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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** | Rocket Challenge |
| **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  (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** | Students will be able to:   * Learn basic rocket principles * Identify rocket parts, flight paths, center of gravity * Create their own stable bottled rocket * Apply what they have learned by testing the rocket * Assess which rocket flies the best and why   **Preparation** |
| **Rationale** | Understand that students will want to simply build and fly a rocket. Make sure they understand the principles behind the rocket (i.e. stability, center of gravity, etc.) This project relates design, drafting, and physics since students will be considering basic physics principles. This lesson also covers fairly advanced math (i.e. calculus). Students will only need to understand basic  algebraic functions in order to understand some of the concepts. |
| **Duration of Lesson** |  |
| **Word Wall/Key Vocabulary**  *(ELPS c1a,c,f; c2b; c3a,b,d; c4c; c5b) PDAS II(5)* |  |
| **Materials/Specialized Equipment Needed** | **Materials:**   * 2 Liter Bottles * Pencil * Tape * Paper * Launcher * Glue * Nose cone (can be made with paper or tape or commercially purchased) * Scissors   **Instructional Aids:**   * Rocket Challenge PowerPoint presentation * Rocket Challenge Test Report |
| **Anticipatory Set**  (May include pre-assessment for prior knowledge | **Introduction (LSI Quadrant I):**  **SAY:** Today we are going to discuss how rockets work and the basic scientific principlesbehind them.  **ASK:** Does anyone know why rockets arestable?  **SAY:** Ithas a little todo with the location of the centerof gravity and the centerof pressureona rocket.  **SAY:** Now, let’s go through basicrocket fundamentals.  **SHOW:** Show How to Make aModel Rocket PowerPoint presentation.  **SAY:** We are now going to go through a PowerPoint presentation that will briefly cover whycertain rockets are stable and why some are not.  **SHOW:** Show the PowerPoint presentationall the way through and then havestudents work ontheir own bottled rockets |
| **Direct Instruction \*** | Use outline, PowerPoint presentation slides, handouts, and notes pages  *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 \*** | Students will be taught how to build a rocket that will be stable in flight  *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 \*** | Students will be required to be creative and think critically and make their own bottled rockets with their own kind of fins.  For more enrichment, students should construct a modeled rocket that uses powdered motors.  *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** | **ASK:** (After class tests rockets)Ask, “Whichrockets flewthe best and why?”  **Question:** Which rocket flew the highest? Why?  **Answer:** Generally, the answer will be “because the rocket flew straight up with little weather cocking and because its center of gravity was above its center of pressure.”  **Question:** Why do rockets need fins?  **Answer:** To lower the center of pressure of a rocket below its center of gravity  **Question:** (Bonus) What fuels NASA’s shuttle?  **Answer:** Combustion reaction of oxygen and hydrogen molecules |
| **Summative/End of Lesson Assessment \*** | The teacher will observe the students as they are working on their rockets.  The students will create rockets that should have somewhat stable flights and will be assessed with the Rocket Challenge 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** | Hayhurst, P. (2004). *Mr. Hayhurst's Quick and Easy Bottle Rocket*. Retrieved May 25, 2010, from Inhs web site:  <http://www.grc.nasa.gov/WWW/K-12/rocket/shortr.html>  <https://www.nasa.gov/audience/foreducators/topnav/materials/listbytype/Rockets.html> |
| **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)