## Class: Grade 5 Science

**Lesson Title: Simple Machines Kinulation**

Class Size: **24**
Time: **60 mins**

**Curriculum Outcomes:**
**303-12** investigate different kinds of forces used to move objects or hold them in place
**303-16** demonstrate the use of rollers, wheels, and axles in moving objects
**206-6** suggest improvements to a design or constructed object

**Learning Objectives:**
1. Students will gain an understanding of the differences between the six simple machines in order to create a Rube Goldberg machine.
2. Students will be able to create and critique simple machine constructions.

**Materials:**
- A large ball or item to be "transported" through a Rube Goldberg machine
- Video camera (optional – if you would like to record the Rube Goldberg machine so that students can view their creation afterward)
- Resource links: https://www.youtube.com/watch?v=9yZmOMY8qgw
  https://www.youtube.com/watch?v=4MiYtvbK4JY
  https://www.rubegoldberg.com/

Preparation beforehand:
- Have a large open area ready (gym/outside) or clear desks out of the way as this activity requires a lot of space

Introduction:
1. Introduce the topic. Possible prompt questions include:
   a. What are types of Simple Machines + examples of each in real-life? (lever, wedge, pulley, screw, wheel and axle, inclined plane)
   b. What is the purpose of these machines? (to help make more work output than input; more efficient use of work)
   c. Can you think of any cases where more than one Simple Machine is used together? (bicycle, etc.)

2. *Optional*: Watch some of the videos above to give students an idea of what the simple machines look like independently and working together.

3. Explain what a kinulation is (broken up into kinesthetic and simulation). Ask the students if they'd like to try one out!

Activity:
1. Split students up into 6 groups and give them each one of the Simple Machines as their group's focus.
   a. It helps to have at least 3 students per group, but can be done with fewer.
2. Instruct students in each group to come up with some representation of their simple machine that would be able to transport or move an object (the ball or whichever object you have chosen).
3. They will be given 5-7 minutes to come up with a demonstration, of which they will show to the class to get peer feedback for improvements. If necessary, you can play a clip on YouTube demonstrating one of the Simple Machines performing a task.
4. While students are discussing within their groups how they are going to move the object, simply wander around from group to group to make sure students have a clear understanding of what they should be doing.
5. When students look ready, have all students sit down and one at a time call on a group to demonstrate their Simple Machine. Open up to the floor for students to offer suggestions to make it better or simply to discuss what they like about it and how it clearly demonstrates the machine. Repeat this for each group, and offer your own comments as well.

6. When all groups have completed their demonstration, give them another 4-5 minutes to adjust or tailor their demonstration according to the feedback they received.
7. When the groups are happy with their demonstration, let them know that we will now have groups lined up (either in a straight line, or simply a circle around the room), so that we can transport the ball (or other item) from one group to the next, until it has reached the last group. You can let them know that this is called a Rube Goldberg machine. At this point you may wish to video tape / narrate what is happening as the item is moving through the machines (or have a student(s) narrate); if you wish to videotape, simply use it for the students to see their masterpiece afterward (unless you have consent from parents to keep it).

Conclusion – Possible wrap-up questions:

1. Do you think there is anything we could have done better to make the movement of the ball (or other item) easier?
2. Did you see any points in the machine that were not efficient? Explain.
3. Can you think of any real-world example that would include all six Simple Machines, or why it would be used? (Old mouse-trap game, or examples of a booby-trap in movies with marbles on a hot-wheels ramp, etc.)