**Simple Machines Jigsaw**

This cooperative lesson is designed for students in grades 4-6. Students will use the jigsaw strategy to read about the six types of simple machines. Students will become an expert on one type and then share their knowledge with their peers to collect information about all six types of simple machines. Finally, students will use their notes and knowledge to complete a brief assessment about the six types of simple machines that are the basis of all other, more complex machines.

**Standards:**

**Common Core State Standards:**

* **4th Grade**
  + **CCSS.ELA-Literacy.RI.4.2** – Determine the main idea of a text and explain how it is supported by key details; summarize the text.
  + **CCSS.ELA-Literacy.RI.4.3** – Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text.
* **5th Grade**
  + **CCSS.ELA-Literacy.RI.5.2** – Determine two or more main ideas of a text and explain how they are supported by key details; summarize the text.
  + **CCSS.ELA-Literacy.RI.5.3** – Explain the relationships or interactions between two or more individuals, events, ideas, or concepts in a historical, scientific, or technical text based on specific information in the text.
* **6th Grade**
  + **CCSS.ELA-Literacy.RI.6.2** – Determine a central idea of a text and how it is conveyed through particular details; provide a summary of the text distinct from personal opinions or judgements.

**Objectives:**

* Students will be able to determine the main idea and supporting details of a text.
* Students will be able to identify and distinguish the characteristics of six simple machines and describes ways in which people use them.

**Lesson Duration:** approximately 55-80 minutes

**Materials:**

* The Building Blocks of Physical Science series, specifically Force and Motion
* Scratch paper
* Pencils
* KWL Chart
* Marking the Text Guide
* Machine Article
* Optional: Machine Simplified Article
* Simple Machines Note-Taking Guide
* Simple, but Tough Worksheet
* Simple, but Tough Answer Key
* Optional: Marvelously Simple Worksheet (lower cognitive demand)
* Optional: Marvelously Simple Worksheet Answer Key

**Requisite Prior Knowledge:**

* Before engaging in this lesson, it would be beneficial for students to have read the Building Blocks of Force and Motion book. In this book, students are introduced to the ways in which force and motion work as a team. The book defines work as it is used in physical science and explains how machines, including simple machines, are used to do work. If needed, consider rereading pages 20-27 with students prior to engaging in this lesson.
* If students have not completed a jigsaw task before, it might be helpful to review the procedures prior to engaging in the lesson.

**Assessments:**

* Note-Taking Guide
* The Simple, but Tough Worksheet or the Marvelously Simple Worksheet
* Students’ annotated text

**Vocabulary:**

* Inclined plane – a simple machine shaped like a ramp
* Lever – a simple machine consisting of a rod or bar that rests and turns on a support called a fulcrum
* Pulley – a simple machine made of a rope or chain wrapped around a spinning wheel
* Screw – a simple machine shaped like a ramp wrapped around a central shaft
* Simple machine – any of six basic tools that change the way force is used to do work
* Wedge – a simple machine shaped like two inclined planes placed back-to-back with an edge that cuts or slices
* Wheel and axle – a simple machine with a big wheel attached to a post

**Differentiation Considerations:**

* This lesson involves a jigsaw task in which students work in two groups to determine the main ideas of a lengthy text. In a jigsaw, students first work in an Expert Group to read and take notes on their assigned sections of a text. Next, they transition to their second group, the Jigsaw Group, where they relay the information they learned. They then take notes from their peers about the sections of the text they did not read. Because this task involves two groups, consider being strategic with your grouping. It can be helpful to make sure each Expert Group contains a range of learning abilities as well as a student who can be the group leader.
* Considering using the Machine Simplified Article for particular students as it is written at a lower Lexile level and contains fewer details than the included article.
* Consider using the Marvelously Simple Worksheet as it has a lower level of cognitive demand than the Simple, but Tough Worksheet. This may benefit learners still struggling with these concepts.

**Lesson and Instruction:**

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| **Lesson Components and Time Guidelines** | **Teacher Actions** |
| **Introduction/Hook**  Approximately 8-10 minutes | Display a KWL Chart to complete with students focused on machines. First ask students what they already know about machines. Prompt students to think back specifically to the Force and Motion text. Add these under the K (Know) section of the chart.  Next ask students to use their questioning skills. Discuss what students wonder about machines. Chart these as questions under the W (Wonder) section of the chart.  Explain to students that we will attempt to answer some of these questions as we use the Jigsaw Strategy to learn more about simple machines. Share the objectives with students. *Today we will work to determine the main idea and supporting details of a text all about simple machines so we can identify and distinguish their characteristics.* |
| **Direct Instruction and Modeling**  Approximately 10-15 minutes | Transition to the reading portion of this lesson but first explain that we are going to use a coding system to mark the text as we read. Good readers annotate, or mark, the text to help them keep track of the information. Use the provided Mark the Text Guide or your own system of annotating notes throughout this lesson.  Pass out the Machine Article and use the Introduction as well as the Principles of Machines sections for a shared reading experience. Model how to mark the text as you read aloud. Focus your model on identifying the main idea and most important details of these sections.  After reading the first two sections, review the marks you made. Model and think aloud which information you would include to help summarize the section. Allow students to discuss and share as well. Model how to add this information to your Simple Machines Note-Taking Guide.  If time allows, consider revisiting the KWL chart you created during the hook to add bullet points to the L (Learned) section of the chart. Students may even have some more wonderings to add to the chart as well! |
| **Application Activity**  Approximately 25-35 minutes | Split students into 6 groups, called Expert Groups. Each student will be assigned to an Expert Group which will be responsible for reading about and taking notes on one type of simple machine.  After students complete their work in their Expert Group, they will transition to their Jigsaw Group. This group should contain one person from each Expert Group so all sections of the reading are represented.  Explain the following Jigsaw Task procedures to students:   1. Read your section independently. Mark the text using the strategy modeled in class today. 2. Review your text markings and identify at least one thing per section to share with your Expert Group. 3. As an Expert Group, share what you marked in the text. Determine 2-3 bullet points that best summarize each section and add them to your note-taking guide. 4. Transition to your Jigsaw Group to share the main ideas and bullet points associated with the sections your Expert Group read. In addition, add notes to your guide about the sections your Jigsaw Group read. 5. Use this time to ask questions to the experts in your Jigsaw Group! You will need to know about each type of simple machine for the next portion of this lesson. |
| **Independent Application and Demonstration of Learning**  Approximately 10-15 minutes | Have students transition to the independent work setting where they will complete the Simple, but Tough Worksheet (see Differentiation Considerations for an optional, lower cognitive demand worksheet). Depending on the needs of your learners, consider allowing them to use the note-taking guide they completed during the lesson for support.  This assignment requires students to use what they know to determine which type of simple machine each image represents. Students will also provide explanations to justify their answers and show their understanding of simple machines. |
| **Closure**  Approximately 2-5 minutes | Consider reviewing answers with students to provide immediate feedback. Consider allowing students to keep their notes for use throughout the remainder of related lessons.  Return to the whole group setting and revisit the KWL Chart you created during the Hook portion of this lesson. Elicit student responses about what they learned and add them to the chart.  Close the lesson by reminding students that they were able to collaborate with two groups to first become an expert on a type of simple machine, and second, to share their knowledge with others. In addition, they combined their reading skills with their knowledge of force and motion to determine the characteristics and functions of the six simple machines that are the basis for all other, more complex machines. |

**Next Steps and Reflection:**

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| What went well? |  |
| What changes might be beneficial? |  |
| Reteaching needs |  |
| Extension needs |  |