**SLED Implementation Plan**

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| **Your Name(s):** Cheryl Alcock | **Unit BIG IDEAS:** The Design Process ( Playing with Parachutes & Ship the Chip) |
| **Grade Level**:  6th | **Key Vocabulary:** Prototype; Design Process; Gravity; Surface Area; Rate of Descent;Surface Area; Packaging |
| **School:** Sunnyside Middle School | **Unit prior to and following this unit**: Scientific Process labs (which tissue is stronger? Does height affect how far a pendulum swings? Does the size of parachute affect descent time? |
| **Total time (hours or class sessions):** 10 Class sessions | **Estimated starting date in the school year:** Mid-October |

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| **Unit Objectives**: ***By the end of this unit, students will be able to:*** Maintain a design notebook that will contain the following: 1) The need/problem to be solved; 2) Team/Individual potential/selected solutions; 3) Detailed sketches of plans that include labels and measurements; and, 4) Design steps that can be replicated. Students will also be able to create, test, evaluate, and redesign prototypes from design plans and communicate their solution using oral presentations and visual representations.  |
| **Core Indiana Academic Standard to be addressed**:**Process Standards:** The Nature of Science; The Design Process**Content Standards:** Physical Science; Science, Engineering & Technology**Standard Indicator(s) to be addressed:**6.4.1 Understand how to apply potential or kinetic energy to power a simple device6.4.2 Construct a simple device that uses potential or kinetic energy to perform work.6.4.3 Describe the transfer of energy amongst energy interactions. |
| **Materials and Resources (available in school and/or will need to get):**

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| **ITEM** | **NUMBER** |  | **ITEM** | **NUMBER** |
| **Parachutes:** |  |  |  |  |
| Meter stick | 1/class |  | Plastic shopping bag | 1/group |
| Small ladder (teacher use only) | 1/class |  | Plastic trash bag | 1/group |
| Roll of String | 1/group |  | Sheets of copy paper | 4/group |
| Coffee filters | 4/group |  | Newspaper sheets | 2/group |
| Aluminum foil | 1/group |  | Scissors | 2/group |
| Masking tape (roll) | 1//group |  | Metal washers | 1/group |
| Ruler | 1/group |  | Student Reference Sheets | 1/student |
|  |  |  | Student Worksheets | 1/student |
| **Ship the Chip:** |
| *One set of materials for each group of students consisting of:* |
| One Pringles plain potato chip | String | Foil |
| Paper | Cotton balls | Preaddressed mailing label |
| Cardboard | Plastic wrap | Tape |
| Glue | Tooth picks | Popsicle/craft sticks |
| Student Worksheets | Student Resource Sheet |  |

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| **Overview of Lesson Activities:*****How will you introduce the unit? What kinds of questions will you ask to engage students?***“Playing with Parachutes” – Review parachute inquiry-based lab findings. Discuss how surface area affects the rate of descent. As a class, have students design a mars parachute online ([www.pbs.org/wgbh/nova/mars/parachute.html](http://www.pbs.org/wgbh/nova/mars/parachute.html)). Introduce/Review Design Brief (to be designed); Show early parachute sketches from website <http://inventors.about.com/od/pstartinventions/ss/Parachute.htm>“Ship the Chip” – Show potato chips from a bag and chips from a Pringles’ can; Ask students to compare and contrast the chips from the two different packaging containers. Review Design Brief (to be designed)***What kinds of hands-on activities will students engage in?***1. Design and construct a parachute from everyday materials
2. Design and contract shipping packaging from everyday materials

***How/when will you use the engineering design process?***The engineering process will be introduced by sharing the design process and walking them through it. The engineering design process will be used throughout the unit to complete the required tasks (building the cars/chip packages)***How/when will you introduce the science concepts and vocabulary?***Concepts and vocabulary will be introduced at the beginning and throughout the lesson.***How will you connect science concepts and vocabulary to what students are doing?***Questioning / Illustrations / Demonstrations***How will the lesson build on your existing curriculum?***This unit/lesson will follow lessons on the scientific process/method and more specifically, an inquiry-based lesson regarding parachutes and surface area. ***How will you conclude the unit?***The unit will conclude with the “Ship the Chip” activity, which will reinforce the Design Process. Design brief that will be used is yet to be designed.***Outline the day by day timeline of activities.***Day 1: Review parachute lab / Review student resource sheets (3 pgs) / online Mars parachute activityDay 2: Introduce/Discuss Design Process / Review/record vocab Day 3: Plan/Design and begin to construct parachute prototypeDay 4: Finish constructing / Test parachutes / Evaluate/redesign prototypesDay 5: Evaluate/redesign prototypes / Discuss resultsDay 6: Introduce “Ship the Chip” design project / Review Student resources and the design process Day 7: Plan/Design and begin constructing chip packageDay 8: Finish constructing chip package and recording information/measurementsDay 9: After packages arrive via mail to school, evaluate packages and record dataDay 10: Ending discussions / vocab & concept review***What handouts, worksheets, or other classroom materials will you create and/or use?***“Playing with Parachutes” – Student Resource Document and Student Worksheet (tryengineering.org)“Ship the Chip” – Student Resource Document and Student Evaluation Sheet (tryengineering.org)Design Plan Rubric |
| **Cross-curricular connections:**1. Math – Creating Tables; Computations
2. Language Arts/Writing – Write reflections
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| **Assessment:*****How will you assess student learning?*****Playing with Parachutes:**1. Completion of Student Worksheet
2. Rubric – Design Notebook/Process

**Ship the Chip**:1. Rubric – Design Notebook/Process
2. Overall Score will be based on three criteria: 1) Mass of the Package in Kg’s to 3 significant figures; 2) Volume of the Package in cubic centimeters to 3 significant figures; 3) Intactness score of the shipped chip (100 = like new, 50 = slightly damaged, 10 = broken into 2-5 pcs, 5 = 6-20 pcs, 1 = more than 20 pcs)

 Overall Score = Intactness Score ÷ (mass in Kg x volume in cc)***How will you determine whether or not students have mastered the big ideas and/or vocabulary?***Rubrics/Assessments, Design notebooks and prototypes***What work (evidence) will you collect from students?***Rubrics, Student Design notebooks and prototypes |