Name_____ 8th Grade Science Semester 1 Review

Atoms

- An atom is the smallest unit of an element that upholds all of the properties of that element.
- Atoms are made up of subatomic particles called protons, neutrons, and electrons.
- Protons and neutrons are located in the nucleus of an atom and determine the atomic mass of an atom.
- Protons have a positive electrical charge and electrons have a negative electrical charge. Atoms that have the same number of protons and electrons are neutral charged atoms.
- Atomic number of an element tells you the number of protons for that element.
- Electrons are located outside of the nucleus of an atom in the "electron cloud." They are smaller and have less mass than protons and neutrons.
- Neils Bohr is a famous scientist who developed the model of an atom as a build up of successive orbital shells of electrons.
- Electrons located in the outermost shell of the electron cloud are called "valence electrons" and have the highest energy.
- Valence electrons determine the chemical properties of an element, or how it reacts with other elements.

Atoms Vocabulary Concepts- **Define the following**

Atom-

Atomic Mass-

Atomic Number-

Electron Cloud-

Electrons-

Protons-

Neutrons-

Nucleus-

Valence Electrons-

Atoms Key Concepts- **Answer the following**

- **Atoms are composed of subatomic particles.**

1. How are atoms structured?

2. What are the locations, masses, and electrical charges of the subatomic particles?

3. Where are valence electrons located?

- **Protons determine the atom's identity.**

4. How is the identity of an element determined?

5. What is the importance of protons?

6. Why are protons used to determine the identity of an element?

Periodic Table

- Elements are arranged on the Periodic Table in increasing order of the atomic number or number of protons in the nucleus of the atom in an element.
- The atomic mass of each element increases when moving to the right and down the Periodic Table due to the addition of more atomic particles.
- Columns of elements are called groups and all elements in a group have the same number of valence electrons which causes them to react in similar ways.
- Rows of atoms are called periods and all elements in the same period have the same energy level.
- When moving from left to right of a row, the number of valence electrons increases. When moving down the rows of the Periodic Table, the number of electron shells of the atom in each element increase.
- Elements found in Group 18, known as noble gases, are unreactive due to their full valence shell.
- Properties of metals- good conductors of heat and electricity, lustrous, high melting and boiling points.

Periodic Table Vocabulary Concepts- **Define the following**

Periodic Table of Elements-

Groups-

Periods-

Noble Gases-

Electron Shell-

Periodic Table Key Concepts- **Answer the following**

- **The periodic table, arranged by atomic number, shows a tendency for properties to repeat in a periodic pattern and can be used to predict the properties of an element.**

7. What are some patterns (trends) found in the periodic table of elements?

8. How are elements on the periodic table organized?

9. How is the chemical reactivity of an element determined?

10. How does the arrangement of elements on the periodic table allow for the prediction of undiscovered elements and their properties?

- **Elements are grouped into families on the periodic table.**

11. How are groups of elements similar/different?

12. How are periods of elements similar/different?

13. How do groups and periods of elements compare?

Chemical Formulas, Equations, & Reactions

- During a chemical reaction, the atoms of substances rearrange themselves into a new configuration forming new substances. The reactants (or the energy and atoms or molecules of the original substance) combine to produce products (or the energy, atoms, and molecules of the new substance).
- A compound is the product of a chemical reaction that has different properties than their individual properties.
- A common compound found in living organisms is glucose, $C_6H_{12}O_6$.
- A chemical formula is the combination of all of the elemental symbols found within a substance. The atom numbers of each element are identified by subscripts to the right of the elemental symbol.
- A chemical equation shows the atom numbers and molecules making up the reactants and products of a chemical reaction. A number, or coefficient, in front of the molecule's chemical formula represents the molecule number in each reaction.
- Due to the Law of Conservation Mass, the total atom numbers of each element in a chemical equation is not changed during a chemical reaction; atoms are rearranged to form new compounds.
- The four signs of a chemical reaction are formation of a gas, a production of heat or light, formation of a precipitate or a color change.
- If any of the signs of a chemical reaction are observed, then a chemical change has most likely occurred.
- A chemical equation is balanced when the reactants and products have the same number of each atom on each side in a chemical equation.
- Changes in physical state (color change, breaking, crushing, or cutting) or phase (melting, freezing, boiling) are physical changes. The starting and ending materials of a physical change are the same, even though they may look different.

Chemical Formulas, Equations, & Reactions Vocabulary Concepts- **Define the following**

Chemical Equation-

Chemical Formula-

Chemical Reaction-

Compound-

Law of Conservation of Mass-

Chemical Formulas, Equations, & Reactions Key Concepts-**Answer the following**

- Chemical formulas can be used to determine the number of atoms of each element found in compounds.

14. How are chemical formulas used to determine the number of atoms of each element found in compounds?

15. What is the purpose of a subscript in a chemical formula?

16. What is the purpose of coefficients in a chemical formula?

- Chemical reactions indicate that new substances with different properties are formed.

17. What evidences indicate that a new substance has formed as a result of a chemical reaction?

18. What are the components of a chemical equation?

19. After a reaction, how do the reactants and products in a chemical equation compare?

- A balanced equation represents the law of conservation of mass or that every atom present at the start of the reaction is still present at the end of the reaction.

20. How are balanced chemical equations and the law of conservation of mass related?

21. What is meant by "balanced" equation?

Force and Motion

- There are always forces acting on objects, whether the objects are moving or are at rest.
- The total force on an object is called the **net force** and is calculated by adding the forces acting in the same direction and subtracting forces acting in the opposite direction.
- If the net force on an object is zero, the forces are balanced and the object stays still or in constant motion. If the net force is not zero the forces are unbalanced and the object's motion will change.
- Speed is the distance on object travels divided by the time it takes the object to travel that distance (s=d/t).
- When two forces act upon an object in opposite directions (horizontal and vertical), the net force is determined by calculating the difference of the forces. The object will move in the direction of the stronger force.
- When two or more forces act on an object in the same direction, the net force is determined by calculating the sum of the forces. The object will increase in speed and velocity as it moves in the direction of the net force.
- Motion can be defined as movement of an object, relative to some other point.
- Speed measures how quickly an object moves a certain distance, but does not factor in the direction of the movement.
- Velocity measures how quickly an object moves and the specific direction in which the object is moving.
- Acceleration measures how an object changes velocity by either moving faster, slower, or continuing to move at the same rate.

Force and Motion Vocabulary Concepts- **Define the following**

Acceleration -

Gravity -

Inertia -

Net force -

Newton -

Speed -

Balanced force-

Unbalanced force -

Velocity -

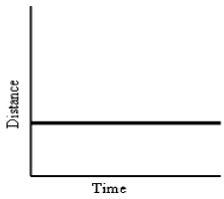
Force -

*Force and Motion Key Concepts-***Answer the following**

- **Motion can be represented mathematically.**

22. How are speed, velocity, and acceleration different?

23. If a car is travels 300 miles in 4 hours, what is its average speed?
24. Describe the motion of the object in the following graph.



- **Unbalanced forces change an object's motion.**

27. What is motion?

28. How is force measured?

29. How do forces affect an object's motion?

30. How do unbalanced forces affect an object? Give examples.

31. Calculate the net force of the picture. 

_____

Newton's Laws of Motion

- Newton's law of inertia states that an object at rest stays at rest or an object in motion stays in motion until unbalanced forces act upon it.
- Newton's law of force and acceleration states that the acceleration of an object depends on the object's mass and magnitude of the force acting upon it (F=ma).
- Newton's law of action-reaction states that for every action, there is an equal and opposite reaction.

Newton's Laws of Motion Vocabulary Concepts- **Define the following**

Newton's law of inertia-

Inertia -

Newton's law of force and acceleration -

Newton's law of action-reaction-

*Newton's Laws of Motion Key Concepts-***Answer the following**

- **An object's motion is the result of the combined effect of all forces acting on the object.**

32. How do Newton's laws explain the effect of all forces acting on an object?

33. What are action-reaction forces?

34. What is the mathematical relationship between force and acceleration?

35. How are force, mass, and acceleration related?

- **The interaction between energy and matter creates forces (pushes and pulls) that produce predictable patterns of change.**

36. What pattern of motion is identified with the law of inertia?

37. What pattern exists in the law of force and acceleration?

38. What pattern exists in the law of action-reaction?

39. How is everyday life affected by the laws of motion? Give examples for each law.

Plate Tectonics

- In the early 20th century, Alfred Wegener developed early theories of continental drift, indicating that the continents of Earth move and historically were in different positions than they are currently.

- The initial skepticism of earth scientists raised questions that became the starting point for new investigations.
- A freshwater reptile, the Mesosaurus, was found in some rock layers in both South America and Africa, which was evidence that the continents were once connected as a single landmass.
- In the 1960s, scientific discoveries about seafloor spreading, combined with earlier theories of continental drift, led to a theory of plate tectonics.
- The movement of plate tectonics causes several crustal formation including earthquakes, volcanoes, and mountains.
- Scientists use seismographs to help measure the movement of Earth and determine the composition of Earth's interior in order to warn people of potential earthquake danger.
- Scientists do not rely on seismographs because the forces of Earth are unpredictable.
- Volcanoes are formed when an oceanic plate and continental plate converge (Move towards each other)
- Mountains are formed when two continental plates collide towards each other.

***Plate Tectonic Vocabulary Concepts*- Define the following**

Plate tectonic theory-

Continental Drift-

Convergent Boundary-

Mountain-

Seismograph-

Volcano-

***Plate Tectonic Key Concepts*-Answer the following**

- **Many scientists have contributed to the theory of plate tectonics.**

45. What is a theory?

46. What makes a theory accepted or not accepted?

47. How does historical evidence support the theory of plate tectonics?

- **Some crustal features on the land surface and beneath the ocean are caused by plate movement.**

48. What are crustal features?

49. How are crustal features related to plate tectonics?

50. How does Newton's law of action and reaction apply to Earth's tectonic activities?

51. Are there patterns in volcanoes caused by plate movement? Explain.

52. Are under water and land surface mountains formed by the same plate movement? Explain.

Erosional Features

- Topographic maps can be used to examine the elevation of an area.
- Satellite technology allows scientists to photograph land and erosional features and study them for changes over time.
- Height of the water table and ground surface are two main factors that affect where groundwater becomes surface water.
- You need to know how to read a topographic map.

Erosional Features Vocabulary Concepts- **Define the following**

Groundwater-

Surface water-

Topographic Map-

Erosional Features Key Concepts- **Answer the following**

- **Topographic maps and satellite views show details of land features and how they change over time.**

54. What is a satellite view?

55. How are land and erosional features depicted on topographic maps and satellite views?

56. How are changes in elevation shown on a topographic map?

- **Topographic maps and satellite views may be used to predict how land and erosional features may be reshaped by weathering.**

58. How can land features be reshaped over time?

59. How can topographic maps and satellite views be used to predict how land features may change over time?

DENSITY

60. Define density and write the formula for calculating density.

61. What is the density of an object with a mass of 125g and a volume of 176 mL?

62. A sample of wood occupies a space of 200ml and has a mass of 75g. What is the density of the wood sample?

63. If an object has the following dimensions (length = 6cm, width = 3cm, and height = 1.5cm) and a mass of 36g, what would be the density?

64. In a lab, you need to determine the density of silly putty. You place it in a graduated cylinder that has 25 mL of water in it to start. The water level rises up to 29 mL after the silly putty is added. If the mass of silly putty is 8 grams, calculate the density (using water displacement too find volume).

65. Label whether each of the following would sink or float in water:
(hint density of water = 1.00 g/mL)

a. Air – 0.0013 g/mL _____

b. Corn oil – 0.93 g/mL _____

c. Glycerine – 1.26 g/mL _____

d. Corn syrup – 1.38 g/mL _____

e. Wood – 0.85 g/mL _____

f. Steel – 7.81 g/mL _____

g. Ice – 0.92 g/mL _____