**Enduring Understandings / Big Ideas:** Designers and Engineers use models and simulations to understand, develop, test, and document theories related to academic study. Scientist and Technologists need to be able to collect, document, and evaluate data from design test experiments.

**Essential Questions:** What scientific principles apply to the design, construction, testing, and evaluation of model planes?

<table>
<thead>
<tr>
<th>Learning Competencies - What the students will know and be able to do upon completion of the unit</th>
<th>Supportive Learning Activities</th>
<th>Assessments</th>
<th>Resources</th>
<th>PDE Academic Standards</th>
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</thead>
<tbody>
<tr>
<td>Students will define and explain the four forces on an airplane during flight.</td>
<td>Teaching Strategies - Large Group Demos Small Group Instruction Individualized Instruction Multimedia Presentations Interactive Comp. Software Journal Writing Hands-On Activities Cooperative Learning</td>
<td>Formative: Check for understanding questions will be utilized during large group instruction. Students will be asked open-ended questions during small group and individualized instruction to check for understanding.</td>
<td>Teacher Resources – Tech Lab Comp. Network Tech Lab tools and materials Loop Glider Design Packet Projection Station Video Camera Digital Camera Internet resources WebLibrary – How Planes Fly PowerPoint Presentation</td>
<td>See Addendum for details</td>
</tr>
<tr>
<td>Students will explain Bernoulli’s Principle and apply it to the airfoil shape of a wing required for lift.</td>
<td>Learning Activities – Journal Entries Students will complete Journal Entries. Paper and electronic journals will be utilized during lessons and design activities.</td>
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<tr>
<td>Students will develop a solution to a design challenge using the Technological Problem Solving Method.</td>
<td>Webquest - Students will complete a webquest to research and develop knowledge of the History of flight and Bernoulli’s Principle of lift.</td>
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<tr>
<td>Students will design, construct, test, and evaluate loop gliders.</td>
<td>Design Challenges Students will complete an aerospace design challenge</td>
<td>Summative: Students will complete and</td>
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<tr>
<td>Students will analyze technical data from loop glider test flights to compare the relationship between design and results gathered during testing.</td>
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</table>

**Teaching Strategies:**
- Large Group Demos
- Small Group Instruction
- Individualized Instruction
- Multimedia Presentations
- Interactive Comp. Software
- Journal Writing
- Hands-On Activities
- Cooperative Learning

**Learning Activities – Journal Entries**
Students will complete Journal Entries. Paper and electronic journals will be utilized during lessons and design activities.

**Webquest**
Students will complete a webquest to research and develop knowledge of the History of flight and Bernoulli’s Principle of lift.

**Design Challenges**
Students will complete an aerospace design challenge

**Wida Access Placement Test (W-APT)**

**Student Resources**
- Tech Ed 6th Grade Web Page
- PowerPoint Presentation
- Loop Glider Design Brief
- Tech Lab Equipment
  - Computer Network
  - Tools and Materials
  - Student workstations
  - MS Software
  - Design Tools
  - Calculators

**How Stuff Works Website**
http://science.howstuffworks.com/airplane.htm

**PDE Academic Standards**
- Science and Technology and Engineering
  - 3.2.6.B1
  - 3.4.5.A2
  - 3.4.6.A2
  - 3.4.6.A3
  - 3.4.5.C1
  - 3.4.6.C1
  - 3.4.7.C1
  - 3.4.6.D2
- Mathematics
  - 2.2.8.A
  - 2.3.5.A
  - 2.3.5.B
  - 2.8.8.D
- Reading, Writing, Speaking
  - 1.1.8.F
  - 1.2.8.A
  - 1.2.8.B
  - 1.5.8.A
  - 1.5.8.B
  - 1.6.8.A
  - 1.6.8.C
  - 1.6.8.D
  - 1.8.8.B
<table>
<thead>
<tr>
<th>Students will redesign and improve loop glider design characteristics and discuss the improved performance based on modifications.</th>
</tr>
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<tbody>
<tr>
<td>Students will utilize mathematics skills to design, test, and evaluate loop gliders.</td>
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<tr>
<td>Students will make use of digital photography skills for a technical report.</td>
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<tr>
<td>Students will develop a technical report document, save to a network drive, and upload to a hand-in folder for evaluation.</td>
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<th>using the technological Problem Solving Procedure.</th>
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<tbody>
<tr>
<td><strong>Digital Photo Shoots</strong>  Students will complete digital photo shoots for technical documentation.</td>
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<tr>
<td><strong>Technical Report</strong>  Students will complete and submit electronically a technical report that will include applied mathematics, technical data, and a written summary of the design challenge.</td>
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<tr>
<td>Students will complete a Loop Glider Design Challenge Activity in the Tech Lab.</td>
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<tr>
<td>Students will complete a technical report for final evaluation.</td>
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<td>Students will complete a post-test for final evaluation.</td>
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<th>submit for evaluation a webquest research document.</th>
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<tr>
<td>Digital Cameras- Kodak EasyShare C310</td>
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<tr>
<td>Internet Access Research Instructor’s Website</td>
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</table>

**Supplemental Resources:**
- ESL staff
- Bilingual dictionaries

**ELL:**
http://www.cal.org/siop: Fifty Strategies for Teaching; English Language Learners, 2<sup>nd</sup> edition; Adrienne Herrell, Michael Jordan; (Merrill/Prentice Hall, 2003)

**Career Education and Work**
13.2.5 A
13.2.5 E
13.3.5 F

**Every Teacher Teaches ESL**
ELP Standard 1: English Language Learners communicate in English for social and instructional purposes within the school setting.
ELP Standard 2: English Language Learners communicate information, ideas, and concepts necessary for academic success in the content area of Language Arts.