

Learning Intention

- To learn how to combine simple machines into a more complex machine
- To learn how gravitational potential energy is calculated
- To learn how to calculate mechanical advantage for pulleys, levers, and gears

Notes

For this project, you will work in a group of 1 to 4 people to build a machine composed of many simple machines, built around a camshaft.

Videos about automata and camshafts:

<https://mrrenwick.ca/index.php/course-materials/physics-11/work-energy-and-power/camshafts-and-automata/>

Requirements

1. The requirements for the project will depend on the number of people in your group.

Number of People in Group	1	2	3	4
Videos	1	1	1	1
Number of Mechanisms	2	4	6	8
Calculation of Gravitational Potential Energy	1	2	3	4
Calculation of MA for lever, pulley, and gear/belt	2	3	4	5

1. Planning and Conducting: Submit a video of your automaton in motion.
 1. Extending: The automaton works perfectly.
 2. Proficient: The automaton mostly works properly.
 3. Developing: The automaton needs lots of manual help to work properly.
2. Processing and Analyzing Data: Submit calculations of gravitational potential energy and mechanical advantage for your automaton.
3. Applying and Innovating
 1. Developing: The project does not include a camshaft, and/or does not include some of the required elements.
 2. Proficient: The project contains a camshaft, and includes almost all of the required elements.
 3. Extending: The project contains all the required elements, plus a camshaft that is used to generate timing between different components of your machine that interact with each other.
4. Evaluating: Analyze your results. This section is the bulk of your analysis, and should use the physics terms we have been using in this unit.
 1. Describe every energy transformation in the machine.
 2. What energy is put into the machine from the outside world?
 3. What work is done by the machine on the outside world?
 4. Where is energy lost in the machine?
 5. If you had to do this exact same project again, what would you do differently?
 6. How could this project be improved for future classes?

Assessment

<https://mrrenwick.ca/index.php/course-materials/physics-11/assessing-curricular-competencies/>

Curricular Competency	Insufficient Evidence	Emerging	Developing	Proficient	Extending
Planning and conducting					
Processing and analyzing data					
Evaluating					
Applying and Innovating					
Communicating					