Wolcott Public Schools

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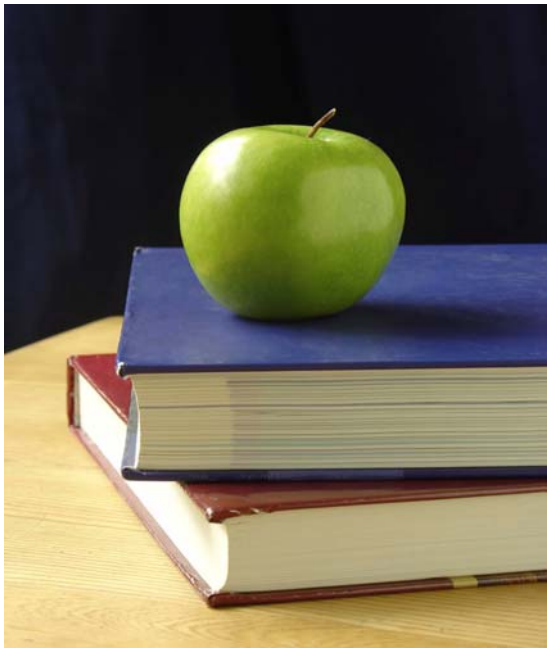
High School Curriculum
Grades 11 and 12
Science – Physics in our World



Children are our Future…

Acknowledgements

Curriculum Writers:

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We acknowledge and celebrate the professionalism, expertise, and diverse perspectives of these teachers. Their contributions to this curriculum enrich the educational experiences of all Wolcott students.

Dr. Gail A. Gilmore
Assistant Superintendent

Date of Presentation to the Board of Education: April 25, 2011

Physics in our World

Physics in our World

Mission Statement:
The mission of the Wolcott Public Schools is to develop in each student the knowledge, skills, and attitudes necessary to become a productive member of the community and a contributing member to society.

Departmental Philosophy:
The philosophy of the Science Department is to develop a base of content knowledge while providing the skills that students need in the next phase of their lives. Courses within the Science Department promote self learning along with problem solving skills. Students will be able to think critically about information/data gathered along with forming relationships and applying what they have learned through experimentation.

Course Description:

Physics in our World is a course designed to focus on the concept of energy. It will study what energy is in many of its forms. The course will also discuss how different systems incorporate the physics of energy and use it in our everyday lives. We will also look at energy production and conservation.

Course Requirements:

Many skills will be used in this class but certain skills will be in focus on a regular basis. In this course, students will focus on certain skills.

- **Read Effectively** – Students will need to read articles that are centered on our need for energy and analyze what they have read. A rubric is provided.

- **Collect and Analyze Data** – Students will perform lab experiments where they will have to think critically about their work. Students will be given a lab quiz at the end of each lab to ensure connections are made between the lab and the current material.

- **Solve Problems** – Students will apply prior knowledge in order to solve problems presented in class. They might be asked to perform calculations based on collected data and provided data. Also, students might need to graph data to arrive at a solution or construct a device. In order to solve problems students will need to be able to synthesize class learning, lab work, and mathematical skills.

- **Communicate Effectively** – Students will present information to the class in an organized, well thought out manner.

Physics in our World

Content Standard - Force Principles

Performance Standards	*Sample Activities*	*Assessment Strategies*	*Resources*
State Standard **Motion and Forces** Newton's laws predict the motion of most objects. **1. Students indentify and provide examples of the principle of Forces and Newton's 2nd Law.** **1.1** Students will distinguish the difference between mass and force. **1.2** Students will indentify types of forces. **1.3** Students will determine the magnitudes of each type of force. **1.4** Students will provide examples of Newton's 2nd Law. **1.5** Students will be able to express their ideas using the appropriate terms.	Comprehension Activities: ***Read Effectively*** • Students will read and report on current articles and web sites that are centered around energy ***Collect and Analyze Data*** Inertia Lab • Students will determine the mass of an object based on simple harmonic motion Newton's 2nd Law • Students will construct graphs to prove Newton's 2nd Law Searching for Mhu Lab • Students will find the coefficient of friction for various surface combinations	**Pre-Assessment** • Pretests • Observations **Formative Assessments** • Student Work (Class work and Homework) • System Response Card Questionnaires • Inquiry Based Lab Work (Simulations or in class lab work) • Quizzes **Summative Assessments** • performance tasks • unit tests • semester exams • product/exhibits/displays • demonstrations	• Hewitt's Conceptual Physics **Read Effectively** • www.nicenet.org • New York Times Search **Inertia Lab** • Inertia Lab Sheet • Masses • Stop Watch • Spring Platform **Newton's 2nd Law** • Newton's 2nd Law Lab Sheet • Dynamic Carts • Masses • Pulley **Searching for Mhu Lab** • Newton Scale • Wood Block • Masses **PhET Simulations** • Friction • Forces in 1 Dimension • Forces and Motion • Hewitt's Conceptual Physics

Physics in our World

State Standard (cont.)

Motion and Forces

Newton's laws predict the motion of most objects.

1. **Students indentify and provide examples of the principle of Forces and Newton's 2nd Law.**

1.1 Students will distinguish the difference between mass and force.

1.2 Students will indentify types of forces.

1.3 Students will determine the magnitudes of each type of force.

1.4 Students will provide examples of Newton's 2nd Law.

1.5 Students will be able to express their ideas using the appropriate terms.

Solve Problems

- Indentifying Forces and Calculate Magnitude
- Show how one type of force has an effect on another
- Apply Newton's 2nd Law to force situations

PHeT Simulations

- Analyze the components that effect friction and calculate the coefficient of friction

Pre-Assessment

- Pretests
- Observations

Formative Assessments

- Student Work (Class work and Homework)
- System Response Card Questionnaires
- Inquiry Based Lab Work (Simulations or in class lab work)
- Quizzes

Summative Assessments

- performance tasks
- unit tests
- semester exams
- product/exhibits/displays
- demonstrations

Read Effectively

- www.nicenet.org
- New York Times Search

Inertia Lab

- Inertia Lab Sheet
- Masses
- Stop Watch
- Spring Platform

Newton's 2nd Law

- Newton's 2nd Law Lab Sheet
- Dynamic Carts
- Masses
- Pulley

Searching for Mhu Lab

- Newton Scale
- Wood Block
- Masses

PhET Simulations

- Friction
- Forces in 1 Dimension
- Forces and Motion

Physics in our World

Content Standard - Energy Principles

State Standard **Conservation of Energy** The law of conservation of energy provides a way to predict and describe the movement of objects. **2. <u>Students indentify and provide examples of the principle of Conservation of Energy.</u>** **2.1** Students will indentify types of energy. **2.2** Students will determine the magnitudes of each type of energy. **2.3** Students will provide examples of energy transformations. **2.4** Students will be able to express their ideas using the appropriate terms.	<u>Comprehension Activities:</u> ***<u>Read Effectively</u>*** • Students will read and report on articles and web sites that are focused on energy ***<u>Collect and Analyze Data</u>*** Hooke's Law • Students will determine the spring constant of a supplied spring or elastic band Energy Conservation Online Lab • Students will explain various energy conversions ***<u>Solve Problems</u>*** • Indentifying Energy types and Calculate Magnitude • Apply conservation of energy to various situations	**Pre-Assessment** • Pretests • Observations **Formative Assessments** • Student Work (Class work and Homework) • System Response Card Questionnaires • Inquiry Based Lab Work (Simulations or in class lab work) • Quizzes **Summative Assessments** • performance tasks • unit tests • semester exams • product/exhibits/displays • demonstrations	• Hewitt's Conceptual Physics **Read Effectively** • www.nicenet.org • New York Times Search **Hooke's Law** • Hooke's Law Lab Sheet • Spring • Masses • Ruler **PhET Simulations** • Masses and Springs • Energy Skate Park

Physics in our World

Content Standard – Temperature and Heat

Performance Standards	*Sample Activities*	*Assessment Strategies*	*Resources*
State Standard **Heat and Thermodynamics** Energy cannot be created or destroyed although, in many processes, energy is transferred to the environment as heat. **3. <u>Students will be able to describe the effects of adding energy to matter in terms of the motion of atoms and molecules, and the resulting phase changes.</u>** **3.1** Explain how energy is transferred by conduction, convection, and radiation. **3.2** Perform calculations based on specific heats and latent heats. **3.3** Describe how heat is used to do work. **3.4** Determine the thermal conductivity of a substance to see how well it carries heat. **3.5** Explain what is a good insulator and why.	<u>Comprehensive Activities</u> ***<u>Read Effectively</u>*** • Students will read and report on articles and web sites that are focused on energy ***<u>Collect and Analyze Data</u>*** Temperature and Heat Online Lab • Students will determine what has an effect on temperature of a gas • Students will explain what is happening on the atomic scale when temperature goes up or down Specific Heat • Students will determine the specific heat of various metals Latent Heat • Students will determine the latent heat of fusion for ice	**Pre-Assessment** • Pretests • Observations **Formative Assessments** • Student Work (Class work and Homework) • System Response Card Questionnaires • Inquiry Based Lab Work (Simulations or in class lab work) • Quizzes **Summative Assessments** • performance tasks • unit tests • semester exams • product/exhibits/displays • demonstrations	• Hewitt's Conceptual Physics **Read Effectively** • www.nicenet.org • New York Times Search **PhET Simulations** • Friction • Gas Properties • States of Matter **Specific Heat** • Specific Heat Lab Sheet • Hot Plate • Water • Metal Samples • Thermometer **Latent Heat** • Ice • Warm water • Thermometer **Heat Conduction**

Physics in our World

State Standard (cont.)

Heat and Thermodynamics

Energy cannot be created or destroyed although, in many processes, energy is transferred to the environment as heat.

3. **<u>Students will be able to describe the effects of adding energy to matter in terms of the motion of atoms and molecules, and the resulting phase changes.</u>**

3.1 Explain how energy is transferred by conduction, convection, and radiation.

3.2 Perform calculations based on specific heats and latent heats.

3.3 Describe how heat is used to do work.

3.4 Determine the thermal conductivity of a substance to see how well it carries heat.

3.5 Explain what is a good insulator and why.

Heat Conduction

- Students will determine the thermal conductivity of various materials
- Students will determine what a good insulator is

<u>Solve Problems</u>

- Students will mathematically predict temperature changes due to heat flow
- Students will be able to draw a diagram of temperature vs. heat flow through all of the phases of H_20
- Determine the latent heat of fusion for Ice – Water

Pre-Assessment

- Pretests
- Observations

Formative Assessments

- Student Work (Class work and Homework)
- System Response Card Questionnaires
- Inquiry Based Lab Work (Simulations or in class lab work)
- Quizzes

Summative Assessments

- performance tasks
- unit tests
- semester exams
- product/exhibits/displays
- demonstrations

- Hewitt's Conceptual Physics

Read Effectively

- www.nicenet.org
- New York Times Search

PhET Simulations

- Friction
- Gas Properties
- States of Matter

Specific Heat

- Specific Heat Lab Sheet
- Hot Plate
- Water
- Metal Samples
- Thermometer

Latent Heat

- Ice
- Warm water
- Thermometer

Heat Conduction

Physics in our World

Content Standard - Thermodynamics

Performance Standards	*Sample Activities*	*Assessment Strategies*	*Resources*
State Standard **Heat and Thermodynamics** Energy cannot be created or destroyed although, in many processes, energy is transferred to the environment as heat. **4. <u>Students identify systems that use the concepts of heat and temperature to perform work.</u>** **4.1** Students will graph Pressure vs. Volume diagrams for various heat engine processes. **4.2** Student will be able to explain heat flow and temperature changes for each process. **4.3** Students will graphically show a heat engine cycle that is repetitive and uses many processes. **4.4** Students will explain the cycle of a four cylinder automotive. **4.5** Students will look at the efficiency of heat engines and specifically an automotive.	<u>Comprehensive Activities</u> ***<u>Read Effectively</u>*** • Students will read and report on articles and web sites that are focused on heat engines or efficiency ***<u>Collect and Analyze Data</u>*** Pressure, Volume, and Temperature Online Lab • Students will determine how doing work and adding or removing heat has an effect on the temperature of a gas • Students will recreate and graph the various processes that occur on a heat engine ***<u>Solve Problems</u>*** • Students will calculate the heat energies in a heat engine and calculate the work • Student will calculate the efficiency of various systems • Students will determine the efficiency of an automobile and the factors that can be controlled by the driver	**Pre-Assessment** • Pretests • Observations **Formative Assessments** • Student Work (Class work and Homework) • System Response Card Questionnaires • Inquiry Based Lab Work (Simulations or in class lab work) • Quizzes **Summative Assessments** • performance tasks • unit tests • semester exams • product/exhibits/displays • demonstrations	• Hewitt's Conceptual Physics **Read Effectively** • www.nicenet.org • New York Times Search **PhET Simulations** • Gas Properties

Physics in our World

Content Standard – Electrical Charge

Performance Standards	*Sample Activities*	*Assessment Strategies*	*Resources*
State Standard **Electric and Magnetic Phenomena** Electric and magnetic phenomena are related and have many practical applications. **5. <u>Students will provide evidence that they understand charge, current, and resistance.</u>** **5.1** Demonstrate how to build up charge using an electrostatic system. Showing how to make the system either positive or negatively charged. **5.2** Explain how electrons flow to build up charge in various situations. **5.3** Explain how electricity flows and what makes a good conductor or insulator. **5.4** Calculate all values of resistance for various arrangements.	<u>Comprehensive Activities</u> ***<u>Read Effectively</u>*** • Students will read and report on articles and web sites that are focused on energy ***<u>Collect and Analyze Data</u>*** Electrostatic Charge Lab • Students will explain how to build charge through conduction and induction • Students determine how to test for the charge on an object ***<u>Solve Problems</u>*** Resistance Lab • Students will calculate the resistance of various circuits • Students will construct circuits	**Pre-Assessment** • Pretests • Observations **Formative Assessments** • Student Work (Class work and Homework) • System Response Card Questionnaires • Inquiry Based Lab Work (Simulations or in class lab work) • Quizzes **Summative Assessments** • performance tasks • unit tests • semester exams • product/exhibits/displays • demonstrations	• Hewitt's Conceptual Physics **Read Effectively** • www.nicenet.org • New York Times Search **Electrostatic Charge Lab** • Electrostatics Lab Sheet • Electroscope • Glass Rod • Rubber Rod • Wool • Silk **Resistance Lab** • Resistance Lab Sheet • Resistors • Wire • Multimeter **PhET** • Balloons and Static Electricity • Electric field hockey

Physics in our World

Content Standard – Electrical Circuits

Performance Standards	*Sample Activities*	*Assessment Strategies*	*Resources*
State Standard **Electric and Magnetic Phenomena** Electric and magnetic phenomena are related and have many practical applications. **6. <u>Students will provide examples of simple circuits and determine the energy involved.</u>** **6.1** Explain the relationship among voltage, current and resistance in a simple series circuit. **6.2** Explain the relationship among voltage, current and resistance in a simple parallel circuit. **6.3** Explain the relationship among voltage, current and resistance in a simple combination circuit.	<u>Comprehensive Activities</u> ***<u>Read Effectively</u>*** • Students will read and report on articles and web sites that are focused on energy ***<u>Collect and Analyze Data</u>*** Basic Circuits Online Labs • Students will construct basic circuits and determine the paths for charges • Students will determine the relatively energy levels of light bulbs by determining their brightness	**Pre-Assessment** • Pretests • Observations **Formative Assessments** • Student Work (Class work and Homework) • System Response Card Questionnaires • Inquiry Based Lab Work (Simulations or in class lab work) • Quizzes **Summative Assessments** • performance tasks • unit tests • semester exams • product/exhibits/displays • demonstrations	• Hewitt's Conceptual Physics **Read Effectively** • www.nicenet.org • New York Times Search **PhET Simulations** • Circuit Construction Kit • Battery Resistor Circuit

Physics in our World

6.4 Explain how electricity is used to produce heat and light in incandescent bulbs and heating elements. **6.5** Calculate all values of voltage, current, resistance and power for a circuit.	***Solve Problems*** Circuit Analysis Lab • Students will calculate values for resistance, current, and voltage for various circuits and check values in a lab setting • Students will form strategies for solving values of resistance with limited equipment	**Pre-Assessment** • Pretests • Observations **Formative Assessments** • Student Work (Class work and Homework) • System Response Card Questionnaires • Inquiry Based Lab Work (Simulations or in class lab work) • Quizzes **Summative Assessments** • performance tasks • unit tests • semester exams • product/exhibits/displays • demonstrations	**Circuit Analysis Lab** • Resistors • Power Supply • Voltmeter • Ammeter • Wires

Physics in our World

Content Standard - Magnetism

Performance Standards	*Sample Activities*	*Assessment Strategies*	*Resources*
State Standard **Electric and Magnetic Phenomena** Electric and magnetic phenomena are related and have many practical applications. **7. <u>Identify the uses for magnets and how magnets are made</u>** **7.1** Identify uses for both permanent magnets and electromagnets. **7.2** Draw magnetic field lines for various situations. **7.3** Identify the relationship between current and magnetism. **7.4** Build and identify the basic components of an electromagnet. **7.5** Build and identify the parts of a motor. **7.6** Solve problems using the Right Hand Rules.	<u>Comprehensive Activities</u> ***<u>Read Effectively</u>*** • Students will read and report on articles and web sites that are focused on magnetism • Students will read information on permanent magnets and report what they have learned ***<u>Collect and Analyze Data</u>*** Electromagnet Lab • Students will determine the basic requirements of an electromagnet • Students will determine the factors that strengthen or weaken an electromagnet ***<u>Solve Problems</u>*** • Students will construct an electromagnet that will be graded on how much mass it can lift • Students will construct a motor that will be graded on how long it spins	**Pre-Assessment** • Pretests • Observations **Formative Assessments** • Student Work (Class work and Homework) • System Response Card Questionnaires • Inquiry Based Lab Work (Simulations or in class lab work) • Quizzes **Summative Assessments** • performance tasks • unit tests • semester exams • product/exhibits/displays • demonstrations	• Hewitt's Conceptual Physics **Read Effectively** • www.nicenet.org • New York Times Search **Electromagnetic Lab** • Electromagnetic Lab Sheet • Wire • Metal core material **PhET Simulations** • Magnet and Compass **Construction of Electromagnet and Motor** • Wire • Power Supply • Sand Paper • Magnets • Magnetic Materials • Iron Filings

Physics in our World

Content Standard – Electrical Energy Production

Performance Standards	*Sample Activities*	*Assessment Strategies*	*Resources*
State Standard **Electric and Magnetic Phenomena** Electric and magnetic phenomena are related and have many practical applications. **8. <u>Students will be able to explain the fundamentals of generators.</u>** **8.1** Student will use the Right Hand Rule to determine the requirements and directions for generator action. **8.2** Students will be able to explain what limits a generators output. **8.3** Students will explain the difference between AC and DC. **8.4** Students will explain the major types of power plants in the world.	<u>Comprehensive Activities</u> ***<u>Read Effectively</u>*** • Students will read and report on articles and web sites that are focused on energy production ***<u>Collect and Analyze Data</u>*** Faraday's Law Online Lab • Students will determine the requirements for generator action • Students will conduct basic experiments to test theories Generators • Students will investigate and report on the relationships between magnetism and electricity ***<u>Communicate Effectively</u>*** Power Plants • Students will investigate a specific type of power plant and report their results to the class	**Pre-Assessment** • Pretests • Observations **Formative Assessments** • Student Work (Class work and Homework) • System Response Card Questionnaires • Inquiry Based Lab Work (Simulations or in class lab work) • Quizzes **Summative Assessments** • performance tasks • unit tests • semester exams • product/exhibits/displays • demonstrations	• Hewitt's Conceptual Physics **Read Effectively** • www.nicenet.org • New York Times Search **PhET Simulations** • Faraday's Law • Faraday's Electromagnetic Lab

Physics in our World

Content Standard – Nuclear Power

Performance Standards	*Sample Activities*	*Assessment Strategies*	*Resources*
9. <u>Explain the basic operation of a Nuclear Power Plant</u> **9.1** Identify the basic components found in a Nuclear power plant. **9.2** Balance equations that involve nuclear fission. **9.3** Identify forms of radiation and balance equations that involve these forms. **9.4** Explain why a US reactor is inherently stable. **9.5** Investigate the Three Mile Island incident. **9.6** Investigate the Chernobyl Incident.	<u>Comprehensive Activities</u> ***<u>Read Effectively</u>*** • Students will read and report on articles and web sites that are focused on Nuclear Power • Students will read reports about the Three Mile Island incident. • Students will read reports about the Chernobyl incident ***<u>Collect and Analyze Data</u>*** Radioactive Half Life • Students will graphically determine the half life of a radioactive material	**Pre-Assessment** • Pretests • Observations **Formative Assessments** • Student Work (Class work and Homework) • System Response Card Questionnaires • Inquiry Based Lab Work (Simulations or in class lab work) • Quizzes **Summative Assessments** • performance tasks • unit tests • semester exams • product/exhibits/displays • demonstrations	• Hewitt's Conceptual Physics **Read Effectively** • www.nicenet.org • New York Times Search **PhET Simulations** • Alpha Decay • Beta Decay • Nuclear Fission **MIT iLabs** • http://openilabs.ilab.uq.edu.au/ServiceBroker/Home.aspx **PBS Three Mile Island** • http://www.pbs.org/wgbh/amex/three/timeline/index.html

Physics in our World

9. <u>Explain the basic operation of a Nuclear Power Plant</u> **9.1** Identify the basic components found in a Nuclear power plant. **9.2** Balance equations that involve nuclear fission. **9.3** Identify forms of radiation and balance equations that involve these forms. **9.4** Explain why a US reactor is inherently stable. **9.5** Investigate the Three Mile Island incident. **9.6** Investigate the Chernobyl Incident.	***<u>Solve Problems</u>*** • Students will determine the path a radioactive element goes through to become stable ***<u>Communicate Effectively</u>*** Chernobyl • Students will research and report on the effects of the Chernobyl incident	**Pre-Assessment** • Pretests • Observations **Formative Assessments** • Student Work (Class work and Homework) • System Response Card Questionnaires • Inquiry Based Lab Work (Simulations or in class lab work) • Quizzes **Summative Assessments** • performance tasks • unit tests • semester exams • product/exhibits/displays • demonstrations	• Hewitt's Conceptual Physics **Read Effectively** • www.nicenet.org • New York Times Search **PhET Simulations** • Alpha Decay • Beta Decay • Nuclear Fission **MIT iLabs** • http://openilabs.ilab.uq.edu.au/ServiceBroker/Home.aspx **PBS Three Mile Island** • http://www.pbs.org/wgbh/amex/three/timeline/index.html

Physics in our World

Content Standard – Energy Usage in the USA

Performance Standards	*Sample Activities*	*Assessment Strategies*	*Resources*
10. <u>Determine how much energy is used in the USA as compared to other countries</u> **10.1** Look at major uses of energy and how efficient they are. **10.2** Look at the effects on the environment. **10.3** Look at what other countries do to save energy. **10.4** Apply knowledge of previous sections to explain preferred methods of energy conservation. **10.5** Explain how the 2005 Energy Policy has shaped our future.	***<u>Read Effectively</u>*** • Students will read and report on articles and web sites that are focused on Conservation and using energy. These articles will focus on the USA or be in comparison with another country	**Pre-Assessment** • Pretests • Observations **Formative Assessments** • Student Work (Class work and Homework) • System Response Card Questionnaires • Inquiry Based Lab Work (Simulations or in class lab work) • Quizzes **Summative Assessments** • performance tasks • unit tests • semester exams • product/exhibits/displays • demonstrations	• Hewitt's Conceptual Physics **Read Effectively** • www.nicenet.org • New York Times Search

Physics in our World

Content Standard – Solar Power

Performance Standards	*Sample Activities*	*Assessment Strategies*	*Resources*
11. <u>Students will be able to explain the role of Solar Power in our community.</u> **11.1** Students will be able to describe the principles of Solar Energy. **11.2** Students will be able to explain, using a diagram, the method of using solar power to heat water. **11.3** Students will analyze the benefits and drawbacks of photovoltaic cells. **11.4** Students will discuss the future of solar energy in the USA	***<u>Read Effectively</u>*** • Students will read and report on articles and web sites that are focused on Conservation and using energy. These articles will focus on the USA or be in comparison with another country ***<u>Communicate Effectively</u>***	**Pre-Assessment** • Pretests • Observations **Formative Assessments** • Student Work (Class work and Homework) • System Response Card Questionnaires • Inquiry Based Lab Work (Simulations or in class lab work) • Quizzes **Summative Assessments** • performance tasks • unit tests • semester exams • product/exhibits/displays • demonstrations	• Hewitt's Conceptual Physics **Read Effectively** • www.nicenet.org • New York Times Search **Environmental Science 10th edition**

Physics in our World

Content Standard - Light

Performance Standards	*Sample Activities*	*Assessment Strategies*	*Resources*
State Standard **Waves** Waves have characteristic properties that do not depend on the type of wave. **12. <u>Students will identify and develop experiments that are based on the characteristics of waves.</u>** **12.1** Students will identify the basic parts of any wave (Wavelength, Amplitude, Frequency, and Period). **12.2** Student will diagram and calculate image formation based on the principle of refraction. **12.3** Students will calculate how bending of light when it passes into another material. **12.4** Students will analyze the path of a wave as it is reflected.	***<u>Read Effectively</u>*** • Students will read and report on articles and web sites that are focused on Conservation and using energy. These articles will focus on the USA or be in comparison with another country ***<u>Collect and Analyze Data</u>*** Snell's Law • Students will analyze the path of a light ray and find the index of refraction Convex Lenses • Students will calculate and diagram rays of light to determine image formation ***<u>Solve Problems</u>*** Lens Combinations • Students will construct set ups for combinations of lenses that will provide levels of magnification	**Pre-Assessment** • Pretests • Observations **Formative Assessments** • Student Work (Class work and Homework) • System Response Card Questionnaires • Inquiry Based Lab Work (Simulations or in class lab work) • Quizzes **Summative Assessments** • performance tasks • unit tests • semester exams • product/exhibits/displays • demonstrations	• Hewitt's Conceptual Physics **Read Effectively** • www.nicenet.org • New York Times Search **Snell's Law** • Laser • Ruler • Protractor • Prism **Convex lenses** • Lens • Candle • Meter Stick **Lens Combinations** • Lenses • Candle • Meter Stick

Physics in our World

Pacing Guide

September: Basic Terms and Forces

October: Energy

November: Temperature and Heat

December: Thermodynamics, Automobiles and other Heat Engines

January: Electrical Charge and Resistance

February: Electrical Circuits

March: Magnetism

April: Making Electricity (Generator Action), Energy Power Plants

May: Energy Use in the USA, Energy Conservation

June: Solar Energy, Light

Physics in our World

Essential Questions

1. How can we apply Newton's 2nd Law to various situations?

2. What are the forms of energy that we see in our lives?

3. How is energy transformed from one form to another?

4. What are the forms of heat?

5. How are temperature changes calculated for various situations?

6. How much energy is required to cause a phase change?

7. How does understanding thermal conduction help us?

8. What are the processes involved in a heat engine?

9. How is power determined in an electrical circuit?

10. Where is the knowledge of electromagnetism used in everyday life?

11. How is electricity made?

12. How does a power plant work?

13. As Americans, how much energy do we use?

14. How can we conserve energy?

Physics in our World

Course Syllabus

Physics in our World
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Welcome

Physics in our World is a demanding course that focuses on many of the major topics in physics. In this course we will spend time learning about energy and how it relates to the real world. The class time will be divided up into lecture, group work, and lab work.

Now that you are an upperclassman in high school I do not feel the need to go over any rules of conduct. This class is an elective so I hope you are here because you want to learn about the world of physics and that you understand the importance of what we are going to accomplish here.

Grading

To keep things simple (for me) I use a 'total points' grading system. Every assignment that you turn in will get returned with a fraction on top. The top number is the points you received while the bottom number is the total points you could have received. To determine your quarter grade you simply add up all the points you received during the quarter and divide by all the points you could have received during the quarter.
Or, if you do not want to do the math yourself, you can always check with me after class and I can show you your current grade.

Understand that different assignments are worth different amounts of points as shown:

TYPE	POINTS	FREQUENCY
• Tests	100 points each	every 2 or 3 weeks
• Labs	50 points each (normally)	1 a week
• Homework	20-40 points	1 a week
• Class work	5-20 points	most days
• Quizzes	20 points each	whenever

As long as work is turned in on time, there is no major grade that is written in stone. The goal of this class is to teach you physics. If you do poorly on an exam or lab but feel you could do better, you simply need to speak with me about your grade. If you can show that you learned the required information then we can adjust the grade.

Labs

Lab experiments will focus on two main ideas:

- Understanding how to perform the lab
- Understanding what the results are showing me

With this in mind, there are two points I would like to make about my expectations:

1. Most labs performed in this class with have built in check points. At these checkpoints, you are required to stop and call me over so that I can see if you are on the right track. If things are going well then I will simply initial at the check point and you can keep going. It is also possible that I will ask you to re-do some of the work that got you to that point. Most likely, I will point out what I disagree with and why. I look at check points as an opportunity for discussion about the lab and the topic we are currently working on. You will **NOT** get credit for sections of a lab that have not been initialed.

2. Most labs performed will be followed by a lab quiz. This is your opportunity to show you understood what the results are indicating and basically what the point of the lab was. When taking a lab quiz you will be allowed to have your lab in front of you but, of course, you cannot talk with your lab partner. These quizzes will NOT ask you to copy results from your lab. Because of the built in check points it should be understood that when the lab is finished the information is correct. The quiz will focus on what that information is telling you and how the information goes along with what has previously been discussed in class.

3. Lab Partners – Your lab partner is the person that is at your table on the same side of the table as you. If there are only 3 people at your table then you 3 are a lab team. Labs are performed in groups of two or three students, never more and rarely less. If you are out, you still need to complete all parts of the lab. No one should be 'getting you caught up'.

Tests

I would hope everyone does well on each test. But, if you do poorly on an exam, there are two expectations that I have for you:

1. You go over your exam and fix ALL of your mistakes.
2. You "re-test" or take another test that will be similar in content.

If you accomplish these things then I will be happy to establish a new grade for your test.

Usually I take the average of the old test and the new test.

This option is ALWAYS available regardless of your first test score but it is EXPECTED if you score less than 70%.

Behavior

The class that you have signed up for is designed to be hands on. Along with this there is a large component of group work. With this in mind it is easy to get distracted by discussions and news that would be better for outside of the classroom. I would hope everyone in this class has the maturity to handle what is expected. When class starts please be ready to begin with a clear workspace that is void of any possible distractions.

Cell phones will not be used in the classroom in any way. Have an actual calculator when it is needed.

Physics in our World

Skills Objectives

- **Read Effectively** – Students will need to read articles that are centered on our need for energy and analyze what they have read. A rubric is provided.

- **Collect and Analyze Data** – Students will perform lab experiments where they will have to think critically about their work. Students will be given a lab quiz at the end of each lab to ensure connections are made between the lab and the current material.

- **Solve Problems** – Students will apply prior knowledge in order to solve problems presented in class. They might be asked to perform calculations based on collected data and provided data. Also, students might need to graph data to arrive at a solution or construct a device. In order to solve problems, students will need to be able to synthesize class learning, lab work, and mathematical skills

- **Communicate Effectively** – Students will present information to the class in an organized, well thought out manner

- **Learn Independently** – Lab experiments in this class are designed to teach new concepts. Students will have to collect and analyze data (above). Then, they will need to evaluate what their results mean and synthesize that new information with past topics.

Physics in our World

Assessments

- **Personal Response Cards** – Data will be collected through the use of response cards. Class averages, class averages per questions, and individual student grades can be quickly obtained. Response cards will be used at least bi weekly.

- **Lab Quizzes** – Lab Quizzes will be used after every inquiry based lab experiment. The purpose of the lab quiz is to assess the class' learning during the lab and also to give emphasis to self learning.

- **Exams** – Students will be assessed in a formal exam at the end of every section.