**SLED 2013-2014 Unit Plan**

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| **Your Name(s**):  Laurie Camp, Madeena Coates, Kara Fletcher, Jill Parker | **Unit BIG IDEAS**: Light is a form of energy that travels through air. |
| **Grade Level**: 3rd | **Key science vocabulary and definitions**:  reflect, refract, shadow, absorb, light, heat, energy |
| **School**: Wea Ridge Elementary | **Unit prior to and following this unit**:  Prior: Unit 5, Lesson 3 “What is an Engineer”  After: Unit 1 “Scientist at Work” |
| **Total time** (hours or class sessions):  30 minutes X5 days | **Estimated starting date in the school year**:  Mid-November (2nd and 3rd week) |

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| **Unit Objectives** (one to three objectives):  By the end of this unit, students will be able to:   1. Demonstrate that light is a form of energy by using a light to warm a piece of material. The temperature of the material will be measured to show the change in heat. 2. Demonstrate that the cover of the material influences the temperature of the material because of how light is either absorbed or reflected. 3. Apply their understanding of light to design a container to keep a beverage cool in the sunlight. 4. Use various materials and typical engineering design components. 5. Measure lengths using the metric system to design the cup holder and measure temperature in Celsius.   *Note: Do your goals and objectives align with the lesson’s big ideas?* |
| **Core Indiana Academic Standard** to be addressed (one or two):  3.1.5 Observe and describe how light is absorbed, changes its direction, is reflected back and passes through objects. Observe and describe that a shadow results when light cannot pass through an object.  3.1.6 Describe evidence to support the idea that light and sound are forms of energy  3.4.1 Choose and use the appropriate tools to estimate and measure length, mass, and temperature in metric units.  3.1.4 Investigate how light travels through the air and intends to maintain its direction until interacts with some other objects or materials.  **Standard Indicator**(s) to be addressed (one to two):  Physical Science  Science, Engineering, and Technology  **Process Standards: The Nature of Science** to be addressed (one or two):   * Use measurement skill and apply appropriate units when collecting data. * Keep accurate records in a notebook during investigations and communicate findings to others using graphs, charts, maps, and models through oral and written reports.   **Process Standards: The Design Process** to be addressed (one or two):   * Identify the need or problem to be solved. * Select a solution to the need or problem. * Communicate how to improve the solution |
| **Conceptual understandings related to the engineering design process:** (What engineering design process vocabulary will you integrate in this lesson and how will you define them for your students?)  Design Process: explain that scientists use the multi-step design process to solve problems that are big and small.  Client: the person who has the problem that needs solved  Goal: desired outcome (what you are creating)  User: the person who will eventually use the final product that solves the problem  Prototype: a working model designed to meet a specific need that can be tested and redesigned as needed  Constraints: rules or guidelines to follow  Criteria: details that the client wants the product to have  Redesign: improving and recreating the original prototype |
| **Materials and Resources** (available in school and/or will need to get):   * Duct tape (multiple colors and types) * Plastic car drink cup holders * Card stock/oak tag * Science Notebooks * Scissors * Text book * Discovery Education * Magic School Bus video on light * Foldable for vocabulary (paper/pencils) |

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| ***Overview of Lesson Activities*** |
| Outline the **day by day timeline of activities**  Day 1: 1.Overview of Engineering Design: Unit 5, Lesson 3 pages 211-221 read and discuss 2.Create a foldable using the Design Process vocabulary (client, user, problem, redesign, prototype, goal, constraints, criteria)foldable page 330 3. What is an Engineer? Draw/Complete worksheet  Day 2: Science Notebooks: Create Flow Chart of the Engineering Design Model  Day 3: Inquiry Activity: Prediction of Best Covering: 1. Create thermometer using Celsius to show boiling point, freezing point, and room temperature. 2. Create a prediction chart in the Science Notebook to determine which color absorbs the least amount of heat. Rank them 1-3 (1 hottest, 3 coolest)  Day 4: Introduce Design Task: *Drink Pouch Holder Design*. 1. Distribute task sheets and record in the Science Notebooks the Client, User, Problem, Criteria, and Constraints. 2. Go over materials that will be available to them (drink holder, juice box, 5 sheets of cardstock, one roll of duct tape) 3. Have students begin the Individual Design.  Day 5: Team Design: Students will share and collaborate with their group to develop a team design that they will use for the project. They will list materials, measurements, label parts, and conference with the teacher.  Day 6: Construct Team Design Prototype  Day 7: Testing of Team Design (Will it stand by itself? Is it removable? Does a drink box fit?)  Day 8: Reflection: Write one thing that your team did well, one thing you would improve. What were differences between your team design and your individual design? Would you redesign?  Day 9: Fill in chart the actual results in Celsius after testing (data provided for students). Create a bar graph comparing the different colors/temperatures.  Day 10: BOOK: Vocabulary Foldable and Video  Day 11: BOOK: What is Light? Pages 89-93 read and discuss  Day 12: BOOK: Seeing Double pages 94-99 read and discuss  Day 13: BOOK: review pages 100-102  Day 14: Study Guide Review (SLED Assessment)  Day 15: Assessment (SLED Assessment) |
| How will you introduce the unit? What kinds of questions will you ask students to engage them? Will there be any pre-assessment to gather students’ existing knowledge?   * We will cover the Engineering Design Process using our book (Unit 5, Lesson 3). * Using Inquiry Activity we will introduce the concepts and vocabulary that we want to cover * What is the problem? Who is the client? Who is the end user? What are examples of constraints? * How does light heat up the drink? * What size does the holder need to be? * What shape should it be? * Are you going to fold paper or cut it out? * When are you going to use the tape/covering? * What color of duct tape do you think absorbs/refracts light the best?   Pre-Assessment: SLED Assessment, prediction chart |
| What kinds of hands-on activities will students engage in?   * Designing and building the prototype for the Design Activity * Foldables |
| How and when will you introduce and reinforce the phases of the engineering design process? Be explicit and descriptive.   * Beginning of the unit we will be reading and discussing Unit 5, Lesson 3 from our Science text book. * We will create flowchart in the Science Notebook showing the different phases of the Design Model after reading it in our book. * After they create the group prototype we will have the students complete reflective questions for both their group design and their individual design. * At the end of the design process we will create a foldable of vocabulary.   *(daily plans for implementation of the Design Process are listed above)* |
| How and when will you integrate the science concepts and vocabulary? Is the science accurately represented and does the science content align with your standards?   * SLED Design Process Vocabulary will be introduced on Day 1as a whole group lesson using a foldable in the design notebook. * Unit vocabulary will be reinforced when we identify the problem. We will use key vocabulary (light, refraction, reflection, etc.) throughout the Design Model process as we rotate throughout the room/groups. We would expect students to use key vocabulary when communicating their results to the class/teacher. * The science is accurately represented and does meet our standards for teaching this specific science lesson. |
| Describe how the lesson will build on your existing curriculum.   * The Design Task will springboard us into our light unit that is in our science text book. |
| How will you conclude the unit?   * We will use the SLED assessment to create a review of the lesson. * We will use the SLED assessment to assess the students. * We will collect the Science Notebooks. |
| What handouts, worksheets, or other classroom materials will you create and/or use?   * SLED Design Model flowchart * Inquiry Activity chart/data table * Vocabulary Foldable * Bar Graph of temperatures * Review of the Assessment (i.e. Jeopardy, Study guide, etc…) * Thermometer in Science Notebooks * Workbook pages from text book   Design Task Materials (per class): 45 pieces of card stock, 9 cup holders, 3 rolls of black duct tape, 3 rolls of white duct tape, 3 rolls of reflective silver duct tape, scissors, ruler, 9 juice boxes, design notebooks, colored pencils, pencils, stopwatch |
| **Cross-curricular connections**: Provide specific and descriptive ways you will connect this lesson with other disciplines. Include examples of writing prompts, books, inquiry activities, etc.  **Mathematics**: Metric system (cm, Celsius), reading a thermometer, addition (adding measurements), converting a data table to a bar graph, interpreting results of a bar graph  **Literacy/Language Arts/90 minute Reading Block**: *Amazing Colors*science leveled-reader  **Social Studies**:  **Art**: Drawing an Engineer activity |
| **Assessment**:  How will you assess students’ learning of science and engineering design? Be specific. Include copies of your rubrics. What kinds of questions will you ask students to determine what they learned? How will you determine or assess a design that is a good design?   * We will collect their Science Notebook and use a rubric to score their understanding of the Big Idea within the design task. * Reflection in Science Notebooks: Write one thing that your team did well, one thing you would improve. What were differences between your team design and your individual design? Would you redesign? |
| How will you determine whether or not students have mastered the big ideas and/or vocabulary?   * Class discussion * Foldables (students will place vocab cards in pockets labeled “know” and “need to know” in their notebooks) * SLED Post-Assessment * Brain Check Word Play from text book |
| What work (evidence) will you collect from students?   * Design Notebooks * Design Task prototype * Assessments |

