

Physical Science...CP1

Physical Science, Grade 9				
Learning Standards	Objectives	Resources	Time Allotment	SHS Student Expectations
Learning Standard #1 Motion and Forces				
Learning Standard #1.1 Vector and Scalar Quantities	The student will be able to: <ul style="list-style-type: none"> • Distinguish between vector and scalar quantities. • Provide examples of vector and scalar quantities. • Apply an understanding of vectors to velocity, acceleration and momentum. 	Unit Force and Motion <ul style="list-style-type: none"> • Lesson 1 • Activity...Speed Trap • Vector Project...Design a Golf Course or Ski resort using vectors. 	3 days	1, 3, 4, 5
Learning Standard #1.2 Representing Vector Quantities	The student will be able to: <ul style="list-style-type: none"> • Graphically represent vector quantities. • Add and subtract vector quantities. • Adding vectors at right angles. 	Unit Force and Motion <ul style="list-style-type: none"> • Lesson 6 • Working the number line • Review Pythagorean Theorem. 	3 days	4, 5
Learning Standard #1.3 Problem Solving with Motion	The student will be able to: <ul style="list-style-type: none"> • Distinguish between velocity, speed and acceleration of a moving object. • Solve mathematical problems involving velocity, speed and constant acceleration. 	Unit Force and Motion <ul style="list-style-type: none"> • Lesson 2...Speed • Overhead notes • Activity: Determine the speed of a toy car. • Activity: Slow Flyer • Lab: Constant speed and average speed • Lesson 3...Velocity • Overhead notes • Lesson 4...Acceleration • Overhead notes • Lab: Accelerometer • Holt: ch. 3 pgs. 74-76 	10 days	1, 2, 4, 5

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<p>Learning Standard #1.4 Graphing motion of objects</p>	<p>The student will be able to:</p> <ul style="list-style-type: none"> • Create graphs of motion (position vs. time, speed vs. time, velocity vs. time and constant acceleration vs. time). • Interpret graphs of motion (position vs. time, speed vs. time, velocity vs. time and constant acceleration vs. time). 	<p>Unit Force and Motion</p> <ul style="list-style-type: none"> • Lessons 2, 3 and 4. • Overhead notes and worksheets • The Physics Classroom Online...http://www.physicsclassroom.com/morehelp/graphpra/graphs.html 	<p>6 days</p>	<p>4, 5</p>
<p>Learning Standard #1.5 Mass and Inertia</p>	<p>The student will be able to:</p> <ul style="list-style-type: none"> • Distinguish between mass and inertia. • Problem solve given hypothetical situations involving mass and inertia of an object. 	<p>Unit Force and Motion</p> <ul style="list-style-type: none"> • Lesson 5 • Overhead notes • Activity: A Massive Problem • Holt: ch. 3 pg. 89 • Activity: How can you study the effects of increasing mass on inertia. 	<p>5 days</p>	<p>1, 4, 5</p>
<p>Learning Standard #1.6 Newton's First Law of Motion</p>	<p>The student will be able to:</p> <ul style="list-style-type: none"> • Use this Law to explain how things move. • Apply Newton's First Law of Motion to everyday situations. 	<p>Unit Force and Motion</p> <ul style="list-style-type: none"> • Lesson 9 • Overhead notes • Brick demo • Tablecloth trick • Shoebox listening skill • Inertia Apparatus demo. • Gyroscopic inertia activity • Which string will break Lab • Holt: ch. 3 pgs. 87-89. • Video: Newton: A Tale of Two Isaacs 	<p>10 days</p>	<p>1, 2, 4, 5</p>

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<p>Learning Standard #1.7 Newton's Second Law of Motion</p>	<p>The student will be able to:</p> <ul style="list-style-type: none"> • Interpret Newton's Second Law to show how an object's motion will change only when a net force is applied. • Apply Newton's Second Law of Motion to everyday situations. 	<p>Unit Force and Motion</p> <ul style="list-style-type: none"> • Lesson 10 • Overhead notes • Investigation: Calculating Force, mass and motion. Holt pg. 94. • Centripetal Force Demonstrator • The Physics Classroom Web Site • Holt: ch. 3 pg. 90 	<p>5 days</p>	<p>1, 2, 4, 5</p>
<p>Learning Standard #1.8 Free Body Diagrams</p>	<p>The student will be able to:</p> <ul style="list-style-type: none"> • Draw free body diagrams to show all the co-linear forces acting on an object. • Determine the net force acting on an object. 	<p>Unit Force and Motion</p> <ul style="list-style-type: none"> • Lesson 8 • Overhead Notes • The Physics Classroom Website: Recognizing Forces. • Video: Forces...Teacher's Video 	<p>5 days</p>	<p>3,4,5</p>
<p>Learning Standard #1.9 Static and Kinetic friction</p>	<p>The student will be able to:</p> <ul style="list-style-type: none"> • Qualitatively distinguish between static and kinetic friction. • Determine what static and kinetic frictions depend on. • Explain their effects on the motion of objects. 	<p>Unit Force and Motion</p> <ul style="list-style-type: none"> • Lesson 7 • Overhead notes • Holt: ch. 3 pgs. 81-83 and 106-107. • Activity: Measuring friction 	<p>3 days</p>	<p>1, 5</p>

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<p>Learning Standard #1.10 Newton's Third Law of Motion</p>	<p>The student will be able to:</p> <ul style="list-style-type: none"> • Use Newton's Third Law of Motion to explain how things move • Apply Newton's Third Law to everyday occurrences. 	<p>Unit Force and Motion</p> <ul style="list-style-type: none"> • Lesson 11 • Overhead notes • Holt transparency • Holt: ch. 3 pgs. 91-92 • Computer Lab activity: Looking for Newton. • Video:Newton's Three Laws 	<p>6 days</p>	<p>1,2,3,4,5</p>
<p>Learning Standard #1.11 Newton's Law of Universal Gravitation</p>	<p>The student will be able to:</p> <ul style="list-style-type: none"> • Conceptualize the law. • Understand that gravitational force varies with the mass of the objects and their distance from one another. 	<p>Unit Force and Motion</p> <ul style="list-style-type: none"> • Lesson 7 • Holt: ch. 3 pgs. 83-85 • Video: Gravity...Discovery • Video: Moving Bodies • Video: Scrapes of Wrath • Video: Thrill Ride 	<p>6 days</p>	<p>1,2,3,4,5</p>
<p>Learning Standard #1.12 System of International Units for Motion.</p>	<p>The student will be able to:</p> <ul style="list-style-type: none"> • Identify the appropriate unit of measure for force, mass, distance, speed, acceleration and time. • Explain how they are measured. 	<p>Unit Force and Motion</p> <ul style="list-style-type: none"> • Lesson 1 • Measurements...ch.1 section 2, pgs.15-25. • Investigation: pg. 26 • Overheads from section 	<p>4 days</p>	<p>1,2,3,4,5,</p>

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<p>Learning Standard #2 Conservation of Energy and Momentum</p>				
<p>Learning Standard #2.1 Law of Conservation of Energy</p>	<p>The student will be able to:</p> <ul style="list-style-type: none"> • Interpret the Law of Conservation of Energy. • Provide examples of the Law. 	<p>Unit on Energy</p> <ul style="list-style-type: none"> • Lessons 1 and 2 • Overhead notes • Holt: ch.5 pgs. 130-136 • Refrigerators and heat sink 	<p>5 days</p>	<p>1,2,3,4,5,6</p>
<p>Learning Standard #2.2 Energy Transformation</p>	<p>The student will be able to:</p> <ul style="list-style-type: none"> • Give examples of how energy is transformed from kinetic to potential and vice versa. 	<p>Unit on Energy</p> <ul style="list-style-type: none"> • Lessons 1 and 2 • Overhead notes • Holt: ch. 5 pgs. 124-129 • Activity: pg. 128 	<p>4 days</p>	<p>1,4,5</p>
<p>Learning Standard #2.3 Mechanical Energy Calculations</p>	<p>The student will be able to:</p> <ul style="list-style-type: none"> • Calculate the kinetic energy of a mechanical system. • Calculate the potential energy of a mechanical system. 	<p>Unit on Energy</p> <ul style="list-style-type: none"> • Lessons 1 and 2 • Holt: ch.5 pg. 124-129. • Ford Motor Company Curriculum on Prodigy Concept Car. • Investigation: Converting Mechanical Energy into Thermal Energy. • Lab: Finding the Potential Energy of a Bouncing Ball. 	<p>10 days</p>	<p>1,4,5</p>
<p>Learning Standard #2.4 Relationships among energy, work and power.</p>	<p>The student will be able to:</p> <ul style="list-style-type: none"> • Conceptualize the relationship among work, energy and power. • Describe quantitatively the relationship among energy, work and power. 	<p>Unit on Work</p> <ul style="list-style-type: none"> • Overhead notes • Holt: chi. 4 pg. 100-107 • Activity: pg. 104 • Video: Energy and Work...Cambridge Educational. 	<p>5 days</p>	<p>1,4,5</p>

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<p>Learning Standard #2.5 Law of Conservation of Momentum</p>	<p>The student will be able to:</p> <ul style="list-style-type: none"> • Interpret the Law of Conservation of Momentum. • Provide examples of the Law. • Calculate the momentum of an object. 	<p>Unit on Force and Motion</p> <ul style="list-style-type: none"> • Lesson 5 • Lab on Momentum • Video: Thrill ride • Holt: chi. 3 pg. 92-93 	<p>5 days</p>	<p>1,4,5</p>
<p>Learning Standard #2.6 SI units for energy, work, power and momentum</p>	<p>The student will be able to:</p> <ul style="list-style-type: none"> • Identify appropriate standard units of measure. 	<ul style="list-style-type: none"> • Measurements...ch.1 pgs. 15-25. • Overheads from text. 	<p>5 days</p>	<p>1,2,3,4,5,6</p>

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<p>Learning Standard #3 Heat and heat transfer</p>				
<p>Learning Standard #3.1 Movement of Heat</p>	<p>The student will be able to:</p> <ul style="list-style-type: none"> • Relate thermal energy to the movement of molecules. • Identify thermal expansion in substances. 	<p>Unit on Energy</p> <ul style="list-style-type: none"> • Lesson 3 • Activity on convection currents in air • Holt: ch. 5 pgs. 138-143 • Research and design an experiment depicting heat transfer. Demonstrate to the class. 	<p>5 days</p>	<p>1,2,3,5</p>
<p>Learning Standard #3.2 Specific Heat and Heat Capacity</p>	<p>The student will be able to:</p> <ul style="list-style-type: none"> • Distinguish between specific heat and heat capacity. 	<p>Unit on Energy</p> <ul style="list-style-type: none"> • Lesson 3 • Holt: ch. 5 pgs. 138-146 	<p>2 day</p>	<p>1,2,4</p>
<p>Learning Standard #3.3 Temperature change in a substance</p>	<p>The student will be able to:</p> <ul style="list-style-type: none"> • Explain the relationship between temperature and heat transferred. • Explain the relationship between temperature and the mass of the substance. • Explain the relationship between temperature and specific heat of a substance. 	<p>Unit on Energy</p> <ul style="list-style-type: none"> • Lesson 3 • Holt: ch. 5 pgs.138-146 • Overhead transparencies • Overhead notes 	<p>3 days</p>	<p>1,2,4</p>

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Learning Standard #3.4 Phases of Matter	The student will be able to: <ul style="list-style-type: none">• Classify matter• Distinguish between elements and compounds.• Identify a characteristic property of matter.• Distinguish between melting point, freezing point, and boiling point.• Apply the kinetic molecular model of matter to thermal expansion.• Analyze phase changes of matter using the kinetic molecular model.	<ul style="list-style-type: none">• Holt: ch. 2 pgs. 32-51• Investigation 2.2: Using models in Science• Investigation: Measuring melting and freezing point.• Overhead transparencies• Overhead notes	4 days	1,2,4,5
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Learning Standard #4 Waves				
Learning Standard #4.1 Wave motion	The student will be able to: <ul style="list-style-type: none"> Differentiate between wave motion and motion of objects. 	<ul style="list-style-type: none"> Holt: ch. 8 pgs. 216-233 Holt: ch. 9 pgs.240-256 Demo with tuning forks Overhead transparencies 	1 day	1,4,5
Learning Standard #4.2 Properties of Waves	The student will be able to: <ul style="list-style-type: none"> Calculate velocity, frequency and wavelength. Explain the relationship between velocity, frequency and wavelength. 	<ul style="list-style-type: none"> Holt: ch. 8 pgs. 220-223 Activity: How can you find the relationship among the properties of a wave/ Investigation: 8.1: Identifying wave properties Overhead transparencies 	3 days	1,2,4,5,
Learning Standards #4.3 Transverse and Longitudinal waves	The student will be able to: <ul style="list-style-type: none"> Distinguish between transverse and longitudinal waves. 	<ul style="list-style-type: none"> Holt: ch. 8 pgs. 216-219 Demos of the types of waves Stadium wave demo Longitudinal Wave Model Transverse Wave Model 	3 days	1,2,4,5
Learning Standards #4.4 Mechanical and electromagnetic waves	The student will be able to: <ul style="list-style-type: none"> Distinguish between mechanical and electromagnetic waves 	<ul style="list-style-type: none"> Holt: ch. 8 pgs. 216-233 Holt: ch. 11 pgs. 284-287 Demo of Mechanical Waves with Slinkies. 	2 days	1,2,4,5

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<p>Learning Standards #4.5 Reflection and Refraction of waves</p>	<p>The student will be able to:</p> <ul style="list-style-type: none"> • Interpret the laws of reflection and refraction. • Apply the laws of reflection and refraction to all waves. 	<ul style="list-style-type: none"> • Holt: ch. 8 pgs. 225-228 • Investigation 8.2: Observing Waves on Water • Demonstrations 	<p>3 days</p>	<p>1,2,4,5</p>
<p>Learning Standards # 4.6 Polarization, Wave Interaction and the Doppler Effect</p>	<p>The student will be able to:</p> <ul style="list-style-type: none"> • Describe what happens when two waves arrive at a point at the same time. • Analyze the parts and properties of a standing wave. • State how the motion of the source of sound affects the pitch in the Doppler effect. • Evaluate and explain how reverberation influences acoustics. • Identify the ways in which certain filters polarize light. 	<ul style="list-style-type: none"> • Holt: ch. 8 pgs. 230-233 • Investigation: pg.234. Creating and Measuring Standing Waves. • Extending Science Concepts: Moiré Patterns • Holt: ch. 9 pgs. 251-252 • Investigation 9.1: Observing the Doppler Effect. • Demonstration of the Doppler Effect • Laser Disc 41684-42271 Effect of Polarizing Filters • Demo with Different Filters 	<p>4 days</p>	<p>1,2,3,5</p>
<p>Learning Standard #4.7 Constructive and Destructive Interference</p>	<p>The student will be able to:</p> <ul style="list-style-type: none"> • Explain graphs of constructive and destructive interference. • Graph constructive and destructive interference. • Interpret graphs of constructive and destructive interference. 	<ul style="list-style-type: none"> • Holt: ch. 8 pgs. 230-232 • Demonstration pg. 231 • Slinky Demo • Physics Classroom Web Site 	<p>4 days</p>	<p>1,2,3,5</p>

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<p>Learning Standards #4.8 Wave Mediums</p>	<p>The student will be able to:</p> <ul style="list-style-type: none"> • Explain the relationship between the speed of a wave and the medium it travels through. 	<ul style="list-style-type: none"> • Holt: ch. 9 pgs. 240-243 • Activity: How can you Measure the Speed of Sound? • Demonstrations • Video: Faster than Sound, NOVA • Video: Let's Form a Band, TMW Media Group 	<p>4 days</p>	<p>1,2,3,4,5</p>
<p>Learning Standard #4.9 Standing Wave</p>	<p>The student will be able to:</p> <ul style="list-style-type: none"> • Recognize the characteristics of a standing wave. • Explain how a standing wave can be formed in a string or a pipe. 	<ul style="list-style-type: none"> • Holt: ch. 8 pgs. 232-233 • Guitar string demo • Lab on Creating and Measuring Standing Waves. pg. 234 • Overhead transparencies 	<p>3 days</p>	<p>1,2,3,4,5</p>

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<p>Learning Standard #5 Electromagnetism</p>				
<p>Learning Standard #5.1 Static Charge</p>	<p>The student will be able to:</p> <ul style="list-style-type: none"> • Recognize the characteristics of static charge. • Explain how a static charge is generated. 	<ul style="list-style-type: none"> • Holt: ch. 13 pgs. 342-347 • Activity: How can You Produce and Study Electric Charges? • Demonstration • Overhead transparencies • Laser Disc: 33022, 33023-33026: electrostatic energy; electroscope 33207, 33208-33812; Van de Graaff generator: 1482: lightning • Video: Lightning, NOVA 	<p>4 days</p>	<p>1,5,6</p>
<p>Learning Standard #5.2 Coulomb's Law</p>	<p>The student will be able to:</p> <ul style="list-style-type: none"> • Interpret Coulomb's law. • Apply Coulomb's law. 	<ul style="list-style-type: none"> • Holt: ch. 13 pgs. 342-347 • Physics classroom web site: Static Electricity; Lesson 3; Electric force • Video: Getting Charged, TMW Media Group 	<p>4 days</p>	<p>1,4,5</p>
<p>Learning Standard #5.3 Electric Forces and Fields</p>	<p>The student will be able to:</p> <ul style="list-style-type: none"> • Identify an Electric Force. • Identify the Electric Field. • Explain the difference between them. 	<ul style="list-style-type: none"> • Holt: ch. 13 and 14, pgs. 342-384 • Physics Classroom Web site: Static Electricity; Lessons 3 and 4. • Video: The Earth is a Giant Magnet: TMW Media Group 	<p>4 days</p>	<p>1,4,5</p>

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<p>Learning Standard # 5.4 Measuring Electricity</p>	<p>The student will be able to:</p> <ul style="list-style-type: none"> • Define current, voltage, and resistance. • Quantify current, voltage and resistance • Use these quantities in the appropriate formulas. • Understand the connection between these quantities. 	<ul style="list-style-type: none"> • Holt: ch. 13 pgs. 342-360 • Physics Classroom Web Site: 	<p>3 days</p>	<p>1,4,5</p>
<p>Learning Standard # 5.5 Units of Measure</p>	<p>The student will be able to:</p> <ul style="list-style-type: none"> • Identify appropriate units of measure. • Explain how these units are measured. 	<ul style="list-style-type: none"> • Holt: ch. 13 pgs.342-347 • Physics Classroom Web site 	<p>1 day</p>	<p>1,4,5</p>
<p>Learning Standard # 5.6 Circuits</p>	<p>The student will be able to:</p> <ul style="list-style-type: none"> • Analyze circuits • Use Kirchoff's and Ohm's Laws to find the current and potential difference between any two points in the circuit. 	<ul style="list-style-type: none"> • Holt: ch.13 pg. 342-360 • Holt: Skill, Interpreting a Circuit Diagram; pg. 361 • Holt: Investigation: Making Series and Parallel Circuits • The Physics Classroom Web Site. 	<p>4 days</p>	<p>1,2,3,4,5</p>

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Learning Standard # 6 Electromagnetic Radiation				
Learning Standard # 6.1 Electromagnetic Spectrum	The student will be able to: <ul style="list-style-type: none"> Describe the spectrum in terms of wavelength and energy. Identify specific regions of the spectrum and give examples. 	<ul style="list-style-type: none"> Holt ch.11, pgs. 284-297 Overhead Transparencies Activity: How Does a Prism Form Colors from White Light. 	5 days	1,2,5
Learning Standard # 6.2 Applications of Spectrum	The student will be able to: <ul style="list-style-type: none"> Explain the application of wavelengths to technology 	<ul style="list-style-type: none"> Holt: ch.11, pgs. 284-297; ch.12, pgs. 310-326 Overhead transparencies The Physics Classroom Web Site Projects 	6 days	1,2,3,5
Learning Standard # 6.3 Properties of Electromagnetic Wave	The student will be able to: <ul style="list-style-type: none"> Calculate the frequency of an electromagnetic wave. Calculate the energy of an electromagnetic wave. 	<ul style="list-style-type: none"> Holt: ch 8, pgs. 214-224 The Physics Classroom Web Site 	3 days	1,4,5
Learning Standard # 6.4 Visible Light	The student will be able to: <ul style="list-style-type: none"> Recognize the ways in which visible light can be changed Explain the ways in which the direction of visible light can be changed. 	<ul style="list-style-type: none"> Holt: ch.10, pgs. 260-280 Holt: Investigation: 10.1: Changing Image Size with Optics. Holt: Investigation 10.2: Observing Multiple Images in Plane Mirrors. Overhead transparencies Video: Lenses and Magnification, BARR Film Video: Lenses and Mirrors, TMW, Media Group 	5 days	1,2,3,4,5