changes. The teacher puts a beaker of water onto a hot plate and heats it until bubbles appear.

   a. Classify this as a physical or chemical change. Explain your reasoning using specific details.

      The teacher puts a sugar cube into a container of warm water. Eventually the sugar cube is no longer visible.

   b. Classify this as a physical or chemical change. Explain your reasoning using specific details.

      The teacher pours vinegar into a small container of baking soda. The combined substances begin to fizz and bubble as a gas is released.

   c. Classify this as a physical or chemical change. Explain your reasoning using specific details.
Write your answer in the space provided.
24. Which of the following is a characteristic of all chemical changes?

A. A different state of matter is produced.
B. Some mass is converted to energy.
C. Some form of light is given off.
D. A new material is formed.

25. Which of the following statements best explain why the tilt of Earth on its axis causes summer to be warmer than winter in the Northern Hemisphere?

A. The warm ocean currents flow from the tropics to the Northern Hemisphere in the summer.
B. The rays of the Sun strike the Northern Hemisphere more directly in the summer.
C. The greenhouse effect increases in the Northern Hemisphere in the summer.
D. The Northern Hemisphere is closer to the Sun in the summer.
26. Which of the following pictures shows the appearance of the Moon when a solar eclipse occurs?

A. Waning Moon
B. Quarter Moon
C. Full Moon
D. New Moon
**MSA SCIENCE RUBRIC**

**LEVEL 3**
There is evidence in this response that the student has a full and complete understanding of the question or problem.

- The supporting scientific evidence is complete and demonstrates a full integration of scientific concepts, principles, and/or skills.
- The response reflects a complete synthesis of information, such as data, cause-effect relationships, or other collected evidence.
- The accurate use of scientific terminology strengthens the response.
- An effective application of the concept to a practical problem or real-world situation reveals a complete understanding of the scientific principles.

**LEVEL 2**
There is evidence in this response that the student has a general understanding of the question or problem.

- The supporting scientific evidence is generally complete with some integration of scientific concepts, principles, and/or skills.
- The response reflects some synthesis of information, such as data, cause-effect relationships, or other collected evidence.
- The accurate use of scientific terminology is present in the response.
- An application of the concept to a practical problem or real-world situation reveals a general understanding of the scientific principles.

**LEVEL 1**
There is evidence in this response that the student has minimal understanding of the question or problem.

- The supporting scientific evidence is minimal.
- The response provides little or no synthesis of information, such as data, cause-effect relationships, or other collected evidence.
- The accurate use of scientific terminology may not be present in the response.
- An application, if attempted, is minimal.

**LEVEL 0**
There is evidence that the student has no understanding of the question or problem.

- The response is completely incorrect or irrelevant or there is no response.

*On the Maryland School Assessment, the application of a concept to a practical problem or real-world situation will be scored when it is required in the response and requested in the item stem.*