**Diocese of Allentown UbD UNIT PLAN & LESSON PLANS**

(Adapted from Wiggins & McTighe, Advanced Concepts in Creating and Reviewing Units: Forms & Facts, (2012).

| TEACHER: | CLASS/SUBJECT: Science 3 | DATE |
|---|---|---|
| | | |

**Although this is a sample unit for Grade 3, the resources below may be used to teach these and other related topics in science at various different grade levels. There are segments where teachers address force and movement, a first grade teacher engaging primary children in appropriate means to measure and observe data they have collected and teachers at middle and high school levels, spiraling the same content. Watch http://www.learner.org/vod/vod_window.html?pid=1859 These videos also address Energy, Force, and Motion. http://www.learner.org/resources/series160.html**

**This website provides teaching resources for science engineering tasks.**
**https://www.teachengineering.org/lessons/view/cub_simple_lesson01**

| **STAGE 1- DESIRED RESULTS** | |
|---|---|
| Understanding Goal:<br>Posed as an essential question: How can we make work easier?<br>Statement: The students will be able to explain how force impacts the relationship between energy and matter resulting in motion and demonstrate how the use of simple machines can make work easier. | |
| Standards:<br>Diocesan Guidelines :<br>EK8 Energy and matter interact through forces that result in changes in motion.<br>EK9 The motion of objects can be observed and measured<br>EK 10 Mechanical Energy may cause a change in motion through the use of simple machines | |
| TRANSFER:<br>By the conclusion of the unit the student will independently use his learning to explain how a simple machine or combination of simple machines can make a specific task easier, noting how energy and force were involved in achieving the task more easily. | |
| MEANING<br>The student will understand that :<br>• The work of the scientist involves testing theories not just doing experiments.<br>• Energy and matter interact through forces that result in changes in motion. It takes energy to change the motion of objects. Energy changes can be understood in terms of forces.<br>• Everything is constantly moving.<br>• Motion is a change in position over time.<br>• The motion of objects can be observed and measured.<br>• Mechanical energy may cause a change in motion through the use of simple machines. | |
| Essential Questions (Overarching/Topical) that drive the UNIT:<br>1. What is energy?<br>2. How are energy and force related?<br>3. Can we measure energy?<br>4. How can we make work easier? | |
| ACQUISITION of KNOWLEDGE | ACQUISITION OF SKILLS |

| What facts and basic concepts should the student know and be able to recall/use? | What discrete skills and processes should the students learn and be able to use? |
|---|---|
| Terms:<br>Physics, physicist; Energy, inertia; Motion: position, distance, speed;<br><br>Types of force: push, pull, magnetism, gravity, friction. Gravitational forces between two objects, such as the sun and earth, Earth and moon, Earth and object.<br><br>Work: energy, kinetic energy, potential energy<br><br>Simple machines: lever, pulley, wheel and axle, inclined plane, screw, wedge; compound machine.<br><br>Engineering Process:<br>• Understand the need: What is the problem? What are the requirements? What are the imitations? Who is the customer?<br>• Gather information and conduct research.<br>• Brainstorm and design: Imagine and be creative. Investigate existing technologies and methods.<br>• Plan: Draw a diagram of your idea. How will it work? What materials and tools are needed? How will you test it?<br>• Create: Assign team tasks and build a prototype. Talk about what works and what could work better.<br>• Improve: Talk about how you can improve the product. Make revisions. Make your product the best it can be. | Keep a learning log/lab report, where measurements are recorded.<br>• Measure speed by calibrating distance and time using measuring tape and stopwatch.<br>• Make predictions regarding speed, path or distance of various objects changing the amount of force and surfaces.<br><br>Complete lab trials, correctly following step by step process: (Labs can be found at www.teachengineering.org<br>• Formulate hypothesis.<br>• Conduct trial. Test theory.<br>• Observe and record data accurately.<br>• Formulate conclusion.<br><br>Construct written responses in full sentences.<br><br>Conduct an Engineering Design Trail, following the series of steps needed to solve a problem. |

**How can Religion be incorporated into this unit?**

Einstein's theory of relativity. http://www.space.com/17661-theory-general-relativity.html
How amazing is God who created the human mind which searches for truth. Einstein's theory has recently been proven by the ripple effect of two colliding black holes!

<table>
<tr><th colspan="2">STAGE 2 – ASSESSMENT</th></tr>
<tr><td>Identify all formative, performance, and summative assessments:</td><td>CRITERIA</td></tr>
<tr><td>What evidence will be collected to demonstrate student acquisition of knowledge and skills?<br>What evidence will be collected to demonstrate that the student <u>understands</u> key concepts/Big Ideas in the Unit?<br>This is a sampling of possible formative and summative assessments as well as a culminating assessment task.<br><br>Quiz #1: Terms, labeling diagrams.<br><br>Lab Trial Report #2: Team task to complete lab, creating diagrams, completing calculations, and recording data. Individual writes conclusions about energy, force, and work. Summative assessment.<br><br>Test #1: Objective questions based on knowledge and application, analyzing diagrams and data similar to lab trials already conducted.<br><br>Demonstration of each: kinetic energy, potential energy and individual description of each with diagrams<br><br>Test #2: objective questions based on knowledge and application, analyzing diagrams and unfamiliar lab report excerpts.<br>.<br>Lab Trial #3 Watch It Slide. (Grade 3-5; Teacher needs to set angle for inclined plane [15 degrees, 30 degrees, 60 degrees] for third graders.) Pairs of students complete task.</td><td>12/16 or 75%<br><br>Holistic Rubric 6/8<br>• Team Work (Performance Indicators: Construction of Diagrams, Calculations, Recording of Data) ¾<br>• Individual conclusions 3/4<br><br>80%<br><br>Checklist: Got It<br><table><tr><td>No evidence: understanding</td><td>Partial</td><td>Got It</td></tr></table><br>80%<br><br>Holistic Rubric 6/8<br>• Team Work (Performance Indicators: Construction of Diagrams, Calculations, Recording of Data) ¾<br>• Individual conclusions 3/4</td></tr>
</table>

| | |
|---|---|
| **What culminating assessment will demonstrate that the student has met the unit goal and can transfer that understanding to new situations?**<br><br>**GRASPS**<br>Since the kindergarteners and first graders will be on the lookout for leprechauns soon, you have been asked to create a machine to capture these tricky creatures (**GOAL)**. Your (**ROLE**) is to use the engineering process to build this trap with another team member (**SITUATION**). Since there are several teams working on making an effective trap and only one trap can be used in each classroom, your team will have to explain how your trap will make catching leprechauns easier and better to those classrooms (**AUDIENCE**) .You must follow the rubric **(STANDARD)** provided and:<br>• Show evidence of following the engineering process (questions you asked, what materials and any changes you made to the trap and why, diagrams and prototypes)<br>• Demonstrate how the trap works<br>• Explain what simple machines were used in the trap (**PRODUCT**). | Analytic rubric 12/16<br>• Product Demonstration: The trap does what it is supposed to do; is composed of at least 1 simple machine; instructions for use are clear.<br>• Evidence of Earnest Attempt to follow Engineering Process Steps<br>• Explanation: Oral explanation applies science terms and indicates understanding of simple machines.<br>• Oral Speaking: Clear, eye contact, ability to answer questions, etc. |

| **STAGE 3 – LEARNING EXPERIENCES** | | |
|---|---|---|
| Day/Code | Learning Experiences, noting *WHERE* (means of engagement, materials, and procedures): | Differentiation for each learning experience: |
| DAY 1 | | |
| DAY 2 | | |
| DAY 3 | | |
| DAY 4 | | |