



Manhattan Center for Science and Math High School

Science Department Curriculum

Content/Discipline PHYSICS

<http://mcsportal.net>

Marking Period 1

Topic and Essential Question: Characterizing Motion

Unit/Topics

- What is physics?
- What factors affect the period of a pendulum?
- How can we better apply “operational definitions?” *ESL strategy: mind map*
- What evidence can we cite for uniform motion? *ESL strategy: vocabulary scaffolding*
- What evidence can we cite for non-uniform motion?
- How can we operationally define velocity?
- How can we operationally define acceleration?

SWBAT/Objectives

- Construct and interpret graphs of position, velocity, or acceleration versus time
- Determine and interpret the slopes and areas of motion graphs
- Devise ways of making observations to test proposed explanations (S2.1)
- Use various means of representing and organizing observations (e.g., diagrams, tables, charts, graphs) and insightfully interpret the organized data (S3.1)

Vocabulary/Key Terms

Operational Definition, Length, Area, Position, Displacement, Instant of Time, Duration of Time, Velocity, Acceleration, Period

Assessments:

Regents Based Questions, Lab Reports, Inquiry-based Learning, Ranking Tasks,

Common Core Standards:

CCLS:

- Translate quantitative or technical information expressed in words in a text into visual form (table, chart, graph)
- Follow precisely a complex multistep procedure when carrying out experiments (labs)
- Write arguments focused on scientific method, introduce precise claim, develop claim, supply data, provide a concluding statement – (Supports our instructional foci of evidence based learning)
- Compare and contrast findings presented in a text to those from other sources
- Analyze the structure of the relationships amongst concepts in a text
- Analyze the author’s purpose in providing in explanation describing a procedure or discussing an experiment in a text
- Draw evidence from informational text to support analysis, reflection, and research

Differentiated Instruction:

ELLs :

SWDs:

DIFFERENTIATED:

High-Achievers:

- Heterogeneous versus Homogeneous groupings
- Visuals Aids / Models

- Assisted Labs
- Modified Instruction and Assessments (e.g., pre-drawn diagrams)
- Concept Maps
- Manipulative

ELLs: Worksheets with diagrams translated versions if available and requested, group settings, and peer-to-peer instruction. In addition, ELLs receive extended time and glossaries/dictionaries during assessments.

SWDS: IEP Modifications, Vocabulary, Diagrams, Sentence Starters, Graphic Organizers, Pre-Drawn Pictures, Pre Made Data Lists, Multiple-Choice reduced assessments, Pull-out assessments

High Achievers:

- Extension Activities, Further Reading, and Extra Regents Questions
- Teachers can encourage students to explore the relationship between average vs. instantaneous slope, allowing for rudimentary calculus investigation
- Students can explore the methods for determining the area under a curve.

Resources/Books

Physics: Principles and Problems by Glencoe; *High Marks: Regents Physics Made Easy* by Sharon H. Welcher

Homework: Per Teacher



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Content/Discipline Physics

<http://mcsmportal.net>

Marking Period 2

Topic and Essential Question: 2-D Motion: Projectile and Circular Motion

Unit/Topics

- How motion in two dimensions can be broken into two separate, perpendicular problems? *ESL strategy: vocabulary scaffolding*
- How do Forces govern the motion of objects? ESL: Diagrams will be provided.
- What are the ways that motion is described, measured, and analyzed in both horizontal and vertical directions?
- How to draw the direction of centripetal acceleration, centripetal Force, period, speed, and force of gravity? ESL: Pictorial Diagrams will be provided.

SWBAT/Objectives

- Develop skills and protocols in selecting and using proper formulas that require calculating velocity (vertical & horizontal), displacement (range & height), angle, and time of flight.
- Construct and interpret graphs of horizontal and vertical motion (d vs. t, v vs. t) including being able to calculate and analyze the slope and area under the curve.
- Compare velocities and accelerations of a projectile at different times during its flight.
- Compare angles at which projectiles are launched at to the times of flight, heights and ranges.
- Represent velocity, acceleration, and force vectors graphically.

Vocabulary/Key Terms

horizontal and vertical components of vectors, time of flight; range,

Assessments:

Regents Based Questions, Lab Reports, Ranking Tasks.

Common Core Standards:

CCLS:

- Translate quantitative or technical information expressed in words in a text into visual form (table, chart, graph)
- Follow precisely a complex multistep procedure when carrying out experiments (labs)
- Write arguments focused on scientific method, introduce precise claim, develop claim, supply data, provide a concluding statement – (Supports our instructional foci of evidence based learning)
- Compare and contrast findings presented in a text to those from other sources

Differentiated Instruction:

ELLs :

- Analyze the structure of the relationships amongst concepts in a text
- Analyze the author's purpose in providing in explanation describing a procedure or discussing an experiment in a text
- Draw evidence from informational text to support analysis, reflection, and research

SWDs:

High-Achievers:

DIFFERENTIATED:

- Heterogeneous versus Homogeneous groupings
- Visuals Aids / Models
- Assisted Labs
- Modified Instruction and Assessments
- Concept Maps
- Manipulative

ELLs: Worksheets with diagrams, translated versions if available and requested, group settings, and peer-to-peer instruction. In addition, ELLs receive extended time and glossaries/dictionaries during assessments.

SWDS: IEP Modifications, Vocabulary, Diagrams, Sentence Starters, Graphic Organizers, Pictures, Coloring, Multiple-Choice reduced assessments, Pull-out assessments

High Achievers:

- Extension Activities, Further Reading, and Extra Regents Questions
-

Resources/Books

Physics: Principles and Problems Glencoe; High Marks Regents Physics Made Easy: by Sharon Welcher

Homework: Per Teacher

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Marking Period 5 & 6

Topic and Essential Question: SOUND and LIGHT WAVES

Unit/Topics

1. What are the observable properties of sound?
2. How do strings produce sound?
3. How do pipes produce sound?
4. How do we know that sound is a wave? (Beats, Resonance, and the Doppler Effect)
5. What are the wave properties of light?
6. How do we apply the Law of Reflection?
7. What is Snell's Law for Refraction?
8. Snell's Law applications.
9. What is a critical angle?
10. How do we know that light is a wave?

SWBAT/Objectives

- compare the characteristics of two transverse waves such as amplitude, frequency, wavelength, speed, period, and phase
- draw wave forms with various characteristics
- identify nodes and antinodes in standing waves
- differentiate between transverse and longitudinal waves
- determine the speed of sound in air
- predict the superposition of two waves interfering constructively and destructively (indicating nodes, antinodes, and standing waves)
- observe, sketch, and interpret the behavior of wave fronts as they reflect, refract, and diffract
- draw ray diagrams to represent the reflection and refraction of waves
- determine empirically the index of refraction of a transparent medium

Vocabulary/Key

Normal, Angle of reflection, angle of refraction, critical angle

Terms

Assessments: Regents Based Questions, Lab Reports, and Worksheets.

Common Core Standards:

CCLS:

- Translate quantitative or technical information expressed in words in a text into visual form (table, chart, graph)
- Follow precisely a complex multistep procedure when carrying out experiments (labs)
- Write arguments focused on scientific method, introduce precise claim, develop claim, supply data, provide a concluding statement – (Supports our instructional foci of evidence based learning)
- Compare and contrast findings presented in a text to those from other sources
- Analyze the structure of the relationships amongst concepts in a text
- Analyze the author’s purpose in providing in explanation describing a procedure or discussing an experiment in a text
- Draw evidence from informational text to support analysis, reflection, and research

Differentiated Instruction:

DIFFERENTIATED:

- Heterogeneous versus Homogeneous groupings
- Visuals Aids / Models
- Assisted Labs
- Modified Instruction and Assessments

ELLs :

ELLs: Worksheets with diagrams, translated versions if available and requested, group settings, and peer-to-peer instruction. In addition, ELLs receive extended time and glossaries/dictionaries during assessments.

SWDs:

SWDS: IEP Modifications, Vocabulary, Diagrams, Sentence High Achievers:

High-Achievers:

- Extension Activities, Further Reading, and Extra Regents Questions

Resources/Books

Physics Principles and Problems, Glencoe Science

High Marks Regents Physics Made Easy, Sharon H. Welcher

Homework: Per Teacher



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Marking Period 1

Topic and Essential Question: Characterizing Motion with Equations

Unit/Topics

- How can we better employ equations to characterize motion
- How can we improve our use of the motion equations?
- How can we characterize relationships within the motion equations? *ESL strategy: descriptive writing*
- How can we better relate the motion equations to motion graphs?
- How can we operationally define freefall? *ESL strategy: vocabulary scaffolding*
- How can we better characterize the motion of falling bodies?
- How can we employ arrows (vectors) to diagram motion?

SWBAT/Objectives

- Manipulate the motion equations to solve for unknowns (M1.1)
- Develop extended visual models and mathematical formulations to represent an understanding of natural phenomena (M3.1)
- Construct and interpret graphs of position, velocity, or acceleration versus time
- Determine and interpret the slopes and areas of motion graphs
- Devise ways of making observations to test proposed explanations (S2.1)
- Use various means of representing and organizing observations (e.g., diagrams, tables, charts, graphs) and insightfully interpret the organized data (S3.1)
- Determine the acceleration due to gravity near the surface of Earth

Vocabulary/Key Terms

Position, Velocity, Acceleration, Freefall

Assessments:

Regents Based Questions, Lab Reports, Inquiry-based Learning, Ranking Tasks,

Common Core Standards:

CCLS:

- Translate quantitative or technical information expressed in words in a text into visual form (table, chart, graph)
- Follow precisely a complex multistep procedure when carrying out experiments (labs)
- Write arguments focused on scientific method, introduce precise claim, develop claim, supply data, provide a concluding statement – (Supports our instructional foci of evidence based learning)
- Analyze the structure of the relationships amongst concepts in a text
- Draw evidence from informational text to support analysis, reflection, and research

Differentiated Instruction:

ELLs :

DIFFERENTIATED:

SWDs:

- Heterogeneous versus Homogeneous groupings
- Visuals Aids / Models

High-Achievers:

- Assisted Labs
- Modified Instruction and Assessments (e.g., pre-drawn diagrams)
- Concept Maps
- Manipulative

ELLs: Each teacher differentiates according to NYSESLAT levels. In addition, ELLs receive extended time and glossaries/dictionaries during assessments.

SWDS: IEP Modifications, Vocabulary, Diagrams, Sentence Starters, Graphic Organizers, Pre-Drawn Pictures, Pre Made Data Lists, Multiple-Choice reduced assessments, Pull-out assessments

High Achievers:

- Extension Activities, Further Reading, and Extra Regents Questions
- Teachers can encourage students to explore the effect of wind resistance or friction on motion
- Students can explore the tangent line method for determining a slope

Resources/Books

Physics: Principles and Problems by Glencoe; *High Marks: Regents Physics Made Easy* by Sharon H. Welcher



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Marking Period 1

Topic and Essential Question: Vectors

Unit/Topics

- How can we better find the resultant between two vectors algebraically? *ESL strategy: vocabulary scaffolding*
- How can we better find the resultant between two vectors graphically?
- Why do we find resultants by “drawing to scale?” *ESL strategy: mind map*
- How can we better resolve a vector into components?
- How can we better interpret the importance of vector components?
- How can we better characterize equilibrium situations?

SWBAT/Objectives

- Determine the resultant of two or more vectors graphically or algebraically
- Draw a scaled force diagram using a ruler and a protractor
- Resolve a vector into components both graphically and algebraically

- Use scaled diagrams to represent and manipulate vector quantities (M1.1)
- Manipulate equations (trigonometric ratios and Pythagorean Theorem) to solve for unknowns (M1.1)
- Use various means of representing and organizing observations and insightfully interpret the organized data (S3.1)
- Examine collected data to evaluate reliability of experimental results, including percent error. (S3.2)

Vocabulary/Key Terms

Vector, Scalar, Resultant, Vector Sum, Quadrant, Magnitude, Component, Equilibrium, Equilibrant

Assessments:

Regents Based Questions, Lab Reports, Inquiry Based Learning, Ranking Tasks

Common Core Standards:

CCLS:

- Translate quantitative or technical information expressed in words in a text into visual form (table, chart, graph)
- Follow precisely a complex multistep procedure when carrying out experiments (labs)
- Write arguments focused on scientific method, introduce precise claim, develop claim, supply data, provide a concluding statement – (Supports our instructional foci of evidence based learning)
- Compare and contrast findings presented in a text to those from other sources
- Analyze the structure of the relationships amongst concepts in a text
- Analyze the author’s purpose in providing in explanation describing a procedure or discussing an experiment in a text
- Draw evidence from informational text to support analysis, reflection, and research

Differentiated Instruction:

ELLs :

SWDs:

High-Achievers:

DIFFERENTIATED:

- Heterogeneous versus Homogeneous groupings
- Visual Aids / Models
- Assisted Labs
- Modified Instruction and Assessments
- Concept Maps
- Manipulative

ELLs: Each teacher differentiates according to NYSESLAT levels. In addition, ELLs receive extended time and glossaries/dictionaries during assessments.

SWDS: IEP Modifications, Vocabulary, Diagrams, Graphic Organizers, Multiple-Choice reduced assessments

High Achievers:

- Extension Activities, Further Reading, and Extra Regents Questions
- Teachers can encourage further study on vector addition by components as an introduction to linear algebra

Resources/Books

Physics: Principles and Problems by Glencoe; *High Marks: Regents Physics Made Easy* by Sharon H. Welcher



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Marking Period 1

Topic and Essential Question: Dynamics and Newton's Laws

Unit/Topics

- How can we better characterize the behavior of a spring?
- Why do objects accelerate?
- How can we better characterize the acceleration of an object as its mass changes? *ESL strategy: descriptive writing*
- How can we better characterize the acceleration of an object as the force on it changes?
- How can we operationally define net force? *ESL strategy: vocabulary scaffolding*
- How can we better apply our understanding of Newton's Laws?
- How can we better characterize the motion of an object with multiple forces?
- How can we better characterize friction forces?
- How can we test our knowledge of friction?
- How can we apply our knowledge of forces to inclined planes?

SWBAT/Objectives

- Manipulate the motion equations and $F = ma$ to solve for unknowns (M1.1)
- Develop extended visual models and mathematical formulations to represent an understanding of natural phenomena (M3.1)
- Use vector diagrams to analyze mechanical systems (equilibrium and non-equilibrium)
- Verify Newton's Second Law for linear motion
- Determine the coefficient of friction for two surfaces
- Determine a spring constant
- Construct and interpret graphs of position, velocity, or acceleration versus time
- Determine and interpret the slopes and areas of motion graphs
- Devise ways of making observations to test proposed explanations (S2.1)
- Use various means of representing and organizing observations (e.g., diagrams, tables, charts, graphs) and insightfully interpret the organized data (S3.1)

Vocabulary/Key Terms

Spring Constant, Inertia, Coefficient of Friction, Incline, Normal Force, Friction Force, Net Force, Static, Kinetic

Assessments:

Regents Based Questions, Lab Reports, Inquiry-based Learning, Ranking Tasks,

Common Core Standards:

CCLS:

Differentiated Instruction:

- Translate quantitative or technical information expressed in words in a text into visual form (table, chart, graph)
- Follow precisely a complex multistep procedure when carrying out experiments (labs)
- Write arguments focused on scientific method, introduce precise claim, develop claim, supply data, provide a concluding statement – (Supports our instructional foci of evidence based learning)
- Analyze the structure of the relationships amongst concepts in a text
- Draw evidence from informational text to support analysis, reflection, and research

ELLs :

SWDs:

High-Achievers:

DIFFERENTIATED:

- Heterogeneous versus Homogeneous groupings
- Visual Aids / Models
- Assisted Labs
- Modified Instruction and Assessments (e.g., pre-drawn diagrams)
- Concept Maps
- Manipulative

ELLs: Each teacher differentiates according to NYSESLAT levels. In addition, ELLs receive extended time and glossaries/dictionaries during assessments.

SWDS: IEP Modifications, Vocabulary, Diagrams, Graphic Organizers, Pre-Drawn Pictures, Pre Made Data Lists, Multiple-Choice reduced assessments

High Achievers:

- Extension Activities, Further Reading, and Extra Regents Questions
- Teachers can encourage students to explore the effect time dependent forces
- Students can explore various methods for determining coefficient of friction

Resources/Books

Physics: Principles and Problems by Glencoe; *High Marks: Regents Physics Made Easy* by Sharon H. Welcher



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Marking Period 3

Topic and Essential Question. Energy: How Energy is transformed from one form to another?

Unit/Topics

How does work affect the energy of objects?

• ***How is energy conserved as objects change motion?***

ESL strategy: vocabulary; scaffolding

ESL: Pictorial Diagrams will be provided. Energy

SWBAT/Objectives

- 1.) The slope of a graph and area under the curve have a physical significance. (ie. F vs d & W vs t)
- 2.) Potential energy is the energy an object based on its position. Types of potential energy include gravitational and elastic.
- 3.) Kinetic energy is the energy an object has due to its motion, and is directly related to the square of the object's velocity.
 - 4.) In an ideal mechanical system, the sum of the kinetic and potential energies (mechanical energy) is constant.
 - 5.) In a non-ideal mechanical system, as mechanical energy decreases, there is a corresponding increase in internal energy (heat).
 - 6.) When work is done on or by a system, there is a change in the total energy of the system.
 - 7.) Work done against friction results in an increase in the internal energy of the system.
 - 8.) The elongation or compression of a spring depends upon the nature of the spring (its spring constant) and the magnitude of the applied force.

Vocabulary/Key Terms

Momentum, impulse, collision, elastic, inelastic, recoil, conservation.

Assessments:

Regents Based Questions, Lab Reports, Ranking Tasks.

Common Core Standards:

CCLS:

- Translate quantitative or technical information expressed in words in a text into visual form (table, chart, graph)
- Follow precisely a complex multistep procedure when carrying out experiments (labs)
- Write arguments focused on scientific method, introduce precise claim, develop claim, supply data, provide a concluding statement – (Supports our instructional foci of evidence based learning)
- Compare and contrast findings presented in a text to those from other sources
- Analyze the structure of the relationships amongst concepts in a text
- Draw diagrams to visualize the concepts.

Differentiated Instruction:

ELLs :

- Draw evidence from informational text to support analysis, reflection, and research

SWDs:

DIFFERENTIATED:

High-Achievers:

- Heterogeneous versus Homogeneous groupings
- Visuals Aids / Models
- Assisted Labs
- Modified Instruction and Assessments
- Concept Maps
- Manipulative

ELLs: Each teacher differentiates according to NYSESLAT levels. In addition, ELLs receive extended time and glossaries/dictionaries during assessments.

SWDS: IEP Modifications, Vocabulary, Diagrams, Sentence Starters, Graphic Organizers, Pictures, Coloring, Multiple-Choice reduced assessments, Pull-out assessments

High Achievers:

- Extension Activities, Further Reading, and Extra Regents Questions
-

Resources/Books

Physics: Principles and Problems Glencoe; High Marks Regents Physics Made Easy: by Sharon Welcher



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Marking Period 2

Topic and Essential Question. Momentum: How is Momentum is related to Newton's three laws of motion?

Unit/Topics

How do objects affect each other when they interact? *ESL strategy: vocabulary scaffolding*

- How do Forces govern the motion of objects? ESL: Diagrams will be provided.
- How does a force exerted on an object change the object's momentum?
- How are Newton's second and third laws related to momentum? ESL: Pictorial Diagrams will be provided.

SWBAT/Objectives

- 1.) When one object exerts a force on another, both objects experience changes in velocity.
- 2.) When two objects exert force on each other, it often occurs as a result of the two colliding with or recoiling from

each other.

- 3.) When objects interact, the length of time they interact determines the magnitude of their force on each other.
- 4.) An impulse applied to an object will produce a change in that objects velocity in proportion to the object's mass, in other words, a change in momentum.
- 5.) When objects collide or recoil, there is a conservation of momentum.

Vocabulary/Key Terms

Momentum, impulse, collision, elastic, inelastic, recoil, conservation.

Assessments:

Regents Based Questions, Lab Reports, Ranking Tasks.

Common Core Standards:

CCLS:

- Translate quantitative or technical information expressed in words in a text into visual form (table, chart, graph)
- Follow precisely a complex multistep procedure when carrying out experiments (labs)
- Write arguments focused on scientific method, introduce precise claim, develop claim, supply data, provide a concluding statement – (Supports our instructional foci of evidence based learning)
- Compare and contrast findings presented in a text to those from other sources
- Analyze the structure of the relationships amongst concepts in a text
- Draw diagrams to visualize the concepts.
- Draw evidence from informational text to support analysis, reflection, and research

Differentiated Instruction:

ELLs :

SWDs:

High-Achievers:

DIFFERENTIATED:

- Heterogeneous versus Homogeneous groupings
- Visuals Aids / Models
- Assisted Labs
- Modified Instruction and Assessments
- Concept Maps
- Manipulative

ELLS: Each teacher differentiates according to NYSESLAT levels. In addition, ELLs receive extended time and glossaries/dictionaries during assessments.

SWDS: IEP Modifications, Vocabulary, Diagrams, Sentence Starters, Graphic Organizers, Pictures, Coloring, Multiple-Choice reduced assessments, Pull-out assessments

High Achievers:

- Extension Activities, Further Reading, and Extra Regents Questions
-

Resources/Books Physics: Principles and Problems Glencoe; High Marks Regents Physics Made Easy: by Sharon Welcher

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Marking Period 5

Topic and Essential Question: STATIC ELECTRICITY

Unit/Topics

1. How do objects acquire charge?
2. What is Coulomb's Law?
3. Coulomb's Law applications.
4. How do we describe Electric Fields?
5. What is Electric Potential?
6. What is Electric Current?
7. Electric Field strength (intensity)
8. Applications of Major concepts

SWBAT/Objectives

- Understand the concept of charge
- Force of attraction/repulsion between 2 charges
- Understand electric potential and voltage
- Understand electric current as the rate at which charge flows
- Understand electric field strength
- Applications of major concepts

Vocabulary/Key Terms attraction, repulsion, electric potential, electric current, Coulombs Law, electric field lines and electric field intensity (strength)

Assessments: Regents Based Questions, Lab Reports, Worksheets.

Common Core Standards: CCLS:
 Translate quantitative or technical information expressed in words in a text into visual form (table, chart, graph)
 Follow precisely a complex multistep procedure when carrying out experiments (labs)

Differentiated Instruction: Write arguments focused on scientific method, introduce precise claim, develop claim, supply data, provide a concluding statement – (Supports our instructional foci of evidence based learning)
 Compare and contrast findings presented in a text to those from other sources

ELLs : Analyze the structure of the relationships amongst concepts in a text
 Analyze the author's purpose in providing in explanation describing a procedure or discussing an experiment in a text

SWDs: Draw evidence from informational text to support analysis, reflection, and research

High-Achievers:**DIFFERENTIATED:**

Heterogeneous versus Homogeneous groupings
Visuals Aids / Models
Assisted Labs
Modified Instruction and Assessments

ELLs: Each teacher differentiates according to NYSESLAT levels. In addition, ELLs receive extended time and glossaries/dictionaries during assessments.

SWDS: IEP Modifications, Vocabulary, Diagrams, Sentence
High Achievers:

Extension Activities, Further Reading, and Extra Regents Questions

Resources/Books

Physics Principles and Problems, Glencoe Science
High Marks Regents Physics Made Easy, Sharon H. Welcher

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Marking Period 5

Topic and Essential Question: ELECTRICITY and MAGNETISM

Unit/Topics

1. How do we find Electrical Resistance in a circuit?
2. How do we find power in a circuit?
3. What is a series circuit?
4. What is a parallel circuit?
5. Series and parallel circuit applications.
6. Practice with Regents problems.
7. Series and parallel circuit combinations.
8. What is a magnetic field?
9. Magnetic field lines and left hand rules.
10. How do magnetic fields affect charges?

SWBAT/Objectives

- Understand electrical resistance hinders the flow of current
- Understand the flow of current in series and parallel circuits
- Understand the voltage distribution in series and parallel circuits
- Applications of series and parallel circuits
- Work done and Power in series and parallel circuits

- Concept of Magnetic field and field lines (left hand rules)
- Effect of magnetic field on charges

Vocabulary/Key Terms	resistance, resistivity, conductance, series and parallel circuits, Kirchoff's Laws, Magnetic fields, magnetic flux and flux density
Assessments:	Regents Based Questions, Lab Reports, Worksheets.
Common Core Standards:	CCLS: Translate quantitative or technical information expressed in words in a text into visual form (table, chart, graph) Follow precisely a complex multistep procedure when carrying out experiments (labs)
Differentiated Instruction:	Write arguments focused on scientific method, introduce precise claim, develop claim, supply data, provide a concluding statement – (Supports our instructional foci of evidence based learning) Compare and contrast findings presented in a text to those from other sources Analyze the structure of the relationships amongst concepts in a text
ELLs :	Analyze the author's purpose in providing in explanation describing a procedure or discussing an experiment in a text
SWDs:	Draw evidence from informational text to support analysis, reflection, and research
High-Achievers:	DIFFERENTIATED: Heterogeneous versus Homogeneous groupings Visuals Aids / Models Assisted Labs Modified Instruction and Assessments ELLs: Each teacher differentiates according to NYSESLAT levels. In addition, ELLs receive extended time and glossaries/dictionaries during assessments. SWDS: IEP Modifications, Vocabulary, Diagrams, Sentence High Achievers: Extension Activities, Further Reading, and Extra Regents Questions
Resources/Books	Physics Principles and Problems, Glencoe Science High Marks Regents Physics Made Easy, Sharon H. Welcher

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Marking Period 6

Topic and Essential Question: MODERN PHYSICS

Unit/Topics

1. What are photons and quantum theory?
2. What is the photoelectric effect?
3. Can light exhibit particle-like properties?
4. Can particles behave like waves?
5. Relationship between waves and particles (Planck's equation)
6. Mass as a form of energy. (Einstein's equation)
7. What does a nucleus look like?
8. What are fission and fusion?
9. What is quark theory?
10. Review/applications of major concepts

SWBAT/Objectives

- Understand the quantum theory
- Understand the concept of wave-particle duality
- Understand the math relation between wave and particles
- Realize that mass can be converted to energy and vice versa.
- Understand atomic structure and the nucleus
- Realize that protons and neutrons are made up of quarks
- Understand atomic fission and atomic fusion

Vocabulary/Key Terms

Quantum theory, photon, photoelectric effect, Planck's equation, Einstein's equation, quarks, baryons, hadrons, leptons, wave-particle duality

Assessments:

Regents Based Questions, Lab Reports, Worksheets.

Common Core Standards:

CCLS:

Translate quantitative or technical information expressed in words in a text into visual form (table, chart, graph)

Follow precisely a complex multistep procedure when carrying out experiments (labs)

Write arguments focused on scientific method, introduce precise claim, develop claim, supply data, provide a concluding statement – (Supports our instructional foci of evidence based learning)

Compare and contrast findings presented in a text to those from other sources

Analyze the structure of the relationships amongst concepts in a text

ELLs :

Analyze the author's purpose in providing in explanation describing a procedure or discussing an experiment in a text

SWDs:

Draw evidence from informational text to support analysis, reflection, and research

High-Achievers:

DIFFERENTIATED:

Heterogeneous versus Homogeneous groupings

Visuals Aids / Models
 Assisted Labs
 Modified Instruction and Assessments

ELLs: Each teacher differentiates according to NYSESLAT levels. In addition, ELLs receive extended time and glossaries/dictionaries during assessments.

SWDS: IEP Modifications, Vocabulary, Diagrams, Sentence
 High Achievers:

Extension Activities, Further Reading, and Extra Regents Questions

Resources/Books Physics Principles and Problems, Glencoe Science
 High Marks Regents Physics Made Easy, Sharon H. Welcher

**PHYSICAL SETTING PHYSICS REGENTS LAB COURSE SYLLABUS
 Fall 2015**

Unit of Study	Major Topics of Study	Required Labs	Textbook Correlations
Unit 1: Principles of Measurement	1. What is physics? 2. What are the fundamental measurements? 3. How do we convert derived units? 4. How do we use scientific notation? 5. What are direct and indirect relationships? 6. How do we relate a formula to its graph? 7. Review/applications of major concepts 8. Test 1	Lab 1: What factors affect the period of a pendulum? Lab 2: Trigonometric measurement Lab 3: Hooke's Law and Mathematical Physics	Physics: Principles & Problems Chapter: 2 Pages: 12-39

<p>Unit 2: Vector Mathematics</p>	<ol style="list-style-type: none"> 1. How do we find the resultant between 2 vectors? (2 days) 2. Drawing resultants to scale 3. Resolving vectors into components 4. Review/applications of major concepts 5. Test 2 	<p>Lab 4: The Composition of Forces</p>	<p>Physics: Principles & Problems Chapter: 6 Pages: 108-131</p>
<p>Unit 3: Motion</p>	<ol style="list-style-type: none"> 1. How do we describe motion? 2. How do we describe velocity? 3. How do we describe acceleration? 4. What are the motion equations? 5. Practice with the motion equations 6. How do we solve problems involving freefall? (2 days) 7. How do we interpret motion graphs? 8. Review/applications of major concepts 9. Test 3 	<p>Lab 5: Simple Harmonic Motion Lab 6: Analysis of motion</p>	<p>Physics: Principles & Problems Chapters: 3, 4 Pages: 40-85</p>
<p>Unit 4: Newton's Laws</p>	<ol style="list-style-type: none"> 1. What are Newton's laws of motion? 2. Applications of Newton's laws 3. How do we solve problems with multiple forces? (2 days) 4. How do we describe friction forces? 5. Force law applications 6. How do we solve inclined plane problems? (2 days) 7. Review/applications of major concepts 8. Test 4 	<p>Lab 7: Finding coefficients of friction</p>	<p>Physics: Principles & Problems Chapters: 5 Pages: 86-107</p>
<p>Unit 5: Motion in a Plane</p>	<ol style="list-style-type: none"> 1. Projectiles launched horizontally (2 days) 	<p>Lab 8: How does angle affect the range</p>	<p>Physics: Principles & Problems</p>

	<ol style="list-style-type: none"> 2. Projectiles launched at an angle 3. How do we describe uniform circular motion? 4. Applications of centripetal force 5. What is Newton's Universal Law of Gravitation? 6. What is the Cavendish Experiment? 7. What are Kepler's laws of planetary motion? 8. Review/applications of major concepts 9. Test 5 	<p>of a projectile?</p> <p>Lab 9: What factors affect the speed of an object in circular motion?</p>	<p>Chapters: 7, 8</p> <p>Pages: 132-173</p>
Unit 6: Momentum	<ol style="list-style-type: none"> 1. What are momentum and impulse? 2. Applications of momentum and impulse 3. What is the law of conservation of momentum? 4. Conservation of momentum applications 5. Momentum as a vector quantity 6. Review/applications of major concepts 7. Test 6 		<p>Physics: Principles & Problems</p> <p>Chapter: 9</p> <p>Pages: 174-195</p>
Unit 7: Work, Heat, and Energy	<ol style="list-style-type: none"> 1. What are work, energy, and heat? 2. What are the forms of mechanical energy? 3. How do we apply the law of conservation of energy? (2 days) 4. Challenge problem: Energy, forces, and motion. 5. Is energy conserved in collisions? 6. How much work is done stretching a spring? 7. How do we measure power? 8. Review/applications of major concepts 	<p>Lab 10: Conservation of Energy (Part I)</p> <p>Lab 11: Conservation of Energy (Part II)</p>	<p>Physics: Principles & Problems</p> <p>Chapters: 10, 11</p> <p>Pages: 196-239</p>

	9. Test 7		
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Midterm Review (2 days)
Midterm Examination (2 days)

PHYSICAL SETTING PHYSICS REGENTS COURSE SYLLABUS
Spring 2016

Unit of Study	Major Topics of Study	Required Labs	Textbook Correlations
Unit 8: Wave Properties	<ol style="list-style-type: none"> How do we classify waves? What are the wave properties? What is the wave equation? How do waves behave at a boundary? What are the wave phenomena? (2 days) What are standing waves? Review/applications of major concepts Test 8 	Lab 12: What factors affect the speed of a water wave?	<p>Physics: Principles & Problems</p> <p>Chapter: 14</p> <p>Pages: 286-305</p>
Unit 9: Waves, Sound, and Light	<ol style="list-style-type: none"> What are the observable properties of sound? How do strings produce sound? How do pipes produce sound? How do we know that sound is a wave? (Beats, Resonance, and the Doppler Effect) What are the wave properties of light? How do we apply the Law of Reflection? What is Snell's Law for Refraction? Snell's Law applications. What is a critical angle? How do we know that light 	<p>Lab 13: The Speed of Sound.</p> <p>Lab 14: Reflection</p> <p>Lab 15: Refraction</p> <p>Lab 16: Young's Double Slit Experiment</p>	<p>Physics: Principles & Problems</p> <p>Chapters: 15, 16, 17</p> <p>Pages: 306-365</p> <p>Chapter: 19</p> <p>Pages: 390-405</p>

	<p>is a wave?</p> <p>11. Applications of Young's Double Slit.</p> <p>12. How do we use light to make measurements?</p> <p>13. Review/applications of major concepts</p> <p>14. Test 9</p>		
Unit 10: Static Electricity	<p>9. How do objects acquire charge?</p> <p>10. What is Coulomb's Law?</p> <p>11. Coulomb's Law applications.</p> <p>12. How do we describe Electric Fields?</p> <p>13. What is the Milliken Oil Drop Experiment?</p> <p>14. What is Electric Potential?</p> <p>15. What is Electric Current?</p> <p>16. Review/applications of major concepts</p> <p>17. Test 10</p>	Lab 17: Static Electricity	<p>Physics: Principles & Problems</p> <p>Chapters: 20-22</p> <p>Pages: 406-467</p>
Unit 11: Electricity and Magnetism	<p>11. How do we find Electrical Resistance in a circuit?</p> <p>12. How do we find power in a circuit?</p> <p>13. What is a series circuit?</p> <p>14. What is a parallel circuit?</p> <p>15. Series and parallel circuit applications.</p> <p>16. Practice with Regents problems.</p> <p>17. Series and parallel circuit combinations.</p> <p>18. What is a magnetic field?</p> <p>19. Magnetic field lines and left hand rules.</p> <p>20. How do magnetic fields</p>	<p>Lab 18: Ohm's Law</p> <p>Lab 19: Series and Parallel Circuits</p> <p>Lab 20: Testing the Left Hand Rules</p>	<p>Physics: Principles & Problems</p> <p>Chapters: 23, 24</p> <p>Pages: 468-513</p>

	<p>affect charges?</p> <p>21. Review/applications of major concepts</p> <p>22. Test 11</p>		
Unit 12: Modern Physics	<p>11. What are photons and quantum theory?</p> <p>12. What is the photoelectric effect?</p> <p>13. Can light exhibit particle-like properties?</p> <p>14. Can particles behave like waves?</p> <p>15. How is light produced? (The Bohr Model—2 days)</p> <p>16. Review/applications of major concepts</p> <p>17. Test 12</p>	<p>Lab 21: Confirming Hydrogen's Energy Levels.</p>	<p>Physics: Principles & Problems</p> <p>Chapters: 27, 28</p> <p>Pages: 554-593</p>
Unit 13: Nuclear Physics	<p>1. Mass as a form of energy.</p> <p>2. What does a nucleus look like?</p> <p>3. How do we describe radioactive decays?</p> <p>4. What are fission and fusion?</p> <p>5. What is quark theory?</p> <p>6. Review/applications of major concepts</p> <p>7. Test 13</p>		<p>Physics: Principles & Problems</p> <p>Chapters: 30, 31</p> <p>Pages: 614-655</p>
Unit 14: Geometric Optics (optional)	<p>1. How do concave mirrors form images?</p> <p>2. Converging and diverging mirrors.</p> <p>3. How do concave and convex lenses work?</p> <p>4. Lens applications.</p> <p>5. Review/applications of major concepts</p>	<p>Lab 22: How do mirrors form images?</p> <p>Lab 23: Convex lenses.</p>	<p>Physics: Principles & Problems</p> <p>Chapter: 18</p> <p>Pages: 366-389</p>

	6. Test 14		
Regents Review Tues – Thurs after school Mock Examination May 2016 Regents Examination June 2016			