North Providence High School Science Department
Standards – Based Instructional Curriculum Guide

Course: Physics **Grade Level:** 11/12 **Quarter:** 1 **Period(s):** 13

Topic: Motion in One Dimension

21st Century Graduation Expectation(s):

- 1.1 Acquiring and applying knowledge and skills within and across the curriculum
- 1.2 Analyzing and evaluating information
- 1.3 Applying technology as a leaning tool across all disciplines
- 2.1 Working cooperatively and/or independently
- 2.2 Applying problem solving strategies
- 2.3 Utilizing resources and time effectively
- 2.4 Accessing, compiling, interpreting, and presenting data and information
- 3.1 Making informed life and career decisions
- 3.2 Recognizing and respecting the diversity and individuality of others
- 3.3 Understanding and accepting the benefits and consequences of his/her behavior
- 4.1 Reading widely and critically
- 4.2 Writing clearly, concisely, and persuasively

Next Generation Science Standards:

Common Core State Standards:

- RST.11-12.1
- RST.11-12.2
- RST.11-12.3
- RST.11-12.4
- RST.11-12.5
- RST.11-12.6
- RST.11-12.7
- RST.11-12.8
- RST.11-12.9
- RST.11-12.10
- WHST.11-12.1
- WHST.11-12.2
- WHST.11-12.4
- WHST.11-12.5
- WHST.11-12.6
- WHST.11-12.9
- WHST.11-12.10

Essential Question(s):

- How is motion detected?
- What is the difference between position and displacement?
- What is the difference between speed and velocity?
- What is the rate of change of position?
- What is the rate of change of velocity?
- What is the difference between velocity and acceleration?
- What influences the velocity of a freely falling object?

Content Topics:

- Distance, speed, and time
- Position and displacement

- Velocity
- Acceleration
- Kinematic equations
- Free fall (gravity)
- Time of flight & max height

Student Learning Tasks and Opportunities:

- Students will be able to describe and define motion.
- Students will be able to explain the difference between position and displacement.
- Students will be able to explain the difference between speed and velocity.
- Students will be able to describe and model the rate of change of position.
- Students will be able to describe and model the rate of change of velocity.
- Students will be able to explain the difference between velocity and acceleration.
- Students will be able to solve problems involving constant acceleration in one dimension.

Instructional Resources and Equipment:

- Student text
- Complimentary text
- Digital notetaking software
- Charts and graphs
- Labs/demonstrations
- Simulated demonstrations
- PowerPoint
- Interactive white board
- Video clips

Assessment Task(s):

- Entrance/exit slips, etc.
- Class discussions
- Homework
- Quizzes
- Lab activities/reports
- Teacher generated tests
- Presentations/projects

North Providence High School Science Department
Standards – Based Instructional Curriculum Guide

Course: Physics **Grade Level:** 11/12 **Quarter:** 1 **Period(s):** 12

Topic: Vectors

21st Century Graduation Expectation(s):

- 1.1 Acquiring and applying knowledge and skills within and across the curriculum
- 1.2 Analyzing and evaluating information
- 1.3 Applying technology as a leaning tool across all disciplines
- 2.1 Working cooperatively and/or independently
- 2.2 Applying problem solving strategies
- 2.3 Utilizing resources and time effectively
- 2.4 Accessing, compiling, interpreting, and presenting data and information
- 3.1 Making informed life and career decisions
- 3.2 Recognizing and respecting the diversity and individuality of others
- 3.3 Understanding and accepting the benefits and consequences of his/her behavior
- 4.1 Reading widely and critically
- 4.2 Writing clearly, concisely, and persuasively

Next Generation Science Standards:

Common Core State Standards:

- RST.11-12.1
- RST.11-12.2
- RST.11-12.3
- RST.11-12.4
- RST.11-12.5
- RST.11-12.6
- RST.11-12.7
- RST.11-12.8
- RST.11-12.9
- RST.11-12.10
- WHST.11-12.1
- WHST.11-12.2
- WHST.11-12.4
- WHST.11-12.5
- WHST.11-12.6
- WHST.11-12.9
- WHST.11-12.10

Essential Question(s):

- What is the difference between a vector and a scalar?
- What do the components of a vector represent?
- What different types of measurements are vectors used for?
- How are vectors added together?

Content Topics:

- Scalar vs vector
- Vector representation
- Adding vectors graphically & resultant vector
- Vector components
- Adding vectors algebraically

- Adding vectors that are perpendicular
- Adding vectors that are not perpendicular

Student Learning Tasks and Opportunities:

- Students will be able to explain the difference between a vector and a scalar.
- Students will be able to determine the components of a vector and what they represent.
- Students will be able to add vectors together using multiple methods.
- Students will be able to solve real problems using vectors, component vectors, and vector addition.

Instructional Resources and Equipment:

- Student text
- Complimentary text
- Digital notetaking software
- Charts and graphs
- Labs/demonstrations
- Simulated demonstrations
- PowerPoint
- Interactive white board
- Video clips

Assessment Task(s):

- Entrance/exit slips, etc.
- Class discussions
- Homework
- Quizzes
- Lab activities/reports
- Teacher generated tests
- Presentations/projects

North Providence High School Science Department
Standards – Based Instructional Curriculum Guide

Course: Physics **Grade Level:** 11/12 **Quarter:** 1 **Period(s):** 13

Topic: Motion in Two Dimensions

21st Century Graduation Expectation(s):

- 1.1 Acquiring and applying knowledge and skills within and across the curriculum
- 1.2 Analyzing and evaluating information
- 1.3 Applying technology as a leaning tool across all disciplines
- 2.1 Working cooperatively and/or independently
- 2.2 Applying problem solving strategies
- 2.3 Utilizing resources and time effectively
- 2.4 Accessing, compiling, interpreting, and presenting data and information
- 3.1 Making informed life and career decisions
- 3.2 Recognizing and respecting the diversity and individuality of others
- 3.3 Understanding and accepting the benefits and consequences of his/her behavior
- 4.1 Reading widely and critically
- 4.2 Writing clearly, concisely, and persuasively

Next Generation Science Standards:

Common Core State Standards:

- RST.11-12.1
- RST.11-12.2
- RST.11-12.3
- RST.11-12.4
- RST.11-12.5
- RST.11-12.6
- RST.11-12.7
- RST.11-12.8
- RST.11-12.9
- RST.11-12.10
- WHST.11-12.1
- WHST.11-12.2
- WHST.11-12.4
- WHST.11-12.5
- WHST.11-12.6
- WHST.11-12.7
- WHST.11-12.9
- WHST.11-12.10

Essential Question(s):

- How are the vertical and horizontal motions of a projectile related to each other?
- What causes the acceleration for a projectile while it is in flight?
- How long will a projectile be in flight?
- How far will a projectile travel?
- What is the maximum height a projectile will reach?

Content Topics:

- Vertical and horizontal kinematic equations
- Max height
- Range

- Time of flight
- Time to fall (objects launched off cliffs)

Student Learning Tasks and Opportunities:

- Students will be able to clearly explain the relationship between vertical and horizontal motion of a projectile.
- Students will be able to explain how the acceleration of gravity affects a projectile in flight.
- Students will be able to solve problems to determine the time of flight, maximum height, and range of a projectile.

Instructional Resources and Equipment:

- Student text
- Complimentary text
- Digital notetaking software
- Charts and graphs
- Labs/demonstrations
- Simulated demonstrations
- PowerPoint
- Interactive white board
- Video clips

Assessment Task(s):

- Entrance/exit slips, etc.
- Class discussions
- Homework
- Quizzes
- Lab activities/reports
- Teacher generated tests
- Presentations/projects

North Providence High School Science Department
Standards – Based Instructional Curriculum Guide

Course: Physics **Grade Level:** 11/12 **Quarter:** 2 **Period(s):** 17

Topic: Dynamics

21st Century Graduation Expectation(s):

- 1.1 Acquiring and applying knowledge and skills within and across the curriculum
- 1.2 Analyzing and evaluating information
- 1.3 Applying technology as a leaning tool across all disciplines
- 2.1 Working cooperatively and/or independently
- 2.2 Applying problem solving strategies
- 2.3 Utilizing resources and time effectively
- 2.4 Accessing, compiling, interpreting, and presenting data and information
- 3.1 Making informed life and career decisions
- 3.2 Recognizing and respecting the diversity and individuality of others
- 3.3 Understanding and accepting the benefits and consequences of his/her behavior
- 4.1 Reading widely and critically
- 4.2 Writing clearly, concisely, and persuasively

Next Generation Science Standards:

- HS-PS2-1
- HS-PS2-4
- HS-PS2-6

Common Core State Standards:

- RST.11-12.1
- RST.11-12.2
- RST.11-12.3
- RST.11-12.4
- RST.11-12.5
- RST.11-12.6
- RST.11-12.7
- RST.11-12.8
- RST.11-12.9
- RST.11-12.10
- WHST.11-12.1
- WHST.11-12.2
- WHST.11-12.4
- WHST.11-12.5
- WHST.11-12.6
- WHST.11-12.9
- WHST.11-12.10

Essential Question(s):

- What is a force?
- How are force, mass, and acceleration related?
- How do forces affect the motion of objects?
- What are Newton's Laws**?**
- What "everyday" forces are acting on objects?
- How do the attractive and repulsive forces determine the functioning of a material?

Content Topics:

- Force
- Drawing force diagrams/free body diagrams
- Force as a vector
- Newton's Laws
- Everyday forces
- Weight vs mass
- Normal/contact force
- Friction
- Coefficients of friction

Student Learning Tasks and Opportunities:

- Students will be able to describe and give examples of force.
- Students will be able to explain the relationship between force, mass, and acceleration.
- Students will be able to describe Newton's Laws and how force and motion are related.
- Students will be able to solve problems involving forces.
- Students will be able to explain how molecular forces affect the type of materials created with different particles.
- Students will be able to use Newton's Law of Gravitation to determine the force between two objects.

Instructional Resources and Equipment:

- Student text
- Complimentary text
- Digital notetaking software
- Charts and graphs
- Labs/demonstrations
- Simulated demonstrations
- PowerPoint
- Interactive white board
- Video clips

Assessment Task(s):

- Entrance/exit slips, etc.
- Class discussions
- Homework
- Quizzes
- Lab activities/reports
- Teacher generated tests
- Presentations/projects

North Providence High School Science Department
Standards – Based Instructional Curriculum Guide

Course: Physics **Grade Level:** 11/12 **Quarter:** 2 **Period(s):** 23

Topic: Work and Energy

21st Century Graduation Expectation(s):
- 1.1 Acquiring and applying knowledge and skills within and across the curriculum
- 1.2 Analyzing and evaluating information
- 1.3 Applying technology as a leaning tool across all disciplines
- 2.1 Working cooperatively and/or independently
- 2.2 Applying problem solving strategies
- 2.3 Utilizing resources and time effectively
- 2.4 Accessing, compiling, interpreting, and presenting data and information
- 3.1 Making informed life and career decisions
- 3.2 Recognizing and respecting the diversity and individuality of others
- 3.3 Understanding and accepting the benefits and consequences of his/her behavior
- 4.1 Reading widely and critically
- 4.2 Writing clearly, concisely, and persuasively

Next Generation Science Standards:
- HS-PS3-1
- HS-PS3-2
- HS-PS3-3

Common Core State Standards:
- RST.11-12.1
- RST.11-12.2
- RST.11-12.3
- RST.11-12.4
- RST.11-12.5
- RST.11-12.6
- RST.11-12.7
- RST.11-12.8
- RST.11-12.9
- RST.11-12.10
- WHST.11-12.1
- WHST.11-12.2
- WHST.11-12.4
- WHST.11-12.5
- WHST.11-12.6
- WHST.11-12.7
- WHST.11-12.9
- WHST.11-12.10

Essential Question(s):
- What is work and how does the direction of the force creating the work affect the amount of work done?
- How are work and energy related?
- What are the different kinds of energy and how energy transferred from one type to another?
- What does it mean to say that energy is always conserved within a system?
- How is power related to work and energy?

Content Topics:
- Work
- Kinetic energy
- Work-kinetic energy theorem

- Gravitational potential energy
- Elastic potential energy
- Hooke's law
- Conservation of energy
- Power

Student Learning Tasks and Opportunities:

- Students will be able to explain the importance of the direction of a force when solving for work done.
- Students will be able to solve problems involving multiple energies where the energy type is changing from one or more types to another type or types.
- Students will be able to demonstrate energy conversions with diagrams, drawings, descriptions, computer simulations, or other types of models.
- Students will be able to design, build, and refine a device that works within given constraints to convert one form of energy to another form of energy.
- Students will be able to explain the conservation of energy within a system.
- Students will be able to explain the relationship between work, energy, and power and solve problems involving these quantities.

Instructional Resources and Equipment:

- Student text
- Complimentary text
- Digital notetaking software
- Charts and graphs
- Labs/demonstrations
- Simulated demonstrations
- PowerPoint
- Interactive white board
- Video clips

Assessment Task(s):

- Entrance/exit slips, etc.
- Class discussions
- Homework
- Quizzes
- Lab activities/reports
- Teacher generated tests
- Presentations/projects

North Providence High School Science Department
Standards – Based Instructional Curriculum Guide

Course: Physics **Grade Level:** 11/12 **Quarter:** 3 **Period(s):** 15

Topic: Linear Momentum

21st Century Graduation Expectation(s):
- 1.1 Acquiring and applying knowledge and skills within and across the curriculum
- 1.2 Analyzing and evaluating information
- 1.3 Applying technology as a leaning tool across all disciplines
- 2.1 Working cooperatively and/or independently
- 2.2 Applying problem solving strategies
- 2.3 Utilizing resources and time effectively
- 2.4 Accessing, compiling, interpreting, and presenting data and information
- 3.1 Making informed life and career decisions
- 3.2 Recognizing and respecting the diversity and individuality of others
- 3.3 Understanding and accepting the benefits and consequences of his/her behavior
- 4.1 Reading widely and critically
- 4.2 Writing clearly, concisely, and persuasively

Next Generation Science Standards:
- HS-PS2-2
- HS-PS2-3

Common Core State Standards:
- RST.11-12.1
- RST.11-12.2
- RST.11-12.3
- RST.11-12.4
- RST.11-12.5
- RST.11-12.6
- RST.11-12.7
- RST.11-12.8
- RST.11-12.9
- RST.11-12.10
- WHST.11-12.1
- WHST.11-12.2
- WHST.11-12.4
- WHST.11-12.5
- WHST.11-12.6
- WHST.11-12.9
- WHST.11-12.10

Essential Question(s):
- How is the change on momentum of an object related to the force that is causing the change?
- What does it mean to say that momentum is always conserved within a system?
- What are the different types of collisions and what factors determine the type of collision when two objects collide?
- How can the force an object experiences during a collision be minimized?

Content Topics:
- Momentum
- Impulse
- Conservation of momentum

- Types of collisions
- Elastic vs inelastic

Student Learning Tasks and Opportunities:

- Students will be able to use mathematical representations to support the claim that the total momentum of a system of objects is conserved when there is no net force on the system.
- Students will be able to apply scientific and engineering ideas to design, evaluate, and refine a device that minimizes the force on an object during a collision.
- Students will be able to explain the relationship between the change of momentum and force an object experiences during a collision.
- Students will be able to determine the type of collision that has occurred between multiple objects.
- Students will be able to solve conservation of momentum problems.

Instructional Resources and Equipment:

- Student text
- Complimentary text
- Digital notetaking software
- Charts and graphs
- Labs/demonstrations
- Simulated demonstrations
- PowerPoint
- Interactive white board
- Video clips

Assessment Task(s):

- Entrance/exit slips, etc.
- Class discussions
- Homework
- Quizzes
- Lab activities/reports
- Teacher generated tests
- Presentations/projects

North Providence High School Science Department
Standards – Based Instructional Curriculum Guide

Course: Physics **Grade Level:** 11/12 **Quarter:** 3 **Period(s):** 17

Topic: Torque

21st Century Graduation Expectation(s):

- 1.1 Acquiring and applying knowledge and skills within and across the curriculum
- 1.2 Analyzing and evaluating information
- 1.3 Applying technology as a leaning tool across all disciplines
- 2.1 Working cooperatively and/or independently
- 2.2 Applying problem solving strategies
- 2.3 Utilizing resources and time effectively
- 2.4 Accessing, compiling, interpreting, and presenting data and information
- 3.1 Making informed life and career decisions
- 3.2 Recognizing and respecting the diversity and individuality of others
- 3.3 Understanding and accepting the benefits and consequences of his/her behavior
- 4.1 Reading widely and critically
- 4.2 Writing clearly, concisely, and persuasively

Next Generation Science Standards:

Common Core State Standards:

- RST.11-12.1
- RST.11-12.2
- RST.11-12.3
- RST.11-12.4
- RST.11-12.5
- RST.11-12.6
- RST.11-12.7
- RST.11-12.8
- RST.11-12.9
- RST.11-12.10
- WHST.11-12.1
- WHST.11-12.2
- WHST.11-12.4
- WHST.11-12.5
- WHST.11-12.6
- WHST.11-12.7
- WHST.11-12.9
- WHST.11-12.10

Essential Question(s):

- How do the magnitude of the force, the angle of the force, and the distance of the force from the pivot point affect the amount of torque created on an object?
- How does the shape of an object affect the amount of inertia created when the object is rotated?
- What are the different types of simple machines and how are they useful?

Content Topics:

- Torque
- Center of mass
- Equilibrium
- Moment of inertia

- Simple machines

Student Learning Tasks and Opportunities:

- Students will be able to explain how the magnitude of the force, the angle of the force, and the distance of the force from the pivot point affect the amount of torque created on an object.
- Students will be able to determine the moment of inertia for objects that have different shapes.
- Students will be able to describe the different types of simple machines and how they are useful.
- Students will be able to locate the center of mass of an object.

Instructional Resources and Equipment:

- Student text
- Complimentary text
- Digital notetaking software
- Charts and graphs
- Labs/demonstrations
- Simulated demonstrations
- PowerPoint
- Interactive white board
- Video clips

Assessment Task(s):

- Entrance/exit slips, etc.
- Class discussions
- Homework
- Quizzes
- Lab activities/reports
- Teacher generated tests
- Presentations/projects

North Providence High School Science Department
Standards – Based Instructional Curriculum Guide

Course: Physics **Grade Level:** 11/12 **Quarter:** 3 **Period(s):** 17

Topic: Electrostatics

21st Century Graduation Expectation(s):
- 1.1 Acquiring and applying knowledge and skills within and across the curriculum
- 1.2 Analyzing and evaluating information
- 1.3 Applying technology as a leaning tool across all disciplines
- 2.1 Working cooperatively and/or independently
- 2.2 Applying problem solving strategies
- 2.3 Utilizing resources and time effectively
- 2.4 Accessing, compiling, interpreting, and presenting data and information
- 3.1 Making informed life and career decisions
- 3.2 Recognizing and respecting the diversity and individuality of others
- 3.3 Understanding and accepting the benefits and consequences of his/her behavior
- 4.1 Reading widely and critically
- 4.2 Writing clearly, concisely, and persuasively

Next Generation Science Standards:
- HS-PS2-4
- HS-PS3-5

Common Core State Standards:
- RST.11-12.1
- RST.11-12.2
- RST.11-12.3
- RST.11-12.4
- RST.11-12.5
- RST.11-12.6
- RST.11-12.7
- RST.11-12.8
- RST.11-12.9
- RST.11-12.10
- WHST.11-12.1
- WHST.11-12.2
- WHST.11-12.4
- WHST.11-12.5
- WHST.11-12.6
- WHST.11-12.9
- WHST.11-12.10

Essential Question(s):
- What is electric charge?
- How is electric charge conserved and transferred?
- What kind of forces do particles experience due to their electric charge?
- What kind of forces do particles experience when they are in an electric field?

Content Topics:
- Electric charge
- Conservation of charge
- Transferring charge
- Electric force / Coulomb's Law

- Electric field

Student Learning Tasks and Opportunities:

- Students will be able to determine the electrostatic forces between objects using Coulomb's Law.
- Students will be able to develop and use a model of two objects interacting through electric fields to illustrate the forces between objects and the changes in energy of the objects due to the interaction.
- Students will be able to explain the different ways to transfer charge.
- Students will be able to determine the charge of a particle or the strength of an electric field based on their interaction.

Instructional Resources and Equipment:

- Student text
- Complimentary text
- Digital notetaking software
- Charts and graphs
- Labs/demonstrations
- Simulated demonstrations
- PowerPoint
- Interactive white board
- Video clips

Assessment Task(s):

- Entrance/exit slips, etc.
- Class discussions
- Homework
- Quizzes
- Lab activities/reports
- Teacher generated tests
- Presentations/projects

North Providence High School Science Department
Standards – Based Instructional Curriculum Guide

Course: Physics **Grade Level:** 11/12 **Quarter:** 4 **Period(s):** 12

Topic: Simple Circuits

21st Century Graduation Expectation(s):

- 1.1 Acquiring and applying knowledge and skills within and across the curriculum
- 1.2 Analyzing and evaluating information
- 1.3 Applying technology as a leaning tool across all disciplines
- 2.1 Working cooperatively and/or independently
- 2.2 Applying problem solving strategies
- 2.3 Utilizing resources and time effectively
- 2.4 Accessing, compiling, interpreting, and presenting data and information
- 3.1 Making informed life and career decisions
- 3.2 Recognizing and respecting the diversity and individuality of others
- 3.3 Understanding and accepting the benefits and consequences of his/her behavior
- 4.1 Reading widely and critically
- 4.2 Writing clearly, concisely, and persuasively
-

Next Generation Science Standards:

- HS-PS2-5

Common Core State Standards:

- RST.11-12.1
- RST.11-12.2
- RST.11-12.3
- RST.11-12.4
- RST.11-12.5
- RST.11-12.6
- RST.11-12.7
- RST.11-12.8
- RST.11-12.9
- RST.11-12.10
- WHST.11-12.1
- WHST.11-12.2
- WHST.11-12.4
- WHST.11-12.5
- WHST.11-12.6
- WHST.11-12.7
- WHST.11-12.9
- WHST.11-12.10

Essential Question(s):

- How are electric current and a magnetic field related?
- What is the relationship between current, resistance, and potential difference?
- What is a circuit diagram and how is it useful?
- What is the difference between parallel and series circuits?

Content Topics:

- Current
- Resistance
- Potential difference
- Electric power

- Ohm's Law and Kirchhoff's Laws
- Circuit diagrams
- Parallel and series circuits

Student Learning Tasks and Opportunities:

- Students will be able to plan and conduct an investigation to provide evidence that an electric current can produce a magnetic field and that a changing magnetic field can produce an electric current.
- Students will be able to use Ohm's Law and Kirchhoff's Laws to solve problems for current, resistance, and potential difference.
- Students will be able to draw circuit diagrams and use circuit diagrams to solve problems.
- Students will be able to explain the difference between the parallel and series circuits.

Instructional Resources and Equipment:

- Student text
- Complimentary text
- Digital notetaking software
- Charts and graphs
- Labs/demonstrations
- Simulated demonstrations
- PowerPoint
- Interactive white board
- Video clips

Assessment Task(s):

- Entrance/exit slips, etc.
- Class discussions
- Homework
- Quizzes
- Lab activities/reports
- Teacher generated tests
- Presentations/projects