SPRING GROVE AREA SCHOOL DISTRICT

PLANNED INSTRUCTION

Course Title:	**Physics I**	**Length of Course:**	**30 Cycles**
Grade Level(s):	**10**	**Periods Per Cycle:**	**6**
Units of Credit:	**1**	**Length of Period:**	**43 Minutes**
Required:	**X**	**Elective:**	**Total Instructional Time:**	**129 Hours**

Course Description: **The purpose of this course is for the student to study the basic concepts of matter, energy, forces, and motion. Fluid, wave, and thermal properties are also studied. This course also includes a formal laboratory which culminates in a written lab report on the results gained within the laboratory group.**

Objectives of Planned Course:

1. **The student will analyze and explain the nature of science in the search for understanding the natural world and its connection to technological systems.**
2. **The student will identify and analyze the scientific or technological challenges of societal issues, propose possible solutions, and discuss implications.**
3. **The student will describe and interpret patterns of change in natural and human-made systems.**
4. **The student will apply knowledge of scientific investigation or technological design to develop or critique aspects of the experimental or design process.**
5. **The student will evaluate appropriate technologies for a specific purpose, or describe the information the instrument can provide.**
6. **The student will analyze the parts of a simple system, their roles, and their relationships to the system as a whole.**
7. **The student will compare observations of the real world to observations of a constructed model.**
8. **The student will compare and analyze repeated processes or recurring elements in patterns.**
9. **The student will explain the relationship between the structure and properties of matter.**
10. **The student will analyze energy sources and transfer of energy, or conversion of energy.**
11. **The student will demonstrate that different ways of obtaining, transforming, and distributing energy have different environmental consequences.**
12. **The student will use the principles of motion and force to solve real-world challenges.**

Relationship to Academic Standards and Strategic Plan:

PA academic anchors:
S11.A.1 – Reasoning and Analysis
S11.A.2 – Processes, Procedures and Tools of Scientific Investigations
S11.A.3 – Systems, Models and Patterns
S11.C.1 – Structure, Properties, and Interaction of Matter and Energy
S11.C.2 – Forms, Sources, Conversion, and Transfer of Energy
S11.C.3 – Principles of Motion and Force
S11.D.3 – Composition and Structure of the Universe

Materials/Resources:

Text – Physics Principles and Problems, Glencoe 2005

Adopted: 2/21/90
Revised: 9/3/91; 6/17/98; 11/15/01; 8/20/07

CONTENT Physics I – Grade 10	**STANDARDS**	**GRADE-LEVEL BENCHMARKS** **GRADE SPECIFIC CRITERIA**	**INSTRUCTIONAL STRATEGIES, LEARNING PRACTICES, ACTIVITIES AND EXPERIENCES**	**ASSESSMENTS**
The Mathematics of Physics A. SI Units/Unit analysis B. Significant Figures C. Scientific Methods D. Measurement E. Graphing Data F. Algebraic Applications	S11.A.1.1 S11.A.1.2 S11.A.1.3 S11.A.2.1 S11.A.2.2 S11.A.3.1 S11.A.3.2 S11.A.3.3	Review of essential skills for Physics I	Student using text Teacher led discussion and demonstration Laboratory activities Peer assisted practice Critical thinking questions Computer interfacing Inquiry questioning	Complete formal Laboratory Individual student exam Assigned homework problems In class problems Class discussion
TIME: 9 Class Periods				

MATERIALS AND RESOURCES:
Textbook, Worksheets, Lab Experiment

ENRICHMENT AND EXPANDED OPPORTUNITIES:
Student extended practice and critical thinking activities, Outside reading and/or Observation, Additional reading

REMEDIATION AND INTERVENTION STRATEGIES:
The students will be offered the opportunity for additional instruction, extra practice, and peer assistance.

CONTENT Physics I – Grade 10	**STANDARDS**	**GRADE-LEVEL BENCHMARKS GRADE SPECIFIC CRITERIA**	**INSTRUCTIONAL STRATEGIES, LEARNING PRACTICES, ACTIVITIES AND EXPERIENCES**	**ASSESSMENTS**
Linear Motion A. Velocity vs. Speed (Vector vs. Scalar) B. Acceleration C. Motion Diagrams	S11.A.1.1 S11.A.1.2 S11.A.1.3 S11.A.2.1 S11.A.2.2 S11.A.3.1 S11.A.3.2 S11.A.3.3 S11.C.3.1	**S11.C.3.1.3** Describe the motion of an object using variables (i.e., acceleration, velocity, displacement)	Student using text Teacher led discussion and demonstration Laboratory activities Peer assisted practice Critical thinking questions Computer interfacing Inquiry questioning	Complete formal Laboratory Individual student exam Assigned homework problems In class problems Class discussion
TIME: 24 Class Periods				
MATERIALS AND RESOURCES: Textbook, Worksheets, Lab Experiment				
ENRICHMENT AND EXPANDED OPPORTUNITIES: Student extended practice and critical thinking activities, Outside reading and/or Observation, Additional reading				
REMEDIATION AND INTERVENTION STRATEGIES: The students will be offered the opportunity for additional instruction, extra practice, and peer assistance.				

CONTENT Physics I – Grade 10	**STANDARDS**	**GRADE-LEVEL BENCHMARKS GRADE SPECIFIC CRITERIA**	**INSTRUCTIONAL STRATEGIES, LEARNING PRACTICES, ACTIVITIES AND EXPERIENCES**	**ASSESSMENTS**
Forces A. Forces B. Newton's Laws of Motion	S11.A.1.1 S11.A.1.2 S11.A.1.3 S11.A.2.1 S11.A.2.2 S11.A.3.1 S11.A.3.2 S11.A.3.3 S11.C.3.1	**S11.C.3.1.2** Design or evaluate simple technological or natural systems that incorporate the principles of force and motion **S11.C.3.1.5** Calculate the mechanical advantage for moving an object by using a simple machine **S11.C.3.1.6** Identify elements of simple machines in compound machines	Student using text Teacher led discussion and demonstration Laboratory activities Peer assisted practice Critical thinking questions Computer interfacing Inquiry questioning	Complete formal Laboratory Individual student exam Assigned homework problems In class problems Class discussion
TIME: 21 Class Periods				
MATERIALS AND RESOURCES: Textbook, Worksheets, Lab Experiment				
ENRICHMENT AND EXPANDED OPPORTUNITIES: Student extended practice and critical thinking activities, Outside reading and/or Observation, Additional reading				
REMEDIATION AND INTERVENTION STRATEGIES: The students will be offered the opportunity for additional instruction, extra practice, and peer assistance.				

CONTENT Physics I – Grade 10	**STANDARDS**	**GRADE-LEVEL BENCHMARKS** **GRADE SPECIFIC CRITERIA**	**INSTRUCTIONAL STRATEGIES, LEARNING PRACTICES, ACTIVITIES AND EXPERIENCES**	**ASSESSMENTS**
Vector Analysis A. Two Dimensional Forces B. Two Dimensional Motion	S11.A.1.1 S11.A.1.2 S11.A.1.3 S11.A.2.1 S11.A.2.2 S11.A.3.1 S11.A.3.2 S11.A.3.3 S11.C.3.1	**S11.C.3.1.2** Design or evaluate simple technological or natural systems that incorporate the principles of force and motion **S11.C.3.1.5** Calculate the mechanical advantage for moving an object by using a simple machine **S11.C.3.1.6** Identify elements of simple machines in compound machines	Student using text Teacher led discussion and demonstration Laboratory activities Peer assisted practice Critical thinking questions Computer interfacing Inquiry questioning	Complete formal Laboratory Individual student exam Assigned homework problems In class problems Class discussion
TIME: 24 Class Periods				

MATERIALS AND RESOURCES:
Textbook, Worksheets, Lab Experiment

ENRICHMENT AND EXPANDED OPPORTUNITIES:
Student extended practice and critical thinking activities, Outside reading and/or Observation, Additional reading

REMEDIATION AND INTERVENTION STRATEGIES:
The students will be offered the opportunity for additional instruction, extra practice, and peer assistance.

CONTENT Physics I – Grade 10	**STANDARDS**	**GRADE-LEVEL BENCHMARKS GRADE SPECIFIC CRITERIA**	**INSTRUCTIONAL STRATEGIES, LEARNING PRACTICES, ACTIVITIES AND EXPERIENCES**	**ASSESSMENTS**
Gravitation A. Universal Gravitation B. Kepler's Laws of Planetary Motion	S11.A.1.1 S11.A.1.2 S11.A.1.3 S11.A.2.1 S11.A.2.2 S11.A.3.1 S11.A.3.2 S11.A.3.3 S11.C.3.1 S11.D.3.1	**S11.C.3.1.2** Design or evaluate simple technological or natural systems that incorporate the principles of force and motion **S11.C.3.1.3** Describe the motion of an object using variables (i.e., acceleration, velocity, displacement) **S11.D.3.1.1** Describe planetary motion and the physical laws that explain planetary motion **S11.D.3.1.2** Describe the structure, formation, and life cycle of stars **S11.D.3.1.3** Explain the current scientific theories of the origin of the solar system and universe (e.g., big bang theory, solar nebular theory, stellar evolution)	Student using text Teacher led discussion and demonstration Laboratory activities Peer assisted practice Critical thinking questions Computer interfacing Inquiry questioning	Complete formal Laboratory Individual student exam Assigned homework problems In class problems Class discussion
TIME: 18 Class Periods				
MATERIALS AND RESOURCES: Textbook, Worksheets, Lab Experiment				
ENRICHMENT AND EXPANDED OPPORTUNITIES: Student extended practice and critical thinking activities, Outside reading and/or Observation, Additional reading				
REMEDIATION AND INTERVENTION STRATEGIES: The students will be offered the opportunity for additional instruction, extra practice, and peer assistance.				

CONTENT Physics I – Grade 10	STANDARDS	GRADE-LEVEL BENCHMARKS GRADE SPECIFIC CRITERIA	INSTRUCTIONAL STRATEGIES, LEARNING PRACTICES, ACTIVITIES AND EXPERIENCES	ASSESSMENTS
Circular Motion A. Rotational Dynamics B. Equilibrium	S11.A.1.1 S11.A.1.2 S11.A.1.3 S11.A.2.1 S11.A.2.2 S11.A.3.1 S11.A.3.2 S11.A.3.3 S11.C.3.1	**S11.C.3.1.2** Design or evaluate simple technological or natural systems that incorporate the principles of force and motion **S11.C.3.1.3** Describe the motion of an object using variables (i.e., acceleration, velocity, displacement)	Student using text Teacher led discussion and demonstration Laboratory activities Peer assisted practice Critical thinking questions Computer interfacing Inquiry questioning	Complete formal Laboratory Individual student exam Assigned homework problems In class problems Class discussion
TIME: 18 Class Periods				
MATERIALS AND RESOURCES: Textbook, Worksheets, Lab Experiment				
ENRICHMENT AND EXPANDED OPPORTUNITIES: Student extended practice and critical thinking activities, Outside reading and/or Observation, Additional reading				
REMEDIATION AND INTERVENTION STRATEGIES: The students will be offered the opportunity for additional instruction, extra practice, and peer assistance.				

CONTENT Physics I – Grade 10	**STANDARDS**	**GRADE-LEVEL BENCHMARKS GRADE SPECIFIC CRITERIA**	**INSTRUCTIONAL STRATEGIES, LEARNING PRACTICES, ACTIVITIES AND EXPERIENCES**	**ASSESSMENTS**
Momentum A. Impulse and Momentum B. Conservation	S11.A.1.1 S11.A.1.2 S11.A.1.3 S11.A.2.1 S11.A.2.2 S11.A.3.1 S11.A.3.2 S11.A.3.3 S11.C.2.1	**S11.C.3.1.1** Explain common phenomena using an understanding of conservation of momentum **S11.C.3.1.2** Design or evaluate simple technological or natural systems that incorporate the principles of force and motion	Student using text Teacher led discussion and demonstration Laboratory activities Peer assisted practice Critical thinking questions Computer interfacing Inquiry questioning	Complete formal Laboratory Individual student exam Assigned homework problems In class problems Class discussion
TIME: 18 Class Periods				

MATERIALS AND RESOURCES:
Textbook, Worksheets, Lab Experiment

ENRICHMENT AND EXPANDED OPPORTUNITIES:
Student extended practice and critical thinking activities, Outside reading and/or Observation, Additional reading

REMEDIATION AND INTERVENTION STRATEGIES:
The students will be offered the opportunity for additional instruction, extra practice, and peer assistance.

CONTENT Physics I – Grade 10	**STANDARDS**	**GRADE-LEVEL BENCHMARKS** **GRADE SPECIFIC CRITERIA**	**INSTRUCTIONAL STRATEGIES, LEARNING PRACTICES, ACTIVITIES AND EXPERIENCES**	**ASSESSMENTS**
Energy and work A. Work and Energy B. Conservation C. Forms of Energy	S11.A.1.1 S11.A.1.2 S11.A.1.3 S11.A.2.1 S11.A.2.2 S11.A.3.1 S11.A.3.2 S11.A.3.3 S11.C.2.1 S11.C.2.2	**S11.C.2.1.3** Apply the knowledge of conservation of energy to explain common systems **S11.C.2.2.2** Explain the practical use of alternative sources of energy to address environmental problems **S11.C.2.2.3** Give examples of renewable energy resources and nonrenewable resources and explain the environmental and economic advantages and disadvantages of their use	Student using text Teacher led discussion and demonstration Laboratory activities Peer assisted practice Critical thinking questions Computer interfacing Inquiry questioning	Complete formal Laboratory Individual student exam Assigned homework problems In class problems Class discussion
TIME: 18 Class Periods				
MATERIALS AND RESOURCES: Textbook, Worksheets, Lab Experiment				
ENRICHMENT AND EXPANDED OPPORTUNITIES: Student extended practice and critical thinking activities, Outside reading and/or Observation, Additional reading				
REMEDIATION AND INTERVENTION STRATEGIES: The students will be offered the opportunity for additional instruction, extra practice, and peer assistance.				

CONTENT Physics I – Grade 10	**STANDARDS**	**GRADE-LEVEL BENCHMARKS GRADE SPECIFIC CRITERIA**	**INSTRUCTIONAL STRATEGIES, LEARNING PRACTICES, ACTIVITIES AND EXPERIENCES**	**ASSESSMENTS**
Thermodynamics A. Temperature B. Change of State C. Liquid Forces D. Solids	S11.A.1.1 S11.A.1.2 S11.A.1.3 S11.A.2.1 S11.A.2.2 S11.A.3.1 S11.A.3.2 S11.A.3.3 S11.C.2.1 S11.C.2.2	**S11.C.1.1.1** Explain that matter is made of particles called atoms and that atoms are composed of even smaller particles (e.g., protons, neutrons, electrons) **S11.C.1.1.2** Explain the relationship between the physical properties of a substance and its molecular or atomic structure **S11.C.2.1.3** Apply the knowledge of conservation of energy to explain common systems	Student using text Teacher led discussion and demonstration Laboratory activities Peer assisted practice Critical thinking questions Computer interfacing Inquiry questioning	Complete formal Laboratory Individual student exam Assigned homework problems In class problems Class discussion
TIME: 18 Class Periods				
MATERIALS AND RESOURCES: Textbook, Worksheets, Lab Experiment				
ENRICHMENT AND EXPANDED OPPORTUNITIES: Student extended practice and critical thinking activities, Outside reading and/or Observation, Additional reading				
REMEDIATION AND INTERVENTION STRATEGIES: The students will be offered the opportunity for additional instruction, extra practice, and peer assistance.				

CONTENT Physics I – Grade 10	**STANDARDS**	**GRADE-LEVEL BENCHMARKS GRADE SPECIFIC CRITERIA**	**INSTRUCTIONAL STRATEGIES, LEARNING PRACTICES, ACTIVITIES AND EXPERIENCES**	**ASSESSMENTS**
Vibrations and Waves A. Periodic Motion B. Wave Properties C. Wave Behavior	S11.A.1.1 S11.A.1.2 S11.A.1.3 S11.A.2.1 S11.A.2.2 S11.A.3.1 S11.A.3.2 S11.A.3.3 S11.C.2.1	**S11.C.1.1.1** Explain that matter is made of particles called atoms and that atoms are composed of even smaller particles (e.g., protons, neutrons, electrons) **S11.C.1.1.2** Explain the relationship between the physical properties of a substance and its molecular or atomic structure **S11.C.2.1.1** Compare or analyze waves in the electromagnetic spectrum as well as their properties, energy levels, and motion	Student using text Teacher led discussion and demonstration Laboratory activities Peer assisted practice Critical thinking questions Computer interfacing Inquiry questioning	Complete formal Laboratory Individual student exam Assigned homework problems In class problems Class discussion
TIME: 12 Class Periods				
MATERIALS AND RESOURCES: Textbook, Worksheets, Lab Experiment				
ENRICHMENT AND EXPANDED OPPORTUNITIES: Student extended practice and critical thinking activities, Outside reading and/or Observation, Additional reading				
REMEDIATION AND INTERVENTION STRATEGIES: The students will be offered the opportunity for additional instruction, extra practice, and peer assistance.				

CONTENT Physics I – Grade 10	STANDARDS	GRADE-LEVEL BENCHMARKS GRADE SPECIFIC CRITERIA	INSTRUCTIONAL STRATEGIES, LEARNING PRACTICES, ACTIVITIES AND EXPERIENCES	ASSESSMENTS
Earth and Space A. Weather Patterns B. Weather Prediction	S11.A.1.1 S11.A.1.2 S11.A.1.3 S11.A.2.1 S11.A.2.2 S11.A.3.1 S11.A.3.2 S11.A.3.3 S11.D.2.1	**S11.D.2.1.3** Explain weather patterns and seasonal changes using the concepts of heat and density **S11.D.2.1.4** Analyze weather maps and weather data to predict regional or global weather events	Student using text Teacher led discussion and demonstration Laboratory activities Peer assisted practice Critical thinking questions Computer interfacing Inquiry questioning	Complete formal Laboratory Individual student exam Assigned homework problems In class problems Class discussion
TIME: Ongoing Throughout Course				

MATERIALS AND RESOURCES:
Textbook, Worksheets, Lab Experiment

ENRICHMENT AND EXPANDED OPPORTUNITIES:
Student extended practice and critical thinking activities, Outside reading and/or Observation, Additional reading

REMEDIATION AND INTERVENTION STRATEGIES:
The students will be offered the opportunity for additional instruction, extra practice, and peer assistance.