Study Guide
Integrated Science Challenge Test

Content:

- Scientific Method
  You will be given an example of an experiment and asked to identify each step in this method.
- Metric Unit Conversion
  You will be given a metric conversion chart for this section.
- Physical and chemical properties of matter: Physical change-no different substances formed; Chemical change- new substances formed; Examples- melting, burning
- Density and calculations involving density: Density = Mass(g)/volume (cm3)
- Mixtures and compounds: salad is a mixture, salt is a compound (NaCl); be able to distinguish between them
- Kinetic Theory: Cohesive properties and states of matter
  Most cohesive, less kinetic-solid; more kinetic, less cohesive-liquid; most kinetic, not cohesive-gas or plasma
- Four states of matter and their characteristics: be able to compare and contrast the phases as to similarities and differences
- Atomic structure:
  Electrons are negatively charged-exist in orbits
  Protons are positively charged-located in nucleus =atomic number
  Neutrons have no charge-located in nucleus-plus protons = atomic mass
  Bohr model= 2 electrons in first shell and 8 in the rest up to element # 18 on the periodic table
- Periodic Table organization: organized by increasing atomic number
- Families of the periodic table
  Group 1 ,2 and 3 are metals and tend to lose electrons to become an octet.
  Groups 5, 6 and 7 are gases and tend to gain electrons to become an octet.
  Group 8 are noble gases and do not bond and are called inert.
- Chemical formulas: # of atoms
  Be able to count number of atoms in each formula
  Know the difference between sub-scripts and coefficients
- Chemical Bonds…Ionic ,covalent, polyatomic
  Metals bond with gases using ionic bonds by transferring electrons-opposite sides of the periodic table
  Metals bond with metals covalently by sharing electrons –same side of periodic table
- Motion in a straight line
- Speed, distance, time…calculations S=D/T Be able to solve problems using this formula
  Velocity.. V=D/T This formula is used for a specific direction
- Acceleration….calculations A= V final – V initial / time
  Be able to solve problems using this formula
- Laws of Motion: 1^{st}, 2^{nd}, and 3^{rd}; any calculations that apply
  Be able to indicate which law is directly exemplified by each situation you will be given.
  First law: Law of inertia
  Second law: Force = mass x acceleration
  Third law… Action - reaction

Sample Questions:

1. Convert 1.6 kg to grams. A) 1600g B) 16.00g C) 160.0g D) 1.600g
   Answer: A

2. Constructing a graph is an example of the following process:
   A) organizing data B) modeling C) observing D) predicting
   Answer: A

3. The process by which a solid becomes a gas is called: A) sublimation B) condensation C) evaporation D) diffusion
   Answer: A

4. On the Periodic Table, elements in the same vertical column A) are in the same chemical family B) have similar properties C) have the same number of valence electrons D) A, B and C
   Answer: D

5. According to Newton's third law of motion, in order for a jet plane to move north, the engine exhaust must be aimed A) north B) east C) south D) west
   Answer: C