



Machines

STEM Sims

Lesson 4: Balancing Act

A lever is a simple machine consisting of a fulcrum that serves as a pivoting point and a plank. A first class lever is one where the fulcrum is in the middle of the effort force and the load or resistance force. Can you use your first class thinking to determine how a lever works?

Doing the Science

1. Start the Machines Simulation by clicking on the “Sim” tab.
2. Click the “Levers” button at the bottom of the screen.
3. Make sure that the number “1” (first class lever) is selected from the three numbered buttons at the bottom of the screen.
4. Use the Newton Converter button at the bottom right-hand corner of the screen if you need help converting the hanging mass from kilograms to newtons for the Force on Mass column.
5. Click the green “Pull” button on the Force Device on the right side of the screen.
6. Note and record in Table 1 the height the 1.0-kg mass lifts off the ground, the applied force and height moved that is displayed on the Force Device.
7. Click the “Reset” button.
8. Click the left red arrow to move fulcrum to the 3-meter mark on the plank.
9. Repeat steps 4 - 7, making sure to note and record your data in Table 1.
10. Click the right red arrow to move the fulcrum to the 5-meter mark on the plank.
11. Repeat steps 4 - 7, making sure to note and record your data in Table 1.
12. Click on the 2.0-kg mass to replace the 1.0-kg mass on the plank. Repeat the entire experiment with the 2.0-kg mass.

Table 1. Forces and Height Moved

Fulcrum Position (m)	Mass (kg)	Force on Mass (N)	Height Mass Lifted (m)	Applied Force (N)	Height Force Device Moved (m)
4	1				
3	1				
5	1				
4	2				
3	2				
5	2				

Do You Understand?

1. Describe how the position of the fulcrum affected the lifting force required by the Force Device.
2. Describe how the height lifted by the Force Device changed based on the fulcrum position.