Tennessee Tech University  
Lesson Plan Template

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| Name: Anthony, James, Tania  Date: October 6th 2013 Lesson Title: Simple Machines in a Complicated World. Grade/Level: 7th |
| Curriculum Standards |
| *State/Common Core Curriculum Standards*  **7th Grade Standards**  GLE 0707.11.1 Identify six types of simple machines.  SPI 0707.11.1 Differentiate between the six simple machines. |
| Focus Questions/Big Idea/Goal (List all 3) |
| *What question(s), big idea(s), and goals drive your instruction?*  **Question**: How does a simple machine perform? How are they incorporated in our daily lives?  **Big Idea**: Its through Simple machines, both by itself and their combination into complex machines that we as a people have been able to build our civilization. It's because of this that Children must be able to identify and explain how these machines work to make our lives easier**.**  **Goal**: Students will develop an appreciation for all simple machines and how they assist us in daily life. |
| Lesson Objective(s) |
| *Objectives are measurable!*  1. Students will be able to identify and classify the simple machines.  2. Students will be able to explain how simple machines make things easier.  3. Students will be able to identify complex machines and break down its parts into simple machines. |
| Vocabulary/ Academic Language |
| *List and define your vocabulary. All vocabulary is discussed or gone into detail during the Simple Machine slide show.*  **Motion** - A change in position of an object with respect of time and its reference point.  **Work** - The product of distance and the force in the direction an object moves.  **Force** - A push or pull upon an object resulting from the object's interaction with another object.  **Simple Machines** - Any of the basic mechanical devices for applying a force, such as an inclined plane, wedge, or lever.  **Inclined Plane** - An inclined plane is a slanting surface connecting a lower area to a higher area.  **Wedge** - A wedge is an object with at least one slanted edged side. It assists in cutting materials or changing the direction force has to travel.  **Wheel and Axle** - A wheel and axle is a combination of a wheel and the rod connected to its center, known as an axle, which allows people to lift and move loads.  **Screw** - A screw is like an inclined plane, except its wrapped around a pole and used to hold things together.  **Lever** - A lever is a stiff bar that rests on a fulcrum and allows the user to lift and move loads.  **Pulley** - A pulley is a simple machine that uses grooved wheels and a rope to raise, lower or move a load.  **Fulcrum** - A fulcrum is the point or support on which a lever pivots  **Complex Machines** - A machine that is made up of at least two simple machines. |
| Material/Resources |
| *What do you need for this lesson?*  Knex examples - Tractor Knex, Motorcycle Knex, Small Windmill Knex, and Large Windmill Knex  Knex for student construction  Scratch Paper for drawings  Internet  PowerPoint - Simple Machines  Pen and Paper |
| Assessment/Evaluation |

**Formative***: How will students demonstrate understanding of lesson objective(s)? How will you monitor and/or give feedback?*

Throughout the lesson, the teacher will continually ask questions to check for understanding of the material. While checking for previous knowledge, the teacher will assess the students to see where the students are in their understanding of simple machines. If students mention any misconceptions about simple machines, the teacher will explain why the statement was a misconception.

When presenting the examples of the Knex, the teacher will answer any questions the students have about the examples shown.

When introducing students to the concept of simple machines, the teacher will question the students about simple machines and complex machines. If the students are lacking knowledge, the teacher will provide feedback throughout to the students.

During the Annotated Student Drawing activity, the teacher will ask probing questions to lead the students into higher order thinking.

The teacher will ask students for explanations on their thoughts.

During the powerpoint section, the teacher will ask questions to check for feedback to assess their academic growth.

The teacher will ask the students into a circle for final assessment by asking probing questions to assess their knowledge on simple machines and the wheel and axle.

**Summative:** *What evidence will you collect and how will it document student learning/mastery of lesson objective(s)*

Students will be asked to discuss and draw a single complex machine found in their every day life. Then they will be asked to break down that complex machine into as many simple machines they can think of

Near the end of the lesson the teacher will ask the students to take out a sheet of paper and pen or pencil, then clear their desks. They will be asked to identify the six simple machines and explain what they do. They will be given five minutes to do it before the quiz is taken up.

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| Instruction  (Include a suggested time for each major activity) | List Questions for higher order thinking *These cannot be answered by yes or no.*  (Identify Bloom’s Level of Thinking) |
| Set/Motivator: *How will you engage student interest in the content of the lesson? Use knowledge of students’ academic, social, and cultural characteristics.*  **Engage:**  **Time:** 15 minutes  Students will be given the names of the six simple machines. Students will be asked to create a foldable with six flaps for the simple machines to explain what they already know about simple machines. They will also add information to the foldable about the functions of the simple machines.  **Annotated Student Drawings**  Students will participate in sketching what they believe the simple machines look like in their foldables. The teacher will have sketches of own drawn to show to the students in comparison for a more visual way of learning the machines. A few students will be asked to show their own sketches to the class as well. | Knowledge: What are the three types of levers?  Knowledge: Can you tell me the difference between a wheel and an axle?  Knowledge: Can you tell me how a wheel and axle work to perform the function of a single machine? |
| Instructional Procedures/Learning Tasks**:** *Provide specific resources/details of lesson content and delivery.*  **Explore**:  The teacher will provide examples of the simple machine, wheel and axle including a tractor made of K’nex, a car made of K'nex, and two windmills. The smaller of the K’nex will be passed around the room. The larger K’nex windmill will stay at the front, where the teacher will give an experimental spin of the wheel.  Students will be asked to get into groups of two and work together to construct a simple machine out of the provided K’nex. It can be any of the simple machines.  **Time**: 10 minutes  **Explain**:  Once everyone has made their machines, they will be asked to jot down on a piece of paper how they think the simple machine they’ve made out of Knex works in real life and will be asked to share and discuss their answers with the class. Once the students have done this, the teacher will present them with a PowerPoint presentation on simple machines and explain the mechanics behind them. Students will be asked to write down these explanations of each simple machine in their foldables.  **Time**: 15 minutes  **Evaluate**:  **Agreement Circle**  Students will be asked to stand in a circle. They will be asked a series of five questions to assess the students learning. Depending on the question, the students will be asked to stand in the middle if they agree with the question and the students who disagree will stay standing outside the circle. The role can reverse depending on the question, such as the students will step into the circle if they disagree with the question and the students who agree will stay standing outside the circle. After students choose their answer, the teacher will ask a couple students why they chose the answer they did. Then the teacher will briefly go over the correct answer. My questions will be:  1. Can simple machines be used to create complex machines? (Students who agree will step into circle, the rest will stay where they are.)  2. Is a Windmill a complex machine? (Students will start back in one circle. Students who disagree will step into circle, the rest will stay where they are.)  3. Is the Wheel and Axle on the Windmill a simple machine? (Students who agree will step into the circle, the rest will stay where they are.)  4. Is an incline plane and a wedge the same? (Students who agree will step into the circle, the rest will stay where they are.)  5. Do you need a fulcrum for a lever to work? (Students who agree will step into the circle, the rest will stay where they are.)  **Expected minutes**: 10 | Knowledge: Can anyone tell me three simple machines found in everyday life?  Inquiry: Can anyone explain to me why the pencil sharpener is considered a wheel and axle/to possess one?  Analysis: Explain how these simple machines work together to form the complex machine. |
| Closure: *Verbalize or demonstrate learning or skill one more time. May state future learning.*  **Extend:** The students will be asked to get into groups and brainstorm a complex machine that's a part of their daily lives. They will be asked to write down the complex machine and whatever simple machines make up the object. Once this is done, the teacher will ask each group to discuss their complex machine choice.  After that, The students will be asked to clear their desks and take out a sheet of paper. They will be asked to write down the six simple machines, and clarify what they do.  **Expected time:** 10 minutes . |  |

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| Adaptations to Meet Individual Needs: *How will you adapt the instruction to meet the needs of individual students? Include -*  *ELL?; SPED?; Gardner’s Learning Styles - Name and specify what happens in the lesson that uses each learning style listed; Other individual needs of the students/class you are teaching?*  Gardner’s Learning Styles:  Bodily-Kinesthetic: Students will be moving in and out of a circle to answer questions, and move to the board to draw. Students will also be working with their hands while working with K’nex.  Intrapersonal: Students will use a graphic organizer foldable to draw their simple machines.  Interpersonal: Students will interact with their group while working with K’nex. Students will then interact with other students by sharing their ideas about how K’nex are used in real life. Students will also interact with each other during the Assessment Circle by sharing their reasons for the answer they chose.  Linguistic: Students will share their answers with the class and their groups throughout the lesson.  Visual-Spatial: Students will work on an interactive web site. Students will also complete their own drawings of a given simple machine.  Management/Safety Issues: *Are there any management and/or safety issues that need to be considered when teaching this lesson?*  There are no management or safety issues for this lesson. Most of the lesson will be picture based and students will do more writing/drawing than actual hands-on activities that may harm a student. |
| Rationale/Theoretical Reasoning  **Common Misconceptions:**  Students do not realize that machines just change the form of the work that we do, for example, trading off force for distance or distance for force, these two do not completely eliminate the work that we do.  *Children’s Misconceptions about Science.* Retrieved from <http://www.amasci.com/miscon/opphys.html>  **Multiple Intelligences:** This lesson specifically addresses Howard Gardner’s Theory of Multiple Intelligences. The lesson focuses on bodily-kinesthetic, interpersonal, intrapersonal, linguistic, and visual-spatial learning styles to help every student.  *Multiple Intelligences*. Retrieved from <http://www.tecweb.org/styles/gardner.html>  **Marzano’s Nine Essential Instructional Strategies:** This lesson has shown Marzano’s strategies throughout the lesson.  Identifying Similarities and Differences: Identifying similarities and differences help students understand more complex problems by allowing students to analyze them. In this lesson, students will compare their drawings of the simple machines with the teachers to allow the students to learn visually.  Summarizing and Note-taking: Taking notes allow students to fill in pertinent information. In this lesson, students will write down information on their foldables that they will make about how the simple machines function.  Nonlinguistic Representations: It has recently been proven that nonlinguistic representations help stimulate and increase brain activity. In this lesson, students will work with Knex, provided a powerpoint, and an online interactive game.  Cooperative Learning: It has been proven to have a positive impact on overall learning. In this lesson, students will work in groups to build a simple machine with Knex.  Setting Objectives and Providing Feedback: It is important to have objectives that are not too specific that they are not adaptable to students’ individual objectives, and there is no such thing as too much positive feedback, but feedback should be varied. In this lesson, the teacher will monitor student understanding throughout the lesson to make sure the students’ understand the new material that is being presented to them.  *Marzano's Nine Instructional Strategies for Effective Teaching and Learning.* Retrieved from <http://www.ntuaft.com/TISE/Research-Based%20Instructional%20Strategies/marzanos%209%20strategies.pdf> |
| References:<http://www.mikids.com/Smachines.htm>- Explains the simple machines and how they work. This web site also gives very good examples for the simple machines. This web site has activities for each of the simple machines for a step farther in understanding. This was also used to help make the slideshow.  <http://atlantis.coe.uh.edu/archive/science/science_lessons/scienceles1/finalhome.htm>  This web site offers a lot of information for the simple machines. You can explore each simple machine by clicking on the name and it will take you to a new page all about that machine. This web site included a simple six question quiz about simple machines that you could display and ask students to write down responses to for a grade - or you could use it as inspiration for something to help students show mastery of the content.  <http://wiki.answers.com/Q/What_is_the_physical_science_definition_for_work>  Provided definition on work (physical science). This was also used to help make the slideshow.  <http://www.thefreedictionary.com/fulcrum>  Provides definition of Fulcrum. |
| Reflections/Future Modifications:*To what extent did the class learn what you intended them to learn? What will be your next steps instructionally? What did you learn about your students as learners? What have you learned about yourself as a teacher?*  James:  I believe that the students managed to learn, not quite the amount I would have wanted due to how rushed we needed to be, but enough that they could notice lapses and comment on them. I would give them a more detailed explanation of the simple machines and have them repeat this information back to me to clarify what each simple machine does. I learned that the students were very attentive, even when I didn’t think they would be, and could easily catch the gaps in our lesson. I could see some frustration and confusion when they worked, but could also see how curious they were on the topic. I have learned that I should know more on the topic then simply what I put on my slide show (there were times during the lesson where extra knowledge helped me, such as the multiple levels of levers) and should have been able to provide more examples for the simple machines.  Anthony Normile:  I believe that the power point and the sketching activity were very helpful in learning the simple machines. Drawing these machines can help students get a very good grasp of what they look like and what makes them unique. I also think the constructing of the actual wheel and axle gave the students hands on time to examine and understand exactly what makes the windmill work. I think it was hard to control the class when they first arrived to the room. Transitioning is sometimes a problem I have because I think I spend a few seconds of nothing trying to remember what’s next.  Tania Lawson:  I believe that both powerpoint presentations, and the sketching activity were both very successful activities. The students seemed to learn a lot from both activities. I really enjoyed the hands-on activity with the k’nex. I think it was helpful for the students to be able to try constructing their own simple machines. I think the students enjoyed getting to stand in the circle and getting to move in and out of the circle when deciding their answers. The only things that I can think of that could use some work is the transitioning, and knowing about the simple machines more so that I can better explain the answers for the assessment circle. |