**CH. 9 Acids, Bases, and Salts**

\_\_\_ 1. I can differentiate between acidic, basic, and neutral solutions.

\_\_\_ 2. Identify common properties of acids and bases.

\_\_\_ 3. Utilize the pH scale to rank acids and bases in terms of relative

acidity or alkalinity.

\_\_\_ 4. Apply the relative concentration of H3O+ and OH- ions to

describe acidity or alkalinity

\_\_\_5. I can analyze solutions in terms of levels of concentration.

\_\_\_ 6, I can identify the acid and base solutions creating the salt

**CH. 10 Nuclear Reactions**

\_\_\_1. Compare & contrast nuclear with chemical reactions. \_\_\_ 2. Identify common sources of radioactivity. \_\_\_ 3. Identify, define, and contrast nuclear particles [alpha particles, beta particles, gamma particles] \_\_\_ 4. I can differentiate between nuclear fusion & fission reactions. \_\_\_5. Utilize the law of conservation of mass to explain nuclear reactions. ( Balance and complete nuclear reactions/ Predict reactants and products of nuclear reactions, and explain how atoms are not conserved in nuclear reactions. \_\_\_6. I can define half-life and use half-lives to predict the amount of a radioactive substance that will be left after a given amount of time. \_\_\_7. Identify and evaluate positive effects of using nuclear energy. **HPS Physics** **CH. 11 Motion (Kinematics)** \_\_\_\_ 1. I can describe motion in terms of position (x), displacement (Δx), distance (d), speed (s), velocity (v), acceleration (a), and time(t)

\_\_\_ 2. I can differentiate between vector (magnitude and direction

& depend on a frame of reference.. displacement, velocity, acceleration, etc..) and scalar quantities in measurement (magnitude w/o direction … distance, speed, time, etc..)

\_\_\_3. I can use a frame of reference to describe or measure

the position (x) of an object with the correct amount of significant figures and use *the positive or negative sign in the* position to define the frame of reference.

\_\_\_4. I can calculate displacement as defined as the change in the

position of an object (Δx = xfinal – xinitial) explain why the displacement does not always equal the distance travelled

\_\_\_5. I can recognize and convert between common units of

position, displacement, and distance. (SI units)

\_\_\_6. I can describe the velocity of an object as a vector

quantity that is equal to the rate of change of displacement per time ().

\_\_\_7. I can compare and contrast and calculate velocity and speed.

[velocity = vector , + and – values correspond to direction, the rate of change of displacement per time()]

[Speed= Scalar having only magnitude, the rate of change of distance per time ()]

 \*Both are measured in the SI unit of meters per second (m/s).

\_\_\_8. I can differentiate between average velocity [total

displacement over a given time period:

 ] and instantaneous velocity [velocity at a given instant in time.] bith in problems as well as with lab equipment such as a timer and photogates.

\_\_\_9. I can construct and interpret a position time graph. (ID \

independent and dependent variables , calculate the slope to represent the object’s velocity. stationary=horizontal line,no slope=0, velocity=0m/s. horizontal slope, object moving in positive direction.

Negative slope =object moving in negative direction.

*The steeper the slope =faster the object is moving.*

*The flatter the slope (+ or -), the slower the object*

*If the slope is increasing (graph= curve)=acceleration*

\_\_\_10. I can define acceleration as a vector quantity that is

 equal to the rate of change of velocity per time

 ().

negative value for acceleration=slowing (if+ directn.)

acceleration is a vector, & an object that is moving at constant speed but changes direction is accelerating.

\_\_\_11. I can calculate the acceleration of an object using

 SI unit m/s2.

\_\_\_12. I can construct and interpret a velocity time graph.

[ID independent (x-axis) and dependent (y-axis) variables on the velocity time graph, calculate the slope to represent the acceleration of the object.

*Horizontal line, slope = 0, accel= 0 m/s.= constant velocity. If slope=horizontal= positive acceleration.*

 *If slope= negative= negative acceleration.*

*\_\_\_13.* I can understand that ALL objects in freefall accelerate at the

same rate near Earth due to Earth’s gravitation (-9.8 m/s2)

**CH 12. Forces (Dynamics)**

\_\_\_ 1. I can describe types of forces as anything having the

ability to change the motion of an object.

\_\_\_ 2. I can classify various types of forces.

 *Contact forces=* Applied forces that push or pull

Frictional forces oppose the direction of motion/Air

resistance/ Normal forces act perpendicular to the

surface of an object/ Tension forces occur due to the

pulling force of cables or ropes/ Elastic Forces occur

due to the elastic nature of springs etc./

 *Field forces=* I can order the elementary field forces

from strongest to weakest. (Strong nuclear force/ Electromagnetic force/ Weak nuclear force/ Gravitational force); Other field forces: Magnetic force and Electric force

\_\_\_ 3. Relate the inverse square law to various field forces.

\_\_\_ 4. forces are vector quantities (magnitude & direction)

\_\_\_ 5. I can construct free body diagrams showing the force

vectors that are acting on an object and identify the SI unit of force is the Newton (N) [amount of force needed to cause a 1kg object to accelerate at 1 m/s2]

\_\_\_ 6. I can use Newton’s Laws of Motion to describe how

forces affect the motion of an object.

\_\_\_ 7. I can define and apply Newton’s First Law of Inertia.

*Objects in motion will stay in motion and objects at rest will stay at rest unless acted upon by an outside force & as the tendency of objects to remain in present state of motion.*

inertia of an object increases with the mass

\_\_\_ 8. I can explain that forces may be present even if an object is at

rest because the net force is zero.

\_\_\_ 9. I can explain how an object may still be moving at a constant

velocity if there is a net force of zero.

\_\_\_ 10. I can use Newton’s Second Law to describe how forces

affect the motion of an object [rate at which an object changes its velocity is directly proportional to the net force acting on the object, inversely proportional to the mass.

(F=ma and extends to weight Fg = mg where g = -9.8m/s2)

\_\_\_ 11. I can explain Newton’s Second Law in terms of Fnet = ma.

Given mass and acceleration calculate the net force.

\_\_\_12. I can explain, apply and calculate Newton’s Universal Law

of Gravitation

\_\_\_ 13. I can differentiate between the weight and the mass; explain

how weight is a force due to gravitational attraction caused by both the masses of objects and the distance between.

\_\_\_ 14. Comparison of gravity on the Earth vs. the moon /

Comparison of weights of mass at sea level vs. Mt. Everest

\_\_\_ 15. I can define and use Newton’s Third Law to describe how

forces affect the motion of an object (I can explain how

every action has an equal & opposite reaction and identifying force pairs acting on an object)

**CH 13 Work and Energy**

**\_\_\_1.** I can define and apply the Law of Conservation of Energy to

closed systems in which energy is never lost nor gained but

 transformed from one type to another.

\_\_\_2. I can compare and contrast various types of energy.

 **Kinetic Energy***:* describe kinetic energy as the energy due to

the movement of matter; the equation Ek= ½ mv2 to

calculate the amount of KE or Ek in Joules (J); I can use the Law of Conservation of Energy to convert between kinetic and gravitational potential energy in a closed system using the equation: Total Mechanical Energy = Ek+ Eg = ½ mv2 + mgh

 **Potential Energy**

 *Gravitational*: define gravitational potential energy as the

 energy due to an object’s height or position in a

 gravitational field; use the equation Eg = mgh to

 calculate potential energy in Joules (J); describe Eg in

 terms of mutually attracting masses.

 *Elastic:*

 *Electrical*:describe Eg in terms of attracting charges.

 **Electrical Energy**: explain electrical energy=electron mvmnt

 I can construct basic electric circuits and determine if a

 circuit is open or closed and draw basic circuits with their

 symbols.[Battery, Wire, Resistor, Bulb]; differentiate

 between series and parallel circuits; define and contrast

 electrical quantities [Charge+-0, Current I, Potential

 Difference V, Resistance Ω]

 **Thermal Energy**: explain thermal energy based on the

vibrations of atoms at the molecular level.

 **Sound Energy**

 **Light Energy**

 **Nuclear Energy**

\_\_\_ 3.Work to explain how energy can be transferred over a specified

distance; work=amount of force applied over a certain

displacement {in the direction of the applied force only:not perpendicular}W = FΔx=FΔd [measured in Joules (J)]

\_\_\_4. I can calculate and apply power P=W/t and efficiency.

\_\_\_5. I can use simple machines to show how forces can be

multiplied over distances but still obey the Law of

Conservation of Energy.

**Thermal Energy**

\_\_\_1. I can explain the difference between heat and temperature

B. Compare units of temperature and understand relationships

 between scales (Fahrenheit, Celsius, Kelvin)

\_\_\_2. I can explain thermal energy flow and how heat transfers from

 one substance to another

\_\_\_3. Contrast, define and diagram methods of heat transfer

(Conduction, Convection, Radiation)

\_\_\_4. I can define specific heat and heat capacity and explain why it

varies for different substances. Q=mc∆T and understand

how various factors affect specific heat (mass, temperature,

 material)

\_\_\_5. I can distinguish between thermal conductors and insulators as

well as identify examples and practical uses.

**CH 15 -16 Waves, Sound and Light**

\_\_\_ 1. I can describe how various types of waves transfer energy

\_\_\_2. I understand period & frequency are inversely proportional.

 (T = ) Period: calculate the period of a wave measured in seconds

Frequency: calculate the frequency measured in Hertz (Hz).

\_\_3. I understand wavelength & frequency are inversely proportional.

\_\_\_4. Wave speed: use the equation v = λf to calculate

 I understand that wave speed remains constant as long as

the medium remains uniform.

\_\_\_5. contrast how waves can change speed with various medium.

\_\_\_6. I can use simple harmonic motion to explain the basic

characteristics of waves.

\_\_\_7. I can define simple harmonic motion in terms of restoring

force and oscillations, give examples,

\_\_\_8. interpret graphs of simple harmonic motion and label the basic

characteristics of waves. [Period, Frequency, Wavelength,

Cycle, Amplitude, Crest, Trough]

\_\_\_9. I can explain how damping affects simple harmonic motion.

\_\_\_10. I can compare and contrast transverse and longitudinal waves

 **Transverse waves:** explain how transverse waves move

perpendicular to their direction of motion and list examples

of transverse waves (Water waves, all EM waves)

**Longitudinal waves**: explain how longitudinal waves move

parallel to their direction of motion ( define compression

& rarefaction in explaining the movement of )

\_\_\_11. I can explain how sound waves are longitudinal waves and

require matter to transport them.

\_\_\_12. I can interpret the electromagnetic spectrum by ranking EM

radiation based on Wavelength (Ω), Frequency(ƒ), Energy

\_\_\_13. I can apply the speed of light in a vacuum as 3.0 x 108 m/s to

 all types of electromagnetic radiation when using the equation

 v = λf (c = λf) in order to calculate wavelength and frequency.

\_\_\_14. I can explain how electromagnetic waves do not need matter

to be present to travel and therefore are able to transmit

energy throughout the universe.

\_\_\_15. I can compare and contrast types of wave motion.

**Reflection**: I can diagram how a plane wave experiences

reflection when meeting a boundary predicting the angle

at which a wave will reflect when meeting a boundary.

**Refraction**: I can explain how waves can change direction

 as it passes through differing types of materials. I can

 explain how waves travel at different speeds depending

 on the medium.

 **Diffraction:** I can diagram how waves bend when passing

 through a small slit or opening.

 **Absorption:** I can explain how waves can be absorbed by

 certain materials.

\_\_\_16. I can predict wave behavior when two or more waves exist at

 the same point in terms of the principle of superposition.

**Constructive Interference**: I can explain how waves in the

 same phase exhibit constructive interference.

 **Destructive Interference**: I explain how waves that are out

 of phase exhibit destructive interference.

\_\_\_17. I can use the Doppler Effect to describe the how the behavior

of a wave can change based on the position of the observer.

…how a wave moving towards the observer experiences a shorter wavelength and larger frequency and to explain blue shifts in the universe red and describe how a wave moving away from the observer experiences a longer wavelength and smaller frequency (blue shift)