

## Honor's Physics Curriculum and Alignment with State Standards

Unit/Chapter	Outcomes	Activities	Standards*
Chapter 1 - Units and Problem	<p>Students will:</p> <ul style="list-style-type: none"> <li>become familiar with the units commonly used in physics</li> <li>Identify the base and derived units of the SI system</li> <li>correctly use the standard prefixes of the SI system</li> <li>understand the differences and similarities of the SI system and the fps system</li> <li>use unit analysis to determine the validity of equations</li> <li>successfully convert quantities</li> <li>correctly determine the proper amount of significant digits that should be reported in the answer of given calculations</li>   <li>understand the reasoning behind the use of significant digits</li> <li>learn and apply general problem solving techniques</li> <li>understand that there are many different ways to solve a problem that may be correct</li> </ul>	<p>Circumference-Diameter Ratios of a Circle</p> <p>Graph Matching</p>	
Chapter 2 - Kinematics: Description of motion	<p>Students will:</p> <ul style="list-style-type: none"> <li>understand the relationship of mechanics, kinematics, and dynamics</li>   <li>understand the difference between vector and scalar quantities</li> <li>accurately measure and compute distance, displacement, speed, velocity, and acceleration.</li> <li>understand the concept of vectors and vector addition</li> <li>determine the graphical relationships of displacement, velocity, acceleration, and time</li> <li>be able to correctly use the kinematic equations and apply these equations to common situations</li> <li>apply the kinematic equations to free falling objects</li> </ul>	<p>Picket Fence Free Fall</p> <p>Determining "g" on an Incline</p> <p>Modern Galileo Experiment</p> <p>The Physics 500</p> <p>Uniform Motion</p> <p>Accelerated Motion</p> <p>Keep Your Eye on the Ball</p>	12.D.5a, 12.D.5b
Chapter 3 - Motions in Two Dimensions	<p>Students will:</p> <ul style="list-style-type: none"> <li>correctly break down two dimensional motion into its component parts and apply the kinematic equations to these components</li> </ul>	<p>Mousetrap Catapult</p> <p>Shoot For Your Grade</p>	12.D.5a, 12.D.5b

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	learn to add and subtract vectors geometrically and algebraically comprehend relative velocities in one and two dimensions study projectile motion to predict the range, position, and flight time	Motion of a Projectile	
Chapter 4 - Force and Motion	Students will:  understand the concept of a net force and how it effects motion be able to define inertia and how it relates to mass be able to accurately explain Newton's three laws of motion and apply them to physical situations relate Newton's second law to the concept of weight understand forces as vector quantities and be able to use vector addition to determine the net force determine action-reaction pairs apply Newton's three laws through the use of free-body diagrams understand the concept of translational equilibrium determine the many causes and applications of friction correctly identify how friction affects motion determine the magnitude to which friction affects motion	Composition of Forces  Static and Kinetic Friction  Rafter Physics  Cardboard Chair  Pool-Ball Silver Dollar Trick  Sailing Through Physics	12.D.5a, 12.D.5b
Chapter 5 - Work and Energy	Students will:  identify work and how it applies to real-life situations determine the amount of work done in given situations understand and compute the vector quantities of work differentiate between constant and variable forces that do the work accurately compute the work done by variable forces understand the work-energy theorem and apply it to physical situations understand the concept of potential energy identify different types of potential energy	Conservation of Energy  Human Body Power Lab  How Hot Are Your Hot Wheels?	12.D.5a, 12.D.5b

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	<p>understand the concept of an arbitrary zero point and use it to make calculations easier</p> <p>understand the law of conservation of energy and apply it to physical situations</p> <p>differentiate between conservative and non-conservative forces</p> <p>understand the concept of power</p> <p>determine the mechanical efficiency of machines</p>		
Chapter 6 - Momentum and Collisions	<p>Students will:</p> <p>understand and compute linear momentum</p> <p>be introduced to order-of-magnitude calculations and their use</p> <p>problem solving</p> <p>determine the vector sum of the momentum in a system</p> <p>understand the relationship of kinetic energy, momentum, and impulse</p> <p>relate impulse to physical situations</p> <p>explain the conditions for the conservation of momentum and apply it to physical situations</p> <p>understand the different types of collisions and study those differences</p> <p>relate kinetic energy to the different types of collisions</p> <p>understand the concept of the center of mass</p> <p>find the center of mass for simple systems</p> <p>understand the relationship between the center of mass and the center of gravity</p> <p>relate the conservation of momentum to the propulsion of objects</p>	<p>The All-American Egg Drop</p> <p>2-Liter Bottle Rockets</p> <p>How Fast is Your Fast Ball?</p> <p>Momentum, Energy, and Collisions</p>	12.D.5a, 12.D.5b
Chapter 7 - Circular Motion and Gravitation	<p>Students will:</p> <p>measure and compute angular displacement, velocity, and acceleration</p> <p>understand the relationship between angular kinematics and linear kinematics</p>	<p>The Pendulum</p> <p>Around and Around</p>	12.D.5a, 12.D.5b

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	<p>approximate the distance of objects using the angle between lines of sight</p> <p>understand the relationship between degrees and radians and be able convert from one unit to the other</p> <p>determine the frequency and period of a rotating object</p> <p>recognize uniform circular motion</p> <p>compute centripetal acceleration and centripetal force</p> <p>fully understand Newton's universal law of gravitation</p> <p>revisit the concept of gravitational potential energy as it relates to the universal law of gravitation</p> <p>understand Kepler's three laws of planetary motion and apply them to the motion of planets and satellites</p> <p>learn about escape velocity and how it relates to gravity</p>	Centripetal Force	
Chapter 8 - Rotational Motion and Equilibrium	<p>Students will:</p> <p>distinguish between rotational and translational motion</p> <p>determine the requirements for a body to roll without slipping</p> <p>define and compute torque</p> <p>apply the concepts of translational and rotational equilibrium to determine the force exerted on objects</p> <p>understand the relationship between stability and the position of the center of gravity of an object</p> <p>determine the moment of inertia of a rigid body</p> <p>apply the rotational equivalent of Newton's 2nd law to physical situations</p> <p>understand and compute rotational work, power, and energy</p> <p>apply the concept of rotational momentum to physical situations</p>	Equilibrium Lab	12.D.5a, 12.D.5b
Chapter 9 - Solids and Fluids	<p>Students will:</p> <p>understand the concepts of stress and strain and how they effect objects</p>		12.C.5b

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Chapter 10 - Temperature	Students will: distinguish between heat and temperature recognize the use of different temperature scales and be able to convert between them apply the ideal gas laws to physical situations understand the concept of absolute zero as a theoretical temperature determine how temperature affects the expansion of liquids and solids realize the uniqueness of water as it changes from a liquid to solid	Hot Shot	12.C.5b
Chapter 11 - Heat	Students will: understand the use of the different units of heat understand the mechanical equivalent of heat use calorimetry to determine the specific heat of different materials and measure their ability to hold heat understand how heat is used in the changes of state of a material identify the different ways that heat is transferred and determine what can be used to slow the transfer	Heat of Fusion	12.C.5b
Chapter 12 - Thermodynamics	Students will: learn the three laws of thermodynamics understand the basic principles behind heat engines and thermal pumps realize the limitations of heat engines and thermal pumps		12.C.4a
Chapter 13 - Vibrations and Waves	Students will: identify the properties of an object moving in simple harmonic motion be familiar with the terminology associated with simple harmonic motion determine the potential and kinetic energy of an object moving in SHM	Ripple Tank Waves  Wave Project  Pendulum Periods	

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	recognize sources of SHM determine and apply the equations of motion for an object in SHM recognize the relationship between an object in SHM and wave motion identify the different characteristics used of describe waves and wave motion recognize the different types of waves understand the properties associated with wave motion such as: interference, refraction, reflection, and diffraction understand the formation of standing waves and how they relate to resonance	Energy in Simple Harmonic Motion	
Chapter 14 - Sound	Students will: define sound and recognize the different parts of the sonic spectrum realize that the speed of sound depends on the material it is traveling through and the temperature of the material understand the concept of sound intensity and how it relates to loudness understand the use of the logarithmic scale to specify sound intensity levels relate the general properties of waves to sound  apply the concept of the Doppler effect to physical situations determine the resonant frequency possible in open and closed resonance tubes understand how the frequency of a sound wave is related to the pitch that is heard	Speed of Sound vs. Temperature  Speed of Sound and Resonance  Mathematics of Music	
Chapter 20 - Section 4 - Electromagnetic waves	Students will: explain the physical nature, origin, and measurement of propagation of electromagnetic waves identify the different types of electromagnetic waves		12.C.4a

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Chapter 25 - Section 5 - Color	Students will: understand the combination of pigments to form color understand the combination of light to form color  understand the interaction of light and pigments to form color		
Chapter 24 - Section 2 - Thin Film Interference	Students will: understand the formation of bands of color on surfaces of thin films		
Chapter 22 - Geometrical Optics: Reflection and Refraction of Light	Students will: understand the basic motion of wave fronts and rays identify the types of reflection identify and apply the law of reflection identify and apply Snell's law to physical situations determine the index of refraction of given materials and explain how it effect the speed of light in the material explain how the concept of total internal reflection is used in fiber optics explain the dispersion of light	How Light Intensity Varies with Distance  Snell's Law	
Chapter 24 - Section 1 - Young's Double-Slit Experiment	Students will: understand how Young's experiment demonstrated the wave nature of light  determine the wavelength of light based on experimental data		
Chapter 24 - Section 3 - Diffraction	Students will: define diffraction and compute the effects of diffraction in physical situations	Wavelengths of Colors	
Chapter 24 - Section 4 - Polarization	Students will: identify properties of polarized light identify applications and examples of polarized light	Polarization of Light	

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Chapter 24 - Section 5 - Atmospheric Scattering of Light	Students will: understand the impact of the scattering of light on the color of the sky		
Chapter 23 - Mirrors and Lenses	Students will: understand the principles of reflection and how they relate to plane mirrors determine the general characteristics of an image formed by a plane mirror identify the differences between converging and diverging mirrors determine the general characteristics of an image formed by a spherical mirror identify the differences between converging and diverging lenses determine the general characteristics of an image formed by a lens accurately draw ray diagrams to help determine the characteristics of the image in given situations understand the concept of aberrations and explain how they can be reduced	Law of Reflection of Light  Convex and Concave Lenses	
Chapter 15 - Electrical Charge, Forces, and Fields	Students will: recognize the significance of the two types of charges determine the law that operates between charged objects understand and use the law of conservation of charge identify insulators and conductors understand the use of an electroscope and know how it can be use to determine the charge on an object identify the different ways that an object can be charged understand and apply Coulombs law to find the forces present between charges identify the existence of electric fields	Electric Field Lab	12.D.5a, 12.D.5b

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	<p>determine the strength and direction of forces produced by electric fields</p> <p>determine the electric field in and around a conductor</p>		
Chapter 16 - Electric Potential, Energy, and Capacitance	<p>Students will:</p> <p>understand the concept of voltage and its relationship to the amount of electric potential energy</p> <p>determine characteristics of the electric field between two equipotential surfaces</p> <p>understand capacitance and determine the characteristics of a given parallel plate capacitor</p> <p>determine how the use of a dielectric material effects the properties of a capacitor</p> <p>understand how capacitors connected in series and in parallel effect the circuit</p>	Charging and Discharging a Capacitor	12.D.5a, 12.D.5b
Chapter 17 - Electric Current	<p>Students will:</p> <p>understand how the parts of a battery work to produce direct current</p> <p>define and compute the electrical current in a circuit</p> <p>understand the factors that effect resistance and calculate the effect of these factors</p> <p>understand and compute electrical power in a circuit</p> <p>explain the significance of decreasing power loss in transmission lines</p>	<p>Electrical Equivalent of Heat</p> <p>Electrical Energy</p>	12.D.5a, 12.D.5b
Chapter 18 - Electric Circuit Basics	<p>Students will:</p> <p>determine the equivalent resistance in parallel and series circuits</p> <p>determine the equivalent resistance and use it to simplify and analyze circuits</p> <p>identify Kirchoff's rules for electrical circuits and apply these rules to analyze simple circuits</p> <p>understand the proper use of voltmeters and ammeters to analyze circuits</p>	<p>Series Circuits</p> <p>Series and Parallel Circuits</p>	12.D.5a, 12.D.5b

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	<p>correctly connect the devices to existing circuits to take appropriate measurements</p> <p>understand the basic concepts of household circuits and the safety measures taken in household circuitry</p>		
Chapter 19 - Magnetism	<p>Students will:</p> <p>understand the polarity of magnets and the forces that exist between these poles</p> <p>understand the concept of magnetic fields and their direction</p> <p>determine how a magnetic field effects the motion of a charged particle</p> <p>understand the link between current and the magnetic field it creates</p> <p>identify the different types of magnetic material</p> <p>understand the concept of domains and their relationship to the magnetic properties of a material</p>	<p>Speaker Lab</p> <p>Simple Motor</p> <p>Magnetic Field in a Slinky</p>	12.D.5a, 12.D.5b

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