

PHYSICS

PARENT MASTERY GUIDE

FIRST TERM

<p>Standard Number: 1.0 Mechanics The student will investigate the laws and properties of mechanics.</p> <p>Performance Indicators: Mastery by end of fifth week of 1st nine weeks</p> <p><i>At Level 1, the student is able to</i></p> <ul style="list-style-type: none">*distinguish between mass & weight using base units in the standard international (SI) system.*relate time in the (SI) system to the independent experimental variable in most situations.*relate inertia, force or action-reaction forces to Newton's 3 laws of motion & distinguish between the 3 laws in various scenarios.*compare & contrast characteristic properties of scalar & vector quantities.*investigate the definitions of force, work, power, kinetic energy, and potential energy.* explore velocity and acceleration. <p><i>At Level 2, the student is able to</i></p> <ul style="list-style-type: none">*analyze vector diagrams (addition, subtraction and scaling) & solve composition & resolution problems for force & momentum.*explore characteristics of rectilinear motion & analyze distance-time graphs (velocity), velocity-time graphs (acceleration and distance).*investigate the characteristics of centripetal motion & centripetal acceleration.*evaluate the dynamics of systems in motion including friction, gravity, impulse and momentum, change in momentum, & conservation of momentum.*analyze the characteristics of energy, and conservation of energy including friction, and gravitational potential energy.	<ul style="list-style-type: none">*relate work & power to various simple machines, mechanical advantage of different machines & recognize simple machines utilized in compound machines.*describe rotational equilibrium and relate to torque.*investigate projectile motion.*utilize trigonometry & vector analysis to solve force & momentum problems. <p><i>At level 3, the student is able to</i></p> <ul style="list-style-type: none">*apply elementary calculus to solve motion problems.*experiment with elastic and inelastic collisions. <p>Standard Number: 2.0 Thermodynamics The student will examine the properties and laws of thermodynamics.</p> <p>Performance Indicators: Mastery at the end of 1st nine weeks</p> <p><i>At Level 1, the student is able to</i></p> <ul style="list-style-type: none">*investigate temperature in relationship to kinetic energy.*recognize that absolute zero is the absence of molecular kinetic energy. <p><i>At Level 2, the student is able to</i></p> <ul style="list-style-type: none">*identify the characteristics of internal energy & temperature/heat (joules/calories).*relate the First Law of Thermodynamics as an application of the Law of Conservation of Energy (hot to cold) and heat transfer through conduction, convection and radiation.*relate change in heat content (quantity of thermal energy) to kinetic energy and specific heat ($Q=mcDT$).*investigate potential energy changes (phase changes) of heat of fusion, heat of vaporization, and heat of sublimation. <p><i>At Level 3, the student is able to</i></p> <ul style="list-style-type: none">*explore thermal expansion and contraction.*apply the second law of thermodynamics to the Carnot engine.
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SECOND TERM (2 pages)

Standard Number: 3.0 Waves and Sound: The student will investigate the properties of waves and sound.

Performance Indicators: Mastered by end of 2nd week of 2nd nine weeks

At Level 1, the student is able to

- *describe and investigate simple harmonic motion.
- *investigate and analyze wavelength, frequency and amplitude of longitudinal and transverse waves.
- *identify a wave interaction as reflection, refraction, diffraction, and interference.

At Level 2, the student is able to

- *compare mechanical and electromagnetic waves.
- *explore Hooke's Law.
- *investigate reflection, refraction, diffraction, & interference of waves.
- *demonstrate and explain the Doppler Effect.
- *experiment with reflection, refraction, diffraction, and interference of waves and sound.
- *compare wave characteristics to natural auditory phenomena.

At Level 3, the student is able to

- *determine the speed of sound experimentally using various materials and temperatures.
- *measure spring constants.

Standard Number: 4.0 Light and Optics: The student will examine the properties of light and optics.

Performance Indicators: Mastered by end of 4th week of 2nd nine weeks

At Level 1, the student is able to

- *explore properties of electromagnetic radiation.
- *examine properties of light waves.

Standard Number: 6.0 Nuclear Physics: The student will investigate the laws and properties of nuclear physics.

At Level 2, the student is able to

- *differentiate among transmission, reflection, refraction, diffraction, and interference of light waves.
- *investigate the optical properties of plane and curved mirrors.
- *solve problems related to Snell's law.
- *explore the formation of color.

At Level 3, the student is able to

- *draw, explain, & solve problems for the optics of mirrors & lenses
- *investigate optical phenomena (i.e., the Puddle Effect, optical illusions, and polarization).

Standard Number: 5.0 Electricity and Magnetism: The students will investigate electricity and magnetism.

Performance Indicators: Mastered by the 7th week of the 2nd nine weeks

At Level 1, the student is able to

- *analyze a given group of charges for repulsion and attraction.
- *distinguish between charged particles related to repulsion & attraction.
- *create a simple electromagnet.

At Level 2, the student is able to

- *describe the electric field that fills the space around a charged particle or group of charges.
 - *draw an electric field, given a scenario of charged particles.
 - *solve problems of resistance using Ohm's law.
 - *draw and explain series and parallel circuits.
 - *identify components of series and parallel circuits and solve problems related to voltage, amperage, and resistance.
 - *build series & parallel circuits and demonstrate how they function
 - *demonstrate a generated current by electromagnetic induction.
- At Level 3, the student is able to*
- *describe how current is generated by electromagnetic induction.
 - *design a lab that demonstrates the flow of charged particles and an electric current.

Performance Indicators: Mastery by the end of 2nd nine weeks

At Level 1, the student is able to

- *identify the parts of an atom.
- *describe the properties and location of subatomic particles.
- *describe three forms of radioactivity.
- *distinguish between nuclear fission and nuclear fusion.

At Level 2, the student is able to

- *distinguish between the Bohr model and the quantum model of an atom.
- *explain the changes in atomic number or mass number for each form of radioactivity.
- *write and balance equations for the three forms of radioactive decay.
- *solve half-life problems.
- *explain dating methods using carbon-14 or uranium.
- *explain how particles behave like waves.
- *distinguish between coherent and incoherent light.
- *describe how a laser is produced.

At Level 3, the student is able to

- *recognize how the quantum theory explains the photoelectric effect.
- *solve problems related to the photoelectric effect.