Middle School Physical Science
Standards 5.3 B, 5.4A, 5.4C, 5.7B

# Mechanical Challenge

You are members of the supervisory team on a construction site. You know that you need to move a 100 kg load to a platform 1 m high. You also know that one member of your construction crew can safely exert a force of 250 N. (Remember that a 1 kg mass is about 10 Newtons, so for this job, your crew would need to lift a total of _____ N)

Here is the unfortunate problem…you can only find one crew member who is available to lift the load. What kind of device can be constructed so that the one available crew member can lift 100 kg on to a platform?

Build your machine to scale. In other words, build a machine that can lift a 1 kg weight a distance of 20 cm using the least amount of force. What is the greatest amount of force possible if only one crew member can lift the mass to the platform?_____

*You will work in a group of three or four to develop a solution to this problem. You will have three days in class to develop your machine and test it. The first group to develop a working solution and develop an appropriate laboratory report wins the competition!

You may use any simple machine, or combination of simple machines to solve the problem.

***All lab reports must include the following:**

1) A clearly defined problem statement.

2) A hypothesis that clearly states the type/types of simple machines that will be used to solve the problem

3) An accurate list of your materials

4) A data table that includes sketches of your machine and the results of your tests

5) Results and conclusions based on your findings.

****The roles for this activity are as follows:**
**Recorder:** Notetaking during activity, produces final copy of lab activity, or requires all members to submit their own.

**Materials Manager:** Provides all necessary materials for construction of device, assists with device building, and ensures that all materials are put back properly at the end of each class period.

**Mechanical Engineer**: Lays out possible design/designs for machine and manages construction.

**Statistician:** Collects all data, performs all calculations of Work Input; Work Output, and calculates the Mechanical Advantage, and Mechanical Efficiency for the machine.