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*The Mission of the Chardon Local Schools is High Achievement  
for All Students, Where Learning is Our Most Important Work.*

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**Science Course of Study:**

**PHYSICS - *General***

*Revised March 2022*

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# General Physics

Committee Members: Brad McGovern

## Strand: MOTION (Kinematics) - QUARTER 1

<p><b>Learning Standards:</b></p> <p>MOTION P.M.1: Motion Graphs:</p> <ul style="list-style-type: none"><li>• Position vs. time</li><li>• Velocity vs. time</li><li>• Acceleration vs. time</li></ul> <p>MOTION P.M.2: Problem Solving:</p> <ul style="list-style-type: none"><li>• Using graphs (average velocity, instantaneous velocity, acceleration, displacement, change in velocity)</li><li>• Uniform acceleration including free fall (initial velocity, final velocity, time, displacement, acceleration, average velocity)</li></ul> <p>MOTION P.M.3: Projectile Motion:</p> <ul style="list-style-type: none"><li>• Independence of horizontal and vertical motion</li><li>• Problem-solving involving horizontally launched projectiles</li></ul>	<p><b>How Taught?</b> <b>Teaching activities may include, but are not limited to:</b></p> <ul style="list-style-type: none"><li>• Interpretation of velocity from a position-time graph.</li><li>• Interpretation of acceleration from a velocity-time graph.</li><li>• Students closely read select passages from documents to analyze text structure, development, and consequent meanings</li><li>• Teacher provides direct instruction, give feedback, and model critical thinking</li><li>• Small group and class discussions</li><li>• Cooperative learning groups</li><li>• Students to define, use, and connect to content area and based vocabulary</li><li>• Students analyze video content related to standards that provide a broader global perspective of content.</li><li>• Design and conduct lab-based investigations that connect content to real-life experiences.</li><li>• Using technology and mathematics to improve investigations and communications.</li><li>• Utilize data to impact instruction</li></ul>
<p><b>Materials:</b> <b>Class textbook</b> <b>Gizmo simlab</b> <b>PhET simlab</b> <b>Kahoot</b> <b>Google sheets / graphs</b> <b>Vernier labquests / motion sensors</b> <b>Hands-on Labs</b> <b>Videos</b> <b>Web Assign</b></p>	<p><b>How Assessed?</b> <b>Assessments may include, but are not limited to:</b></p> <ul style="list-style-type: none"><li>• Pre-Assessments (pre-tests, observation, questioning, diagnostics)</li><li>• Formative Assessments (entry/exit slips, mini analysis assignments, group work, discussions, homework/classwork, self and peer evaluations, checklists, guided notes, observations, quizzes, conferences, rubrics, lesson review questions, lab reports)</li><li>• Summative Assessments (formal essays, using rubrics; tests/exams, project, evaluation, demonstration, lab practicals)</li></ul> <p><b>How Re-Taught?</b> <b>Re-teaching activities may include, but are not limited to:</b></p> <ul style="list-style-type: none"><li>• descriptive feedback on original task/assessment</li></ul>

- student examples of expectations
- modeling
- student self assessments
- manipulatives
- presenting the information again in a different way
- review sessions
- graphic organizers
- small-group instruction
- practice activities
- computer tutorials / programs
- peer tutoring
- breaking down concept into smaller components
- games and hands-on activities
- cooperative learning
- Universal Design for Learning principles offering students opportunities to experience and engage material in new and different ways

**Strand: FORCES, MOMENTUM, and MOTION (dynamics) - QUARTER 2**

**Learning Standards:**

- P.F.1: Newton's laws applied to complex problems**
- P.F.2: Gravitational force and fields**
- P.F.3: Elastic forces**
- P.F.4: Friction force (static and kinetic)**
- P.F.5: Air resistance and drag**
- P.F.6: Forces in two dimensions:**
  - **Adding vector forces**
  - **Motion down inclines**
  - **Centripetal forces and circular motion**
- P.F.7: Momentum, impulse and conservation of momentum**

**How Taught?**

**Teaching activities may include, but are not limited to:**

- Students closely read select passages from documents to analyze text structure, development, and consequent meanings
- Teacher provides direct instruction, give feedback, and model critical thinking
- Small group and class discussions
- Cooperative learning groups
- Students to define, use, and connect to content area and based vocabulary
- Students analyze video content related to standards that provide a broader global perspective of content.
- Design and conduct lab-based investigations that connect content to real-life experiences.
- Using technology and mathematics to improve investigations and communications.
- Utilize data to impact instruction

**Materials:**

- Class textbook**
- Gizmo simlab**
- PhET simlab**
- Kahoot**
- Google sheets / graphs**
- Vernier labquests / motion sensors**
- Hands-on Labs**
- Videos**
- Web Assign**

**How Assessed?**

**Assessments may include, but are not limited to:**

- Pre-Assessments (pre-tests, observation, questioning, diagnostics)
- Formative Assessments (entry/exit slips, mini analysis assignments, group work, discussions, homework/classwork, self and peer evaluations, checklists, guided notes, observations, quizzes, conferences, rubrics, lesson review questions, lab reports)
- Summative Assessments (formal essays, using rubrics; tests/exams, project, evaluation, demonstration, lab practicals)

**How Re-Taught?**

**Re-teaching activities may include, but are not limited to:**

- descriptive feedback on original task/assessment
- student examples of expectations
- modeling
- student self assessments
- manipulatives
- presenting the information again in a different way
- review sessions
- graphic organizers
- small-group instruction

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|  | <ul style="list-style-type: none"><li>● practice activities</li><li>● computer tutorials / programs</li><li>● peer tutoring</li><li>● breaking down concept into smaller components</li><li>● games and hands-on activities</li><li>● cooperative learning</li><li>● Universal Design for Learning principles offering students opportunities to experience and engage material in new and different ways</li></ul> |
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**Strand: ENERGY - QUARTER 3**

<p><b>Learning Standard: (kinetic energy)</b> P.E.1: Gravitational potential energy P.E.2: Energy in springs P.E.3: Work and power P.E.4: Conservation of energy P.E.5: Nuclear energy</p>	<p><b>How Taught?</b> <b>Teaching activities may include, but are not limited to:</b></p> <ul style="list-style-type: none"><li>● Students closely read select passages from documents to analyze text structure, development, and consequent meanings</li><li>● Teacher provides direct instruction, give feedback, and model critical thinking</li><li>● Small group and class discussions</li><li>● Cooperative learning groups</li><li>● Students to define, use, and connect to content area and based vocabulary</li><li>● Students analyze video content related to standards that provide a broader global perspective of content.</li><li>● Design and conduct lab-based investigations that connect content to real-life experiences.</li><li>● Provide opportunities for out of building excursions (field trips) to provide additional real world application of standards.</li><li>● Using technology and mathematics to improve investigations and communications.</li><li>● Utilize data to impact instruction</li></ul>
<p><b>Materials:</b> <b>Class textbook</b> <b>Gizmo simlab</b> <b>PhET simlab</b> <b>Kahoot</b> <b>Google sheets / graphs</b> <b>Vernier labquests / motion sensors</b> <b>Hands-on Labs</b> <b>Videos</b> <b>Web Assign</b></p>	<p><b>How Assessed?</b></p> <ul style="list-style-type: none"><li>● Pre-Assessments (pre-tests, observation, questioning, diagnostics)</li><li>● Formative Assessments (entry/exit slips, mini analysis assignments, group work, discussions, homework/classwork, self and peer evaluations, checklists, guided notes, observations, quizzes, conferences, rubrics, lesson review questions, lab reports)</li><li>● Summative Assessments (formal essays, using rubrics; tests/exams, project, evaluation, demonstration, lab practicals)</li></ul> <p><b>How Re-Taught?</b> <b>Re-teaching activities may include, but are not limited to:</b></p> <ul style="list-style-type: none"><li>● descriptive feedback on original task/assessment</li><li>● student examples of expectations</li><li>● modeling</li><li>● student self assessments</li><li>● manipulatives</li></ul>

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|  | <ul style="list-style-type: none"><li>● presenting the information again in a different way</li><li>● review sessions</li><li>● graphic organizers</li><li>● small-group instruction</li><li>● practice activities</li><li>● computer tutorials / programs</li><li>● peer tutoring</li><li>● breaking down concept into smaller components</li><li>● games and hands-on activities</li><li>● cooperative learning</li><li>● Universal Design for Learning principles offering students opportunities to experience and engage material in new and different ways</li></ul> |
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**Strand: WAVES - Quarter 3**

**Learning Standard:**

P.W.1: Wave properties:

- Conservation of energy
- Reflection
- Refraction
- Interference
- Diffraction

P.W.2: Light phenomena:

- Ray diagrams (propagation of light)
- Law of reflection (equal angles)
- Snell's law
- Diffraction patterns
- Wave—particle duality of light
- Visible spectrum of light

**How Taught?**

**Teaching activities may include, but are not limited to:**

- Students closely read select passages from documents to analyze text structure, development, and consequent meanings
- Teacher provides direct instruction, give feedback, and model critical thinking
- Small group and class discussions
- Cooperative learning groups
- Students to define, use, and connect to content area and based vocabulary
- Students analyze video content related to standards that provide a broader global perspective of content.
- Design and conduct lab-based investigations that connect content to real-life experiences.
- Using technology and mathematics to improve investigations and communications.
- Utilize data to impact instruction

**Materials:**

**Class textbook**

**Gizmo simlab**

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**Kahoot**

**Google sheets / graphs**

**Vernier labquests / motion sensors**

**Hands-on Labs**

**Videos**

**Web Assign**

**How Assessed?**

**Assessments may include, but are not limited to:**

- Pre-Assessments (pre-tests, observation, questioning, diagnostics)
- Formative Assessments (entry/exit slips, mini analysis assignments, group work, discussions, homework/classwork, self and peer evaluations, checklists, guided notes, observations, quizzes, conferences, rubrics, lesson review questions, lab reports)
- Summative Assessments (formal essays, using rubrics; tests/exams, project, evaluation, demonstration, lab practicals)

**How Re-Taught?**

**Re-teaching activities may include, but are not limited to:**

- descriptive feedback on original task/assessment
- student examples of expectations
- modeling
- student self assessments
- manipulatives
- presenting the information again in a different way



- review sessions
- graphic organizers
- small-group instruction
- practice activities
- computer tutorials / programs
- peer tutoring
- breaking down concept into smaller components
- games and hands-on activities
- cooperative learning
- Universal Design for Learning principles offering students opportunities to experience and engage material in new and different ways

**Strand:** ELECTRICITY and MAGNETISM - QUARTER 4

**Learning Standard:**

P.EM.1: Charging objects (friction, contact and induction)  
P.EM.2: Coulomb's law  
P.EM.3: Electric fields and electric potential energy  
P.EM.4: DC circuits:  
• Ohm's law  
• Series circuits  
• Parallel circuits  
• Mixed circuits  
• Applying conservation of charge and energy (junction and loop rules)  
P.EM.5: Magnetic fields  
P.EM.6: Electromagnetic interactions

**How Taught?**

**Teaching activities may include, but are not limited to:**

- Students closely read select passages from documents to analyze text structure, development, and consequent meanings
- Teacher provides direct instruction, give feedback, and model critical thinking
- Small group and class discussions
- Cooperative learning groups
- Students to define, use, and connect to content area and based vocabulary
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**Materials:**

**Class textbook**  
**Gizmo simlab**  
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**Kahoot**  
**Google sheets / graphs**  
**Vernier labquests / motion sensors**  
**Hands-on Labs**  
**Videos**  
**Web Assign**

**How Assessed?**

**Assessments may include, but are not limited to:**

- Pre-Assessments (pre-tests, observation, questioning, diagnostics)
- Formative Assessments (entry/exit slips, mini analysis assignments, group work, discussions, homework/classwork, self and peer evaluations, checklists, guided notes, observations, quizzes, conferences, rubrics, lesson review questions, lab reports)
- Summative Assessments (formal essays, using rubrics; tests/exams, project, evaluation, demonstration, lab practicals)

**How Re-Taught?**

**Re-teaching activities may include, but are not limited to:**

- descriptive feedback on original task/assessment
- student examples of expectations
- modeling
- student self assessments
- manipulatives
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