### Enduring Understandings / Big Ideas:
Engineers use a design process to develop, test, evaluate, redesign, and communicate design solutions.

### Essential Questions:
Is it important to follow a design process when developing solutions to a design challenge?  Is it important to evaluate design solutions at intervals? What modifications to the design of your rocket will increase launch performance and distance when testing straw rockets?

<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/ Common Core Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students will explain a real world example of Newton’s 3rd Law of Motion.</td>
<td>Learning Activities – Journal Entries Students will complete Journal Entries. Paper and electronic journals will be utilized during lessons and design activities.</td>
<td></td>
<td></td>
<td></td>
</tr>
<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 Rockets and Newton’s laws of Motion.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Students will be able to explain why it is important to follow a design process.</td>
<td>Design Challenges Students will complete an aerospace design challenge using the technological Problem Solving Procedure.</td>
<td>Summative: Students will complete and submit for evaluation a Wida Access Placement Test (W-APT)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Students will be able to explain why it is important to evaluate design solutions using conceptual, physical and mathematical models at various intervals.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Students will evaluate designs and identify necessary modifications</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

**NASA Website** – [http://quest.arc.nasa.gov/space](http://quest.arc.nasa.gov/space)

**Mathematics**
- 2.1.8.A
- 2.2.8.B
- 2.3.8.B
- 2.3.8.C
- 2.7.8.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
Students will utilize mathematics skills to design, test, and evaluate rockets.

Students will make use of digital photography skills for a technical report.

Students will develop a technical report document, save to a network drive, and upload to a hand-in folder for evaluation.

<table>
<thead>
<tr>
<th>Pitsco Straw Rocket Design Challenge</th>
<th>webquest research document.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students will design, construct, test, and evaluate straw rockets.</td>
<td>Students will complete a Straw Rocket Design Challenge Activity in the Tech Lab.</td>
</tr>
<tr>
<td>Students will redesign and improve rocket launch characteristics and discuss the improved performance based on modifications.</td>
<td>Students will complete a technical report for final evaluation.</td>
</tr>
</tbody>
</table>

**Digital Photo Shoots**
Students will complete digital photo shoots for technical documentation.

**Technical Report**
Students will complete and submit electronically a technical report that will include applied mathematics, technical data, and a written summary of the design challenge.

Students will analyze technical data from rocket launches to compare the relationship between design and results gathered during testing.

**Students will complete a post-test for final evaluation.**

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

**ELL:**

---

**Common Core Standards**
- RST.6-8.3
- RST.6-8.4
- RST.6-8.7
- RST.6-8.9
- WHST.6-8.2
- WHST.6-8.4
- WHST.6-8.6
- SL.6.1
- SL.6.2
- SL.6.3

**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.

**Physics Classroom Website** - http://www.physicsclassroom.com/Class/newtlaws/

**Newton’s laws of Motion Website** – http://www.williamsclass.com/EighthScienceWork/NewtonThreeLaws.htm

**Digital Cameras** - Kodak EasyShare C310

**Internet Access**

**Research**

**Instructor’s Website**

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

**ELL:**