NHPS Physics CURRICULUM OVERVIEW To be Revised 07-08 I) Traditional Physics (Honors/Academic) II)Physics for All (Academic/Conceptual)

# **Physics Curriculum Outline 2001**

Unit 1: Skills and Concepts

**Topics**: Scientific Notation Metric System Graphs and Charts Equation Manipulation Laboratory Safety

# Performance Standards:

After completing this unit the student will be able to:

- 1. Demonstrate the ability to use scientific notation.
- 2. Perform arithmetic operations.
- 3. State the fundamental metric system units of time, length, mass and volume.
- 4. Prepare tables, charts, and graphs and read and interpret data.
- 5. Demonstrate knowledge of safety rules by following them in the laboratory.

# Activities:

- 1. Paper Tower
- 2. Reaction Time

#### Unit 2: Mechanics

Topics:Scalars and Vectors<br/>Kinematics (Motion)<br/>Newton's Laws of Motion<br/>Energy, Work and Power<br/>Impulse and Momentum<br/>Universal Gravitation

#### Performance Standards:

After completing this unit the student will be able to:

- 1. Differentiate between vector and scalar quantities.
- 2. Add vectors graphically and analytically.
- 3. Resolve a vector into its horizontal (x) and vertical (y) components.
- 4. Differentiate between displacement, distance, velocity, and speed.
- 5. Calculate the velocity of a moving object.
- 6. Plot and interpret a velocity-time graph.
- 7. Differentiate between instantaneous and average velocity.
- 8. Determine the velocity and displacement for objects under constant acceleration.
- 9. Learn to use an organized strategy for solving motion problems.
- 10. State Newton's three Law's of Motion and display an understanding of their applications.
- 11. Use Newton's Laws of Motion in solving problems.
- 12. Calculate the work done by a force.
- 13. Differentiate between work and power.
- 14. Define kinetic and potential energy.
- 15. Apply work-energy theorem.
- 16. State the law of conservation of energy.
- 17. Apply the law of conservation of energy to mechanical systems.
- 18. Demonstrate knowledge of the way simple machines are useful.
- 19. Define momentum and impulse.
- 20. Use the momentum-impulse theorem to calculate the changes in momentum.
- 21. Demonstrate the difference between elastic and inelastic collisions.
- 22. Recognize how Kepler's Laws resulted in Newton's Laws of Gravitation.
- 23. State that gravitational force is proportional to both masses and the inverse square of the distance between the centers of spherical bodies.

# Activities:

- 1. Finding the resultant vector.
- 2. The elevator ride.

- 3. Getting straight.
- 4. Your power
- 5. Playground/Amusement Park Physics

#### **Demonstrations:**

- 1. Momentum conservation
- 2. Collisions
- 3. Newton's Second Law

# Laboratory Experiments:

- 1. Calculating Coefficients of friction.
- 2. Two-Dimensional motion.
- 3. Velocity and Acceleration
- 4. Gravitational experiment
- 5. Projectile experiment
- 6. Pendulum experiment
- 7. Slinky Lab

#### Unit 3: Waves

Topics: Wave Properties Types of Waves Wave Interference Reflection and Refraction Sound Light

#### **Performance Standards:**

After completing this unit the student will be able to:

- 1. Define wavelength, frequency, period and amplitude.
- 2. Distinguish between longitudinal and transverse waves.
- 3. Demonstrate that wave speed depends upon the medium.
- 4. State the law of reflection.
- 5. Describe refraction in terms of behavior of a transmitted wave.
- 6. Define defraction of a wave around a barrier.
- 7. Relate physical properties of sound waves to perceived pitch and loudness.
- 8. Define the Doppler shift and identify some applications.
- 9. Show an understanding of resonance.
- 10. Identify the parts of the ear and the function of each in detecting sound.
- 11. Define transparent, translucent, and opaque.
- 12. Demonstrate the formation of color by addition of light and by subtraction by pigments and dyes.
- 13. Describe methods of producing polarized light.
- 14. Predict whether a ray will be bent toward or away from normal when light moves from one medium to another.
- 15. Describe the image produced by a plane mirror.
- 16. Explain how concave mirrors form real and virtual images.
- 17. Explain how convex mirrors form virtual images using ray diagrams.

# Activities:

1. Waves on a Snaky

# **Demonstrations:**

- Doppler Effect
   Frequency
   Resonance

- 4. Mixing colored light

# Laboratory Experiments:

- Bending of Light
   Determining the speed of sound

# Unit 4: Electricity and Magnetism

Topics:Charges<br/>Static Electricity<br/>Coulomb's Law<br/>Current, Voltage, and Resistance<br/>Ohm's Law<br/>Series and Parallel Circuits<br/>Electromagnetism<br/>Motors and Generators

#### **Performance Standards:**

After completing this unit the student will be able to:

- 1. Recognize the basic properties of electrical interaction.
- 2. Demonstrate how to charge an object.
- 3. State the difference between conductors and insulators.
- 4. State Coulomb's Law and how the force depends on the charges and their separation.
- 5. Define an electric current and the ampere.
- 6. Solve problems involving current, voltage, resistance, and power.
- 7. Describe Ohm's Law.
- 8. Diagram simple electric circuits.
- 9. Describe a series connection.
- 10. Calculate current, voltage drops and equivalent resistance when devices are connected in series.
- 11. Describe a parallel connection.
- 12. Calculate current, voltage drops and equivalent resistance when devices are connected in parallel.
- 13. Describe magnetic fields around permanent magnets and between like and unlike poles.
- 14. Explain the design and operation of an electric motor.
- 15. Explain how an electric generator works and how it differs from an electric motor.

# **Demonstrations:**

1. Tesla coil or balloon static

#### Laboratory Experiments:

- 1. Coulomb's Law
- 2. Circuits
- 3. What's the Charge?
- 4. Light Intensity

#### **Teacher Strategies**

- 1. Lecture/Discussion/Overhead Presentation
- 2. Small-group work/Cooperative Learning
- 3. Manipulatives
- 4. Independent Study/Projects
- 5. Technology/Scientific Advancements
- 6. Questioning Teacher/Student dialogue, developing critical thinking skills
- 7. Facilitating Active Scientific Inquiry

#### Assessment

I. Performance Based Assessment of Laboratory Reports, Projects, Written Workincluding Research Papers and Essays, and Oral Presentations/Communication

Rubrics—Holistic and Analytical

- Student Self-Assessments
- Teacher Evaluation of Product
- I. Traditional
  - Chapter/Unit Exams
  - Quizzes
  - Homework
  - Mid-term and Final Exams
- I. Direct Observation of Groupwork
  - Cooperative Learning groups

#### I. Grading

- Mid-term and Final Exams are each 10% of the final grade for the course.
- Each Marking Period Grade is 20% of the final grade for the course.
- Each Marking Period Grade varies according to the needs of the group: generally 30-60% Written Work, 20-40% Tests/Quizzes, 20-50% Laboratory Activities, and 10-20% Class Participation/Presentations.

# Resources

Brueningsen, Chris & Wesley Krawiec. TI: Exploring Physics and Math with CBL System.

Brueningsen C., Bower B., Antinone L., and Brueningsen E. <u>TI: Real World Math with CBL &</u> <u>TI 82</u>.

Zitzewitz, Paul. Physics: Principles and Problems, Glencoe, 1992.

# ACADEMIC/CONCEPTUAL PHYSICS

Physics is the most basic of sciences. It is the study of the physical world, the interrelationship between matter and energy. Topics included in the study of Physics include the theoretical and experimental study of motion and forces, friction and momentum, fluid dynamics, thermodynamics and heat, wave motion, sound, light and optics, electromagnetism and modern physics. An integral part of the course is extensive laboratory experiments with a variety of equipment, from simple to highly technological. Students are expected to mathematically analyze physical phenomena and apply the laws of physics. Students will work with scientific concepts by analyzing data, solving problems, group work and discussion and extensive applications of math and writing.

Throughout the course students work in cooperatively to investigate physical phenomena, collect and analyze data and draw conclusions. Students also apply physics to real world situations, and use their experiences to make decisions. All students who plan any type of scientific, medical or engineering career should complete a high school physics course.

Honors students are expected to complete extensive projects, be independently motivated, and have high-level math ability.

#### **Prerequisites:**

C or better in Algebra I, completion of Geometry completion or concurrent enrollment in Chemistry

(Honors) B or better in Algebra I, completion of Algebra II. C or better in Chemistry Science Department recommendation

(see www.richtherrn.net/physics)

Beginning Curriculum Map		Subject: PHYSICS	Grade: 11-12 :	
	August/September		October	
Essential Questions	How do we analyze moving objects? What makes a good observation, measurement and experiment in physics?		Should I speed up or slow down at a yellow light? How can physics be used to analyze motion and traffic?	
Content	-Properties and measurement -Graphing -Graphing of motion -Distance and Velocity		-One Dimensional Acceleration (Kinematics) - Relative Motion	
Objectives	<ul> <li>-use measuring devices and see and record physical properties</li> <li>-Develop an understanding of measurements and units used</li> <li>-Design and conduct a good p experiment.</li> <li>-Use distance time and velocit analyze moving objects</li> <li>-Be able to explain speed (vel- acceleration.</li> </ul>	enses to observe of matter the in physics hysics ty time graphs to ocity), time, and	<ul> <li>-continue using math, measurement, observation and experimentation skills to analyze moving objects.</li> <li>-use computer assisted technology to analyze moving objects.</li> <li>-develop the relationships between the variables involved in moving objects.</li> <li>-use algebraic equations to solve simple one dimensional motion word problems.</li> <li>-use physics to make predictions about accelerated objects.</li> <li>-use research skills and algebra to apply knowledge of accelerated motion to a real life situation.</li> <li>-determine what factors affect the acceleration due to gravity.</li> </ul>	
Instructional Strategies/ Activities	-gyroscope investigation -science sleuth day at the race -moving on down car lab (ope -stump the teacher, design ow -graphing motion lab with gra calculators. -graphing motion activities	s m ended) n unit activities phing	<ul> <li>-Interactive Physics with accelerated motion</li> <li>-Rolling Down ramp lab with "Where Will They Collide?" and "Half The Trip" components.</li> <li>- Determination of g gravity lab. (open ended)</li> <li>- word problem group activities</li> <li>-Yellow Light Project</li> <li>-Long Term Traffic Study</li> </ul>	
Assessment Types	-moving on down car lab (schoolwide rubric) -group lab activities -essay on speed in life (schoolwide rubric) -quizzes and tests		-labs, including g lab (schoolwide rubric) -word problems -Yellow Light Project -essay on traffic (schoolwide rubric) -test	
Science Inquiry Skills	ALL (numeracy, experimenta measurement, communication	tion, , society)	ALL (numeracy, experimentation, measurement, communication, society)	
Interdisciplinary Connections	MATH		MATH SOCIAL STUDIES	

Beginning Curriculum	Мар	Subject:	Grade: 11-12	
		PHYSICS		
	Norman	I	December	
	November		December	
Essential Questions	Why is all motion relative?		What makes things move?	
	How can we analyze two dime	ensional motion?	What are the fundamental forces?	
	How can I use physics to shoo	ot a dart gun at	How do Newton's Laws predict the behavior of moving	
	my teacher?		objects?	
			How do other forces (air resistance/friction) affect moving	
Contont	Palativa Mation		Ecross	
Content	Special Pelativity		-rolles	
	-Special Kelativity		-Air Resistance/Friction	
	-Projectile Motion			
Objectives	1 continue using math mean	surement	1 continue using math measurement observation and	
	observation and experiment	ation skills to	experimentation skills to analyze moving objects.	
	analyze moving objects.		2. use computer assisted technology to analyze moving	
	2. use computer assisted tech	nology to	objects.	
	analyze moving objects.	80	3. explain the fundamental forces in the universe.	
	3. use the concepts of relativ	e motion.	4. use Newton's Laws to explain the relationship	
	4. be able to explain the con	sequences of	between force, mass and acceleration.	
	special relativity for moving	objects.	5. be able to predict the results of air resistance	
	5. use vectors to analyze 2 dimensional		(terminal velocity)	
	motion.		6. find out what factors affect friction	
	6. determine the results of p	rojectile motion	7. use physics to analyze Santa Claus	
	using x and y sets of kinema	tic equations.		
Instructional	-Relative Motion on Interactiv	ve Physics	-movie/reading on fundamental field forces.	
Strategies/	-Special Relativity Movies and	d Readings.	-Newton's Laws Investigation	
Activities	-Vector Mapping Lab and Cla	ss Races.	- I erminal Velocity Lab (interactive physics and real	
	-Projectile Lab (Ball off a Tab	ole), using 2D.	(coffee filters/balloons) ).	
	-Dart Gun Lab The Firing Sq	uad	-Determination of Friction Lab	
	-vector movie -Three sets of word problems and group		- I free sets of word problems and group sneets.	
			-Physics of Santa activity	
	sheets			
Assessment Types	-Group Labs (Vector, relative	Projectile)	-Homework and group class work	
	-Individual Lab "Firing Squad	" (schoolwide	-Group Labs	
	rubric)	× ··· ···	-Individual Labs (Friction) (schoolwide rubric)	
	-Homework checks		-Quiz	
	quiz and test			

Science Inquiry Skills	ALL (numeracy, experimentation, measurement, communication, society)	ALL (numeracy, experimentation, measurement, communication, society)
Interdisciplinary Connections	МАТН	МАТН

Beginning Curriculum	Мар	Subject:	Grade: 11-12		
		PHYSICS			
	January		February		
Essential Questions	How can physics be used to analyze traffic collisions?		How much energy does my life use in a week? Should we use simple machines? How are mechanical energy transformations analyzed and how do they affect your life?		
Content	Forces (continued) Conservation of Momentum Collisions		-Energy -Work and Mechanical Advantage -Simple and Complex Machines -Mechanical Energy		
Objectives	<ol> <li>continue using math, mea observation and experiment analyze moving objects.</li> <li>use computer assisted tech analyze moving objects.</li> <li>determine all the forces an including momentum, on a ri- 4. use the principle of conser- momentum in elastic and in- collisions.</li> <li>determine all the factors i common collisions, and use evaluate.</li> </ol>	surement, ation skills to hnology to nd properties, moving object. rvation of elastic nvolved in physics to	<ol> <li>describe how energy is transformed and conserved in everyday life and technology.</li> <li>explain the use of machines to gain mechanical advantage and in assisting society.</li> <li>analyze the transformations of mechanical energy (kinetic, gravitational and elastic) in moving objects.</li> <li>relate the different types of energy and how they are measured.</li> </ol>		
Instructional Strategies/ Activities	-conservation of momentum la -pool game activity -collision of cars activity -police/traffic investigation -videodisc science sleuth traff	ab. ĭc accident	<ul> <li>-energy transformations in society discussion, video and activity.</li> <li>-simple and complex machines lab</li> <li>-word problems on mechanical energy and work.</li> <li>-science sleuths collapsing bleachers, moving monuments.</li> <li>-energy of bouncing ball lab, energy of elastic ball lab</li> <li>-Energy in Life Project</li> <li>-Rube Goldberg competition and videos</li> </ul>		
Assessment Types	-one set of word problems -traffic study (pt 2) -group labs -test		<ul> <li>group labs</li> <li>two sets of word problems</li> <li>use of complex machines in society essay (schoolwide rubric)</li> <li>test</li> </ul>		

Science Inquiry Skills	ALL (numeracy, experimentation, measurement, communication, society	ALL (numeracy, experimentation, measurement, communication, society)	
Interdisciplinary Connections	MATH SOCIAL STUDIES	MATH TECH ED SOCIAL STUDIES ART	

Beginning Curriculum	Map	Subject: PHYSICS	Grade: 11-12	
	March		April	
Essential Questions	<ul> <li>How much energy does my life use in one week?</li> <li>How are energy transformations analyzed and how do they affect your life?</li> <li>How do we get and use electricity?</li> <li>How do we get and use heat?</li> </ul>		How is fluid pressure like energy? How can we use physics to make things fly? How do we analyze simple harmonic oscillators and wave motion, and how can they be useful?	
Content	-Energy transformations (cont) -Electricity, electric generation, circuits -Heat and thermodynamics		-Pressure and density -Bernouilli's Principle and flight -Simple harmonic oscillators -Wave Motion	
Objectives	<ol> <li>analyze energy transformations in electricity and heat.</li> <li>explain basic concepts of power, current, voltage, resistance in electrical circuits and relate it to mechanical energy.</li> <li>describe the energy transformations needed to generate electricity for our devices.</li> <li>analyze series and parallel circuits.</li> <li>explain the concepts of heat transfer</li> <li>relate the laws of thermodynamics and work</li> </ol>		<ol> <li>A construction of energy.</li> <li>Conservation of energy.</li> <li>Use fluid pressure principles to analyze flight</li> <li>A describe and analyze the behavior of simple harmonic oscillator systems, such as pendulums and springs.</li> <li>describe the property of waves</li> </ol>	
Instructional Strategies/ Activities	-electrical investigations onlin -science sleuth energy myster -electric generator/motor dem -electric circuit lab -Energy to take a shower activ -Energy in Life Project -Heat and Work Lab (specific -Newton's Law of Cooling La -science sleuth burning barn	ne y house o/lab vity heat) ab	<ul> <li>-pressure investigation with water and bottles.</li> <li>-pressure word problems and conceptual questions.</li> <li>-videos and notes on flight.</li> <li>-paper airplane contest.</li> <li>-lab with pendulum and spring</li> <li>-wave motion problems.</li> <li>-wave tank labs.</li> </ul>	
Assessment Types	-essay on energy use in life (s rubric) -group labs (electric, heat) -Individual lab: Heat Cooling	chool-wide (School-wide	-group labs -word problem sets -individual lab (school-wide rubric) -test	

	rubric) -Conceptual question sets (three) on heat -electric word problems -Energy in Life Project, and discussion/forum -Test	
Science Inquiry Skills	ALL (numeracy, experimentation, measurement, communication, society)	ALL (numeracy, experimentation, measurement, communication, society)
Interdisciplinary Connections	MATH HEALTH SOCIAL STUDIES	MATH TECH ED

Beginning Curriculum	Мар	Subject: PHYSICS	Grade: 11-12
	Mav		June
Essential Questions	How can we build better rides at an amusement park? How are all types of waves related? How do sound waves make music?		What causes us to see the things we do?
Content	-Circular Motion -Sound Waves -Music		-Light production -color -reflection and refraction -polarization
Objectives	<ol> <li>relate motion, waves and circular motion with frequency, period and wavelength.</li> <li>use principles of physics in designing and analyzing amusement park rides.</li> <li>explain the cause of different sounds.</li> <li>describe and predict music</li> </ol>		<ol> <li>explain how light is produced and perceived</li> <li>describe applications of color addition and subtraction</li> <li>use the principles of reflection and refraction to analyze light.</li> </ol>
Instructional Strategies/ Activities	-circular motion investigation -design roller coaster lab -Lake Compounce Amusement Park Field trip -circular motion word problems -sound wave notes -computer analysis of sound activity. -resonance sound lab -musical instrument study -science sleuths poises in school		-Light notes -Color/Spectra Lab -Dark Suckers -Mirror/Lenses Lab -Group Laser Challenge - science sleuth fogged filters
Assessment Types	-group labs -design process worksheets -word problem and classwork checks -quiz (circular)		-group labs -conceptual question sheets -essay on application of light and sound waves (school- wide rubric) -Test
Science Inquiry Skills	ALL (numeracy, experimental measurement, communication	tion, , society)	ALL (numeracy, experimentation, measurement, communication, society)
Interdisciplinary Connections	MATH MUSIC		MATH ART

PHYSICS CURRICULUM TEMPLATE Essential Questions: How do we analyze moving objects? What makes a good observation, measurement and experiment in physics?

OBJECTIVES	CORRESPONDI	RECOMMENDED	ASSESSMENT	TIMELINES	RESOURCES
	NG	INSTRUCTIONAL	TOOL		
	CT	STRATEGIES			
	FRAMEWORKS				
1. use measuring		1. gyroscope	moving on down	2 weeks	lab equipment
devices and senses		investigation	car lab (school-		videodisc
to observe and		2. science sleuth day at	wide rubric)		computers
record physical		the races	-group lab		labpros
properties of		3. moving on down car	activities		measuring tools
matter		lab (open ended)	-essay on speed in		teacher made labs
2. Develop an		4. stump the teacher,	life (school-wide		and sheets
understanding of		design own unit	rubric)		
the measurements		activities	-quizzes and tests		
and units used in					
physics					
3. Design and					
conduct a good					
physics experiment.		1 1			1.1 · /
		1. graphing motion lab		2 weeks	lab equipment
A IT Pataway days		with graphing			videodisc
4. Use distance time		calculators.			
and velocity time		2. graphing motion			labpros
graphs to analyze		activities			measuring tools
5 Do oblo to					teacher made labs
5. De able to					and sheets
explain speed					
(velocity), time, and					
acceleration.					

**Essential Questions**: Should I speed up or slow down at a yellow light? How can physics be used to analyze motion and traffic

OBJECTIVES	CORRESP	RECOMMENDED	ASSESSMENT	TIMELINES	RESOURCES
	ONDING	INSTRUCTIONAL	TOOL		
	СТ	STRATEGIES			
	FRAMEW				
	ORKS				
1. continue using math,		-Interactive Physics	labs, including g	4 weeks	lab equipment
measurement,		with accelerated motion	lab (school-wide		videodisc
observation and		-Rolling Down ramp	rubric)		computers
experimentation skills to		lab with "Where Will	-word problems		labpros
analyze moving objects.		They Collide?" and	-Yellow Light		measuring tools
2. use computer assisted		"Half The Trip"	Project		teacher made labs
technology to analyze		components.	-essay on traffic		and sheets
moving objects.		- Determination of g	(school-wide		
3. develop the		gravity lab. (open	rubric)		
relationships between the		ended)	-test		
variables involved in		- word problem group			
moving objects.		activities			
4. use algebraic equations		-Yellow Light Project			
to solve simple one		-Long Term Traffic			
dimensional motion word		Study			
problems.					
5. use physics to make					
predictions about					
accelerated objects.					
6. use research skills and					
algebra to apply					
knowledge of accelerated					
motion to a real life					
situation.					
7. determine what factors					
affect the acceleration					
due to gravity					

Essential Questions: Why is all motion relative? How can we analyze two dimensional motion?

OBJECTIVES	CORRESPONDI	RECOMMENDED	ASSESSMENT	TIMELINES	RESOURCES
	NG	INSTRUCTIONAL	TOOL		
	СТ	STRATEGIES			
	FRAMEWORKS				
1. continue using		Relative Motion on	-Group Labs	4 weeks	lab equipment
math,		Interactive Physics	(Vector, relative,		videodisc
measurement,		-Special Relativity	Projectile)		computers
observation and		Movies and Readings.	-Individual Lab		labpros
experimentation		-Vector Mapping Lab	"Firing Squad"		measuring tools
skills to analyze		and Class Races.	(schoolwide rubric)		teacher made labs
moving objects.		-Projectile Lab (Ball off	-Homework checks		and sheets
2. use computer		a Table), using 2D.	quiz and test		
assisted technology		-Dart Gun Lab "The			
to analyze moving		Firing Squad"			
objects.		-vector movie			
3. use the concepts		-Three sets of word			
of relative motion.		problems and group			
4. be able to		sheets			
explain the					
consequences of					
special relativity					
for moving objects.					
5. use vectors to					
analyze 2					
dimensional					
motion.					
6. determine the					
results of projectile					
motion using x and					
y sets of kinematic					
equations.					

OBJECTIVES	CORRESPONDIN	RECOMMENDED	ASSESSMENT	TIMELINES	RESOURCES
	G	INSTRUCTIONAL	TOOL		
	СТ	STRATEGIES			
	FRAMEWORKS				
1. continue using		-movie/reading on	-Homework and	3 weeks	lab equipment
math, measurement,		fundamental field	group class work.		videodisc
observation and		forces.	-Group Labs		computers
experimentation skills		-Newton's Laws	-Individual Labs		labpros
to analyze moving		Investigation	(Friction)		measuring tools
objects.		-Terminal Velocity	(schoolwide		teacher made
2. use computer		Lab (interactive	rubric)		labs and sheets
assisted technology to		physics and real	-Quiz		
analyze moving		(coffee			
objects.		filters/balloons) ).			
3. explain the		-Determination of			
fundamental forces in		Friction Lab			
the universe.		-Three sets of word			
4. use Newton's Laws		problems and group			
to explain the		sheets.			
relationship between		-Physics of Santa			
force, mass and		activity			
acceleration.					
5. be able to predict					
the results of air					
resistance (terminal					
velocity)					
6. find out what					
factors affect friction					
7. use physics to					
analyze Santa Claus					

Essential Question: How can physics be used to analyze traffic collisions?

OBJECTIVES	CORRESPONDIN	RECOMMENDED	ASSESSMENT	TIMELINES	RESOURCES
	G	INSTRUCTIONAL	TOOL		
	СТ	STRATEGIES			
	FRAMEWORKS				
1. continue using math, measurement, observation and experimentation skills to analyze moving objects. 2. use computer assisted technology to analyze moving objects.	FRAMEWORKS	-conservation of momentum lab. -pool game activity -collision of cars activity -police/traffic investigation -videodisc science sleuth traffic accident	-one set of word problems -traffic study (pt 2) -group labs -test	3 weeks	lab equipment videodisc computers labpros measuring tools teacher made labs and sheets
<ol> <li>3. determine all the forces and properties, including momentum, on a moving object.</li> <li>4. use the principle of conservation of momentum in elastic and inelastic collisions.</li> <li>5. determine all the factors involved in common collisions, and use physics to evaluate.</li> </ol>			MIDTERM EXAM: Motion, Forces		

Essential Questions: How much energy does my life use in a week? Should we use simple machines? How are mechanical energy transformations analyzed and how do they affect your life?

OBJECTIVES	CORRESPONDIN	RECOMMENDED	ASSESSMENT	TIMELINES	RESOURCE
	G	INSTRUCTIONAL	TOOL		
	СТ	STRATEGIES			
	FRAMEWORKS				
1. describe how energy		1. energy	- group labs	3 weeks	lab equipment
is transformed and		transformations in	-two sets of word		videodisc
conserved in everyday		society discussion,	problems		computers
life and technology.		video and activity.	-use of complex		labpros
2. explain the use of		2. simple and complex	machines in society		measuring
machines to gain		machines lab	essay (school-wide		tools
mechanical advantage		3. word problems on	rubric)		teacher made
and in assisting society.		mechanical energy and	-test		labs and sheets
3. analyze the		work.			
transformations of		4. science sleuths			
mechanical energy		collapsing bleachers,			
(kinetic, gravitational		moving monuments.			
and elastic) in moving		5. energy of bouncing			
objects.		ball lab, energy of			
4. relate the different		elastic ball lab			
types of energy and		6. Energy in Life Project			
how they are		7.Rube Goldberg			
measured.		competition and videos			

Essential Questions: How much energy does my life use in one week? How are energy transformations analyzed and how do they affect your life? How do we get and use electricity? How do we get and use heat?

OBJECTIVES	CORRESPONDIN	RECOMMENDED	ASSESSMENT	TIMELINES	RESOURCES
	G	INSTRUCTIONAL	TOOL		
	СТ	STRATEGIES			
	FRAMEWORKS				
1. analyze energy		electrical	-essay on energy	4 weeks	lab equipment
transformations in		investigations online	use in life		videodisc
electricity and heat.		-science sleuth	(schoolwide		computers
2. explain basic concepts		energy mystery	rubric)		labpros
of power, current,		house	-group labs		measuring tools
voltage, resistance in		-electric	(electric, heat)		teacher made
electrical circuits and		generator/motor	-Individual lab:		labs and sheets
relate it to mechanical		demo/lab	Heat Cooling		
energy.		-electric circuit lab	(Schoolwide		
3. describe the energy		-Energy to take a	rubric)		
transformations needed		shower activity	-Conceptual		
to generate electricity		-Energy in Life	question sets		
for our devices.		Project	(three) on heat		
4. analyze series and		-Heat and Work Lab	-electric word		
parallel circuits.		(specific heat)	problems		
5. explain the concepts		-Newtons Law of	-Energy in Life		
of heat transfer		Cooling Lab	Project, and		
6. relate the laws of		-science sleuth	discussion/forum		
thermodynamics and		burning barn	-Test		
work					

Essential Questions: How is fluid pressure like energy? How can we use physics to make things fly? How do we analyze simple harmonic oscillators and wave motion, and how can they be

useful?

OBJECTIVES	CORRESPONDIN	RECOMMENDED	ASSESSMENT	TIMELINES	RESOURCES
	G	INSTRUCTIONAL	TOOL		
	СТ	STRATEGIES			
	FRAMEWORKS				
1. explain the units and		1. pressure	-group labs	2 weeks	lab equipment
measurements of		investigation with	-word problem		videodisc
pressure and density.		water and bottles.	sets		computers
2. describe how		2.pressure word	-test		labpros
Bernouilli's Principle		problems and			measuring tools
is a restatement of the		conceptual			teacher made labs
conservation of energy.		questions.			and sheets
3. use fluid pressure		3. videos and notes			
principles to analyze		on flight.			
flight		4. paper airplane			
		contest			
1. describe and analyze		1 1 1 1 1	1 11		
the behavior of simple		1. sho lab with	-word problem	2 weeks	
narmonic oscillator		pendulum and spring	sets		
systems, such as		2. wave motion	-test		
pendulums and		problems.	-individual lab		
springs.		3. wave tank labs.	(SNO)		
2. describe the			(schoolwide		
property of waves			rubric)		

PHYSICS CURRICULUM

Essential Questions: How can we build better rides at an amusement park? How are all types of waves related? How do sound waves make music?

OBJECTIVES	CORRESPONDIN	RECOMMENDED	ASSESSMENT	TIMELINES	RESOURCES
	G	INSTRUCTIONAL	TOOL		
	СТ	STRATEGIES			
	FRAMEWORKS				
1. relate sho		-circular motion	-group labs		lab equipment
motion, waves		investigation	-design process		videodisc
and circular		-design roller coaster	worksheets		computers
motion with		lab	-word problem		labpros
frequency, period		-Lake Compounce	and classwork		measuring tools
and wavelength.		Amusement Park	checks		teacher made labs
2. use principles		Field trip	-quiz (circular)		and sheets
of physics in		-circular motion			
analyzing		word problems			
allalyzilig amusamant nark					
rides			-group labs		
Thues.			-word problem		
			and classwork		
			checks		
1. explain the		-sound wave notes	-quiz (sound)		
cause of different		-computer analysis	1 ( )		
sounds.		of sound activity.			
2. describe and		-resonance sound lab			
predict music		-musical instrument			
		study			
		science sleuths			
		noises in school			

Essential Questions: What causes us to see the things we do?

OBJECTIVES	CORRESPONDIN G CT FRAMEWORKS	RECOMMENDED INSTRUCTIONAL STRATEGIES	ASSESSMENT TOOL	TIMELINES	RESOURCES
1. explain how		-Light notes	-group labs	2 weeks	lab equipment
light is		-Color/Spectra Lab	-conceptual		videodisc