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| **1. Lesson Information** |
| **Subject(s):****Science** | **Date/Time/Period:** **Length:** 2x60 Periods |
| **Unit/Topic of Lesson:**Understanding Structures and Mechanisms 🡪 Pullies and Gears | **Grade/Level**Grade 4 |

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| **2. Materials, Equipment and Technical/Other Requirements** |
| * **Chart Paper**
* **Markers**
* [**Pullies and Gears Simulator**](https://phet.colorado.edu/sims/cheerpj/the-ramp/latest/the-ramp.html?simulation=the-ramp)
* **Computers**
* **Access to the internet**
* **Designing and Building a System Worksheets (Attached below)**
* **Pencils**
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| **3. Learning Goal/Success Criteria: What will students/participants learn by the end of the session?**  |
| **Learning Goals:**2.3 Use technological problem-solving skills to design, build, and test a pulley or gear system that performs a specific task2.4 Use appropriate science and technology vocabulary, including pulley, gear, force, and speed, in oral and written communication3.1 Describe the purpose of both the pulley system and the gear system | **Success Criteria:*** **By the end of this lesson, students will be able to explain the importance of having accessible devices**
* **By the end of this lesson, students will be able to construct an online prototype of a simple machine that can be used to help students in wheelchairs access the school (or parts of it)**
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| **4. Prep Work (To be completed before lesson)** |
| * **Before the lesson ensure all students have read the chapter book *Roll With It*** (I recommend reading this book as a class for a read aloud option)
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| **5. Lesson Plan Activities – UDL** | **Timing** | **Notes (may include Assessment/Check-in, accommodations (DI), instructions for support staff, etc.)** |
| **Beginning/ Engage: Drawing Connections to our Read Aloud Chapter Book*** As the grade 4’s know, we have just finished reading *Roll With It* by Jamie Sumner. This book follows Ellie, a young girl with CP in a wheelchair as she navigates living in a new town, making friends, and going to a new school
* In science class, we have also just finished learning about our pullies and gears. This is a great opportunity to combine the two subjects to show how we can use pullies and gears to make our school more accessible.
* Students will need to design a machine (by using two or more simple machines) to efficiently make our school more accessible
* The purpose of this assessment is for students to inquire about how they can design and build a system of pullies and gears for a specific purpose
* Begin the lesson by explaining the purpose of this assignment (how can we use systems of pullies and gears to make our school more accessible)
* Next, as a group create a list (using chart paper) of all the simple machines your class can think about in their environment
* Next, create a list with locations around the school that can become more accessible and therefore more inclusive
* Finally, before breaking the class up to begin working on their individual, create a success criteria list as a group
 | **30 Minutes** | * **Students can have the option to work individually or with a partner. I suggest limiting the groups to 2 members to help students stay focused and on track**
* **When making your success criteria, this portion is specific to each classroom. Make sure students are aware of what is expected of them prior to them starting their assignment**
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| **Middle/Activity: Design Challenge*** During the first work session (the remining 30 minutes of the first period), students should work towards finishing the first page of their handout (Attached below)
* They should be working towards answering the first 4 questions; 1. What practical problem are you solving? 2. What criteria must your project meet? 3. Based on your research and ideas, what are two possible solutions for your project? Which one do you prefer and why? 4. Draw a labelled diagram of your prototype.
* Once the students have completed their research and the first page of their handout; they can move to the next section (all students should be finished the first page of their handout by the end of the first class)
* Once students have completed question 5 and 6, they must construct and test their prototype, using the [**Pullies and Gears Simulator**](https://phet.colorado.edu/sims/cheerpj/the-ramp/latest/the-ramp.html?simulation=the-ramp)
* Once they have finished making their prototype, they can continue to finish the remaining questions on their worksheets
 | **60 Minutes** (Second half of the first period and the first half of the second period**)** |  |
| **End/ Explain and Extend: Presentations*** Once all students have completed their prototypes and worksheets, the class should take turns presenting their prototype to each other
* Through their presentations, students can be informed of other simple machines that their peers made and think about other places in their life that can benefit from adding accessible resources to their planning
 | **30 Minutes** |  |

Notes: Next Steps/Resources or Required Follow-Up:

* Follow Up Activity 🡪 Writing a formal letter to the principal
	+ To further this lesson to include writing, students can write formal letters to the school’s principal explaining the need of including devices that can make the school more accessible
	+ They can and should also include a brief explanation of their prototype
* Academic portion of this lesson is adapted from <https://ebookcentral-proquest-com.proxy.queensu.ca/lib/queen-ebooks/reader.action?docID=6320330>

