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| **TEXAS CTE LESSON PLAN**  [www.txcte.org](http://www.txcte.org) | |
| **Lesson Identification and TEKS Addressed** | |
| **Career Cluster** | Science, Technology, Engineering & Mathematics |
| **Course Name** | Principles of Applied Engineering |
| **Lesson/Unit Title** | Rubber Band Airplane |
| **TEKS Student Expectations** | **§130.402. (c) Knowledge and Skills**  (6) The student thinks critically and applies fundamental principles of system modeling and design to multiple design projects. The student is expected to:  (A) identify and describe the fundamental processes needed for a project, including the design process and prototype development, and initiating, planning, executing, monitoring and controlling, and closing a project;  (B) identify the chemical, mechanical, and physical properties of engineering materials;  (C) use problem-solving techniques to develop technological solutions;  (D) use consistent units for all measurements and computations; and  (E) assess the risks and benefits of a design solution. |
| **Basic Direct Teach Lesson**  (Includes Special Education Modifications/Accommodations and  one English Language Proficiency Standards (ELPS) Strategy) | |
| **Instructional Objectives** | After completing this lesson, students will be able to design and construct a rubber band airplane, test the planes to determine which designs are most efficient, analyze the relationship between distance and variables of the plane (wings, weight, fins, center of gravity, etc.) and document the results on the Airplane Design Test Report   * Design a rubber band plane using set materials * Apply cause and effect relationships of size, air resistance, shape, and balance that affect the plane's flight * Create their own unique rubber band airplane * Apply critical thinking on how to build the airplane |
| **Rationale** | Design, weight, and power are factors in planes and travel pattern and duration. |
| **Duration of Lesson** | 1-2 hours |
| **Word Wall/Key Vocabulary**  *(ELPS c1a,c,f; c2b; c3a,b,d; c4c; c5b) PDAS II(5)* |  |
| **Materials/Specialized Equipment Needed** | **Materials**   * Paper, pencil, Plane kit or basic balsa wood supplies, rubber bands, and a propeller * Tape, glue, clay, some type of mount for the propeller * Computer, overhead projector |
| **Anticipatory Set**  (May include pre-assessment for prior knowledge) | Discuss rubber band powered airplane designs.  Ask: What might be of importance to consider when designing such a plane? |
| **Direct Instruction \*** | Show PowerPoint presentation, use lesson outline, and notes page;  *Individualized Education Plan (IEP) for all special education students must be followed. Examples of accommodations may include, but are not limited to:*  none |
| **Guided Practice \*** | Assist students in building planes. Discuss performance of planes.  *Individualized Education Plan (IEP) for all special education students must be followed. Examples of accommodations may include, but are not limited to:*  none |
| **Independent Practice/Laboratory Experience/Differentiated Activities \*** | Have each student determine why his/her plane flew as it did and write a report. Also have them write a paragraph about what they would do differently.  Students may write a hypothesis about what part of the plane is the biggest factor in how far the plane traveled.  Challenge: Loop and spiral planes  *Individualized Education Plan (IEP) for all special education students must be followed. Examples of accommodations may include, but are not limited to:*  none |
| **Lesson Closure** | Review why planes flew as they, which planes flew the best, and what could have been done differently to improve the flights. |
| **Summative/End of Lesson Assessment \*** | Airplane Design Test Report  *Individualized Education Plan (IEP) for all special education students must be followed. Examples of accommodations may include, but are not limited to:*  none |
| **References/Resources/**  **Teacher Preparation** | Understand how to build a rubber band airplane and the factors that will ultimately affect its performance. This project relates design, drafting, and physics since students will be considering basic physics principles.  <http://www.midwestproducts.com/> |
| **Additional Required Components** | |
| **English Language Proficiency Standards (ELPS) Strategies** |  |
| **College and Career Readiness Connection[[1]](#footnote-1)** |  |
| **Recommended Strategies** | |
| **Reading Strategies** |  |
| **Quotes** |  |
| **Multimedia/Visual Strategy**  **Presentation Slides + One Additional Technology Connection** |  |
| **Graphic Organizers/Handout** |  |
| **Writing Strategies**  **Journal Entries + 1 Additional Writing Strategy** |  |
| **Communication**  **90 Second Speech Topics** |  |
| **Other Essential Lesson Components** | |
| **Enrichment Activity**  (e.g., homework assignment) |  |
| **Family/Community Connection** |  |
| **CTSO connection(s)** | SkillsUSA |
| **Service Learning Projects** |  |
| **Lesson Notes** |  |

1. Visit the Texas College and Career Readiness Standards at <http://www.thecb.state.tx.us/collegereadiness/CRS.pdf>, Texas Higher Education Coordinating Board (THECB), 2009. [↑](#footnote-ref-1)