**Big Ideas/Key Concepts:** In this unit, students will explore and gain an understanding of the forces acting on a body in static equilibrium, calculating internal and external forces of a system. The students will also explore the basic categories and properties of materials along with testing of those materials. Finally, the students will design problems related to materials and structures.

<table>
<thead>
<tr>
<th>Standards</th>
<th>Student Friendly “I Can” Statements</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>The following standards are addressed in this unit.</strong></td>
<td><strong>Unit 2.1 - Statics – 14 days</strong></td>
</tr>
<tr>
<td><strong>Math Standards (will shift to common core at the end of 12-13 SY)</strong></td>
<td>I can create free body diagrams of objects, identifying all forces acting on the object.</td>
</tr>
<tr>
<td><strong>Number Operations:</strong> understand numbers, ways of representing numbers, relationships among numbers, and number systems; understand meanings of operations and how they relate to one another; and compute fluently and make reasonable estimates.</td>
<td>I can mathematically locate the centroid of structural members.</td>
</tr>
<tr>
<td><strong>Algebra:</strong> understand patterns, relations, and functions; represent and analyze mathematical situations and structures using algebraic symbols; use mathematical models to represent and understand quantitative relationships; and analyze change in various contexts.</td>
<td>I can calculate moment of inertia of structural members.</td>
</tr>
<tr>
<td><strong>Geometry:</strong> Analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships, specify locations and describe spatial relationships using coordinate geometry and other representational systems, apply transformations and use symmetry to analyze mathematical situations, use visualization, special reasoning, and geometric modeling to solve problems.</td>
<td>I can differentiate between scalar and vector quantities.</td>
</tr>
<tr>
<td><strong>Measurement:</strong> understand measurable attributes of objects and the units, systems, and processes of measurement; and apply appropriate techniques, tools, and formulas to determine measurements.</td>
<td>I can identify magnitude, direction, and sense of a vector.</td>
</tr>
<tr>
<td>I can calculate the X and Y components given a vector.</td>
<td>I can calculate moment forces given a specified axis.</td>
</tr>
<tr>
<td>I can use equations of equilibrium to calculate unknown forces.</td>
<td>I can use the method of joints strategy to determine forces in the members of a statically determinate truss.</td>
</tr>
</tbody>
</table>
**Problem Solving:** build new mathematical knowledge through problem solving; solve problems that arise in mathematics and in other contexts; apply and adapt a variety of appropriate strategies to solve problems; monitor and reflect on the process of mathematical problem solving.

**Communication** – organize and consolidate thinking through communication, communicate students mathematical thinking clearly to peers, teachers, and others, analyze and evaluate the mathematical thinking and strategies of others, and use the language of math to express mathematical ideas precisely.

**Connections:** recognize and use connections among mathematical ideas; understand how mathematical ideas interconnect and build on one another to produce a coherent whole; recognize and apply mathematics in contexts outside of mathematics.

**Representation:** Create and use representations to organize, and communicate mathematical ideas, select, apply, and translate among mathematical representations to solve problems.

**National Science Education Standards**

**Unifying Concepts and Processes:**
- Systems, order, and organization
- Evidence, models, and explanation
- Change, constancy, and measurement
- Evolution and Equilibrium
- Form and function

**Standard A: Science as an Inquiry –**
- Abilities necessary to do scientific inquiry
- Understandings about scientific inquiry.

**Science and Technology Standard E -**
- Abilities of technological design
Understanding about science and technology

**Standard F: Science in Personal and Social Perspective**

- Natural Resources
- Science and technology in local, national, and global challenges

**English Language Arts Standards**

**Standard 4:** Students adjust their use of spoken, written, and visual language (e.g. conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes.

**Standard 5:** Students employ a wide range of strategies as they write and use different writing process elopements appropriately to communicate.

**Standard 7:** Students conduct research on issues and interests by generating ideas and questions, and by posing problems. They gather, evaluate, and synthesize data from a variety of sources to communicate their discoveries in ways that suit their purposes and audience.

**Standard 8:** Students use a variety of technological and information resources (e.g. libraries, data bases, computer networks, video) to gather and synthesize information and to create and communicate knowledge.

**Standard 12:** Students use spoken, written and visual language to accomplish their own purposes.

**Standards for Technology Literacy**

**Standard 1:** Students will develop an understanding of the characteristics and scope of technology. (J, L)
Standard 2: Students will develop an understanding of the core concepts of technology. (Z, AA, BB, CC)

Standard 4: Students will develop an understanding of the cultural, social, economic, and political effects of technology. (I, J)

Standard 5: Students will develop an understanding of the effects of technology on the environment. (G, H, J, K, L)

Standard 7: Students will develop an understanding of the influence of technology on history. (G, H, I, J)

Standard 8: Students will develop an understanding of the attributes of design. (H, J, K)

Standard 9: Students will develop an understanding of engineering design. (I, J, K, L) Standard 10: Students will develop an understanding of the role of troubleshooting, research and development, invention and innovation, and experimentation in problem solving. (J)

Standard 11: Students will develop the abilities to apply the design process. (M, N, O, P, Q, R)

Standard 12: Students will develop the abilities to use and maintain technological products and systems. (L)

Standard 17: Students will develop an understanding of and be able to select and use information and communication technologies. (Q)

Standard 19: Students will develop an understanding of and be able to select and use manufacturing technologies. (M, O, P) Standard 20: Students will develop an understanding of and be able to select and use construction technologies. (J, K, L, M, N)