



## Lesson Logistics

### Learning Outcomes

<b>Grades 10-12</b>
Force, motion and work
Fields
From structures to properties

### Class Organization

Ensure that each student has a copy of the *Student Handout*.

The students can be divided into groups of three or four to complete the handout afterwards or to discuss concepts and questions.

### Notes

The magnets used in this activity can pinch skin quite badly if not handled properly. Also, be aware that they are coated in a nickel alloy which can crack and break if the magnets are not handled with care. Magnets should not be placed near computers, and metal objects should be kept away from the train track.

Liquid nitrogen can also cause cold burns if not handled correctly: always use appropriate protection including gloves when handling the substance.

### Further Exploration

#### Maglev Trains in the Real World

Students can do research before the activity on how real maglev trains work. After seeing the demonstration, students can compare and contrast the classroom model with real maglev trains and discuss why the model cannot be applied to real life at the present.

#### Magnets

Create a track that is three magnets wide and see if the train still functions. The same can be done with a track that is two magnets wide.



a WOW Lab

**BLUEPRINT**

**The Maglev Train - Lesson Logistics**

### **Force of Gravity**

Another area to explore is the effect of the force of gravity on the train. The train levitates at the exact point where the forces of gravity and magnetic repulsion are equal but opposite. Students can experiment by adding mass to the train until it no longer levitates.

### **Magnetic Fields**

In order to demonstrate magnetic fields in a visual manner, a bar magnet and iron filings provide an easy visual demonstration.