Lenoir County Public Schools
Curriculum Pacing Guide
2006-2007 (Reviewed 2008)

**Subject:** Physics Honors **Grade Level:** 10-12 **1st/3rd 9 weeks**

| **Time** (approx teaching days) | **Major Concepts** | **Objective / Pacing** | **Text / Support Materials** |
|---|---|---|---|
| **4** | Language of physics<br>Mathematical review<br>Measurements in experimentation | **Objectives**<br>1.01 Identify questions answered through scientific inquiry.<br>1.02 Organize data into charts and graphs.<br>**Questions addressed**<br>• What tests and methods are used to measure and predict?<br>• How do we display and evaluate collected data? | Chapter 1 - **Holt Physics** Text (pp. 4-25)<br>Video: **Conceptual Physics**: *Introduction*<br>Video: **The Mechanical Universe**: *Introduction to the Mechanical Universe* |
| **8** | Displacement<br>Velocity<br>Accelerated motion<br>Linear motion<br>Free fall | **Objectives**<br>2.01 Analyze velocity as a rate of change of position.<br>2.02 Compare and contrast scalar and vector quantities.<br>• Speed and velocity<br>• Distance and displacement<br>2.03 Analyze acceleration as a rate of change in velocity.<br>2.04 Conduct investigations involving position, average velocity, instantaneous velocity, acceleration, and time.<br>**Questions addressed**<br>• What is the difference between distance and displacement?<br>• What is the difference between speed and velocity?<br>• How do you construct various types of motion graphs and interpret the data found in each?<br>• What is the significance of the sign for displacement and velocity?<br>• What are the proper procedures for solving problems and constructing/interpreting graphs?<br>• How does one solve problems involving uniformly accelerated motion?<br>• How does one determine the acceleration due to gravity?<br>• How does one solve free-fall problems? | Chapter 2 – **Holt Physics** Text (pp. 40-67)<br>Video: **Conceptual Physics**: *Linear Motion*<br>Video: **The Mechanical Universe**: *Law of Falling Bodies*<br>Motion detector lab activities |

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| **8** | Vectors<br>Vector operations<br>Projectile motion<br>Relative motion | **Objectives**<br>3.01 Analyze and evaluate projectile motion in a defined frame of reference.<br>3.02 Design and conduct investigations of two-dimensional motion of objects.<br>3.03 Analyze and evaluate independence of the vector components of projectile motion.<br>**Questions addressed**<br>• What is the difference between scalar and vector quantities?<br>• What are the two aspects of any vector quantity?<br>• How is the magnitude of the resultant of two or more vectors determined?<br>• How is the direction of the resultant determined?<br>• How can a vector be resolved into horizontal and vertical components?<br>• How are vectors that are not perpendicular to each other added?<br>• What is projectile motion?<br>• How is projectile motion for an object fired horizontally determined?<br>• How is projectile motion for an object fired at an upward angle determined?<br>• How are velocity measurements dependent upon the specified frame of reference? | Chapter 3 – **Holt Physics** Text (pp. 84-111)<br>Video: **Conceptual Physics**: *Vectors and Projectiles*<br>Video: **The Mechanical Universe**: *Vectors* |

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| **8** | Forces<br>Newton's laws of motion<br>Inertia<br>Net external force<br>Weight<br>Static friction<br>Kinetic friction<br>Air resistance | **Objectives**<br>4.01 Determine that an object will continue in its state of motion unless acted upon by a net outside force (Newton's First Law of Motion, The Law of Inertia).<br>4.02 Assess, measure, and calculate the conditions required to maintain a body in a state of static equilibrium.<br>4.03 Assess, measure, and calculate the relationship among the force acting on a body, the mass of the body, and the value of the acceleration produced (Newton's Second Law of Motion).<br>4.04 Analyze and mathematically describe forces as interactions between bodies (Newton's Third Law of Motion).<br>4.05 Assess independence of the vector components of forces.<br>4.06 Investigate, measure, and analyze the nature and magnitude of frictional forces.<br>**Questions addressed**<br>• What is a force?<br>• In what units is force measured?<br>• What are the two broad categories of forces?<br>• What kind of quantity is force?<br>• How can free-body diagrams be used to represent forces?<br>• What is inertia?<br>• How does net external force affect an object's acceleration?<br>• What is mass?<br>• What conditions are required for an object to be in a state of equilibrium?<br>• How are the mass and acceleration of an object related to the net external force applied to that object?<br>• What is meant by an action-reaction pair?<br>• Does an action-reaction pair act on a single object?<br>• What is weight? | Chapter 4 – **Holt Physics** Text (pp. 124-149)<br>Video: **Conceptual Physics**: *Newton's First Law*<br>Video: **Conceptual Physics**: *Newton's Second Law*<br>Video: **Conceptual Physics**: *Newton's Third Law*<br>Video: **The Mechanical Universe** *Inertia*<br>Video: **The Mechanical Universe** *Newton's Laws* |

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| | | • In what direction do frictional forces always act?<br>• How does the magnitude of kinetic friction compare to that of static friction?<br>• On what factors do frictional forces depend?<br>• How does air resistance affect free fall?<br>• What is terminal velocity? | |
| 5 | Work<br>Kinetic energy<br>Potential energy<br>Gravitational potential energy<br>Elastic potential energy<br>Work-energy theorem<br>Mechanical energy<br>Conservation of mechanical energy | **Objectives**<br>6.01 Investigate and analyze energy storage and transfer mechanisms.<br>• Gravitational potential energy<br>• Elastic potential energy<br>• Kinetic energy<br>6.02 Analyze, evaluate, and apply the principle of conservation of energy.<br>6.03 Analyze, evaluate, and measure the transfer of energy by a force.<br>• Work<br>• Power<br>6.04 Design and conduct investigations of mechanical energy and power.<br>**Questions addressed**<br>• What is work?<br>• How is work calculated?<br>• Is work a scalar or vector quantity?<br>• What is kinetic energy?<br>• How are energy and work related? In what units are each measured?<br>• What is potential energy?<br>• What are the major categories of potential energy?<br>• On what factors does gravitational potential energy depend?<br>• On what factors does elastic potential energy depend?<br>• How is mechanical energy calculated?<br>• Under what conditions is mechanical energy conserved?<br>• What is power?<br>• How is power calculated? In what unit is it measured? | Chapter 5 – **Holt Physics** Text (pp. 168-191)<br>Video: **Conceptual Physics**: *Energy*<br>Video: **The Mechanical Universe**: *Conservation of Energy*<br>Video: **The Mechanical Universe**: *Potential Energy* |

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| **5** | Momentum<br>Impulse<br>Impulse – momentum theorem<br>Conservation of momentum<br>Inelastic collision<br>Elastic collision | **Objectives**<br>5.01 Assess the vector nature of momentum and its relation to the mass and velocity of an object.<br>5.02 Compare and contrast impulse and momentum.<br>5.03 Analyze the factors required to produce a change in momentum.<br>5.04 Analyze one-dimensional interactions between objects and recognize that the total momentum is conserved in both collisions and recoil situations.<br>5.05 Assess real world applications of impulse and momentum, including, but not limited to, sports and transportation.<br>**Questions addressed**<br>• What is momentum?<br>• How is momentum calculated?<br>• What causes a change in momentum?<br>• What is impulse?<br>• What does the impulse-momentum theorem state?<br>• What is the law of conservation of momentum?<br>• What is the difference between elastic and inelastic collisions?<br>• How does the law of conservation of momentum relate to Newton's laws of motion?<br>• What is conserved in elastic collisions? Inelastic collisions? | Chapter 6 – **Holt Physics** Text (pp. 208-230)<br>Video: **Conceptual Physics**: *Momentum*<br>Video: **The Mechanical Universe**: *Conservation of Momentum* |
| **2** | All concepts covered to date | **Lenoir County Public Schools Nine-Week Test Review and Test Administration** | Chapters 1-6 **Holt Physics** |

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| 5 | Centripetal acceleration<br>Tangential acceleration<br>Centripetal force<br>Newton's Law of Universal Gravitation | **Objectives**<br>3.04 Evaluate, measure, and analyze circular motion.<br>3.05 Analyze and evaluate the nature of centripetal forces.<br>3.06 Investigate, evaluate, and analyze the relationship among centripetal force, centripetal acceleration, mass, velocity, and radius.<br>4.07 Assess and calculate the nature and magnitude of gravitational forces (Newton's Law of Universal Gravitation)<br>**Questions addressed**<br>• What is centripetal acceleration?<br>• How can centripetal acceleration be determined?<br>• What is centripetal force?<br>• What are the requirements for circular motion?<br>• What does Newton's Law of Universal Gravitation state?<br>• What is the significance of the constant **G**? | Chapter 7 – **Holt Physics** (Sections 7.2 & 7.3 only!) Text (pp. 257-267)<br>Video: **Conceptual Physics**: *Rotation*<br>Video: **Conceptual Physics**: *Gravity I*<br>Video: **Conceptual Physics**: *Gravity II*<br>Video: **The Mechanical Universe** *Moving in Circles* |