Rise and Shine

5th Grade
Unit 1 – Playing with Words
Literature Connection: *Dictionary of Idioms* by Marvin Terban

Design Challenge Summary
Challenge: What will the students be required to do?
Design a bed that does not allow access to the "wrong side" of the bed. Your water bottle needs to roll off the "right" side of the bed. Label the tissue box with a "right" side and a "wrong" side. Create a barrier on the "wrong" side that will prohibit exiting the bed on the "wrong" side. *The purpose of this design challenge is to introduce the engineering design loop.* Students will go through the engineering design loop to create a device that will prevent them from accidently getting up on the wrong (left) side of the bed.
Standards: What standards are addressed?
Science: NS.1.4.1 Communicate observations orally, in writing, and in graphic organizers NS.1.4.2 Refine questions that guide scientific inquiry NS.1.4.3 Conduct scientific investigations individually and in teams NS.1.4.5 Communicate the designs, procedures, and results of scientific investigations NS.1.4.6 Estimate and measure length, mass, temperature, capacity/volume, and elapsed time NS.1.4.7 Collect and interpret measurable empirical evidence in teams and as individuals NS.1.4.8 Develop a hypothesis based on prior knowledge and observations NS.1.4.9 Identify variables that affect investigations NS.1.4.11 Generate conclusions based on evidence NS.1.4.12 Evaluate the quality and feasibility of an idea or project NS.1.4.13 Use simple equipment, age appropriate tools, technology, and mathematics in scientific investigations **Math:** Mathematical Practice Standards **ELA:** W.5.1 Write opinion pieces on topics or texts, supporting a point of view with reasons and information. W.5.2 Write informative/explanatory texts to examine a topic and convey ideas and information clearly. W.5.3 Write narratives to develop real or imagined experiences or events using effective technique, descriptive details, and clear event sequences. W.5.4 Produce clear and coherent writing in which the development and organization are appropriate to task, purpose, and audience. W.5.7 Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic. W.5.10 Write routinely over extended time frames and shorter time frames for a range of discipline-specific tasks, purposes, and audiences. SL.5.1 Engage effectively in a range of collaborative discussions with diverse partners on grade 5 topics and texts, building on other's ideas and expressing their own clearly. SL.5.3 Summarize the points a speaker makes and explain how each claim is supported by reasons and evidence. SL.5.4 Report on a topic or text or present an opinion, sequencing ideas logically and using appropriate facts and relevant, descriptive details to support main ideas or themes; speak clearly at an understandable pace

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Result: What will students know, value, and be able to do as a result of the lesson? What's the big idea?
Know and apply the engineering design loop. Value collaboration and discussion.
Assessment: What evidence will be used to determine student learning?
Did they follow the design loop process? Did groups work collaboratively together? Did they effectively prohibit the person (water bottle) from rolling off the wrong (left) side of the bed?
Prior Knowledge/Experiences: What prior content knowledge and skills will the students need?
Explanation of the Engineering Design Loop process Connections to the Mathematical Practices Investigations/Inquiry in Science
Summary/Connections: How will this design challenge connect with new/future learning, other content areas, real world experiences, etc.?
This lesson will help students develop problem solving skills and collaboration skills that are essential in succeeding in the 21st century. It will allow students the opportunity to transfer and apply skills from various content areas within one task. **Writing:** Write a summary of this first design challenge. When were you successful? When did you struggle? If you did this challenge again, what would you do differently? **Extensions:** This design challenge can be redone using string instead of paper and a unfix cube instead of a water bottle. **Writing**: Write a story about a day when you got up on the wrong side of the bed. Your story should include at least 2 idioms, 1 metaphor, 1 simile, and 3 examples of onomatopoeia.
Materials/Equipment/Preparation: What materials and equipment will students need to successfully complete this design challenge?
Materials Per Group (suggested group size 2-3): 1 un-opened tissue box 1 straw 6 in. clear scotch tape 1 sheet of copy paper Scissors Full 16oz. water bottle Copy of the engineering design loop Engineering design loop worksheet

ADDITIONAL INFORMATION

The origin of the idiom "Get up on the wrong side of the bed" can be found on pg. 93 of the book Dictionary of Idioms by Marvin Terban.

Success with this STEM lesson is not based on the success of their design. *The major focus is **understanding and using** the engineering design loop.* Our goal is to provide a fun and easy opportunity for students to work collaboratively and become familiar with the format and expectations of future STEM lessons. We encourage you to have a discussion with students regarding the "multiple solutions" aspect of STEM and the importance of seeing both success and failure as part of the design loop process.

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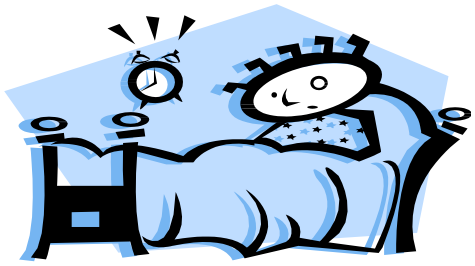

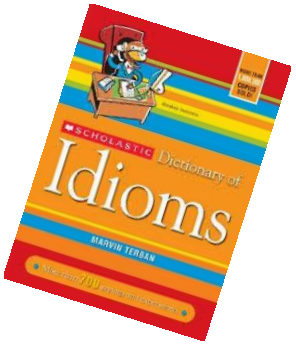

"Getting up on the wrong side of the Bed"

Have you ever woke up grouchy or in a bad mood?

Design a bed that does not allow access to the "wrong side" of the bed.

Your water bottle needs to roll off the "right" side of the bed.

Label the tissue box with a "right" side and a "wrong" side.

Create a barrier on the "wrong" side that will prohibit exiting the bed on the "wrong" side.

Group Supplies:

Un-opened tissue box
1 straw
6" clear tape
1 sheet of paper
16 oz. Water bottle (full)
Scissors

STEM Engineering Design Loop

Name: _____ Date: _____