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Inclined Plane

Level 1

Lesson Slides

Moving Day

How would you get the following into the truck:

- A box of books?
- A couch?
- A refrigerator?

An *inclined plane* is a simple machine that uses a slope to raise and lower heavy objects.

Mechanical Advantage in Inclined Planes [Handout]

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Name: _____

Date: _____

Mechanical Advantage in Inclined Planes - Student Handout

Engineering Background:

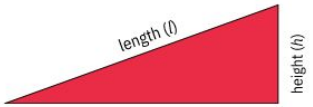
inclined plane: a simple machine that uses a slope to raise and lower heavy objects.

mechanical advantage (MA): a change in the magnitude of force required to do work. Simple machines use MA to help minimize the force needed to complete movement

ideal mechanical advantage (IMA): the theoretical mechanical advantage based on the assumption that no energy is lost to friction, wear, or other resistance

ideal mechanical advantage (IMA) of inclined planes is the ratio of the length of the ramp to the height of the ramp.

$$IMA_{inclined\ plane} = \frac{l_{ramp}}{h_{ramp}}$$



1. List examples of inclined planes in our world.

Introducing the Inclined Plane

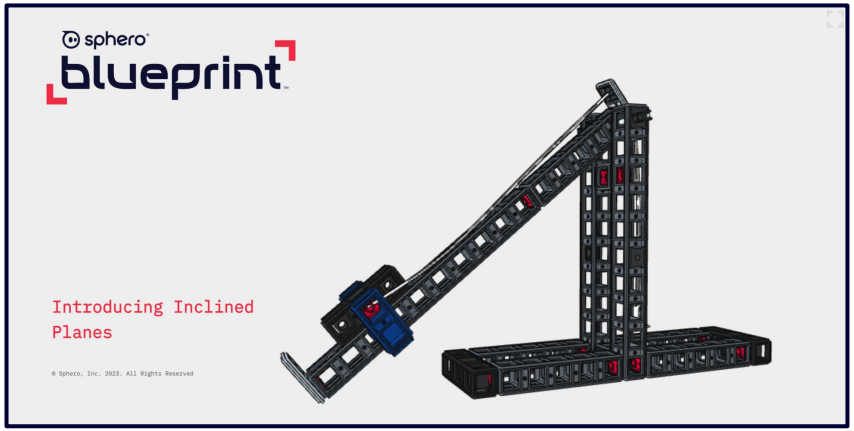
Common Examples of Inclined Planes

Learning objectives

By the end of the lesson, you will be able to:

- construct a simple inclined plane with the Blueprint Build Kit
- calculate the ideal mechanical advantage (IMA) of inclined planes
- modify inclined planes to meet certain conditions

Inclined Plane Build Instructions



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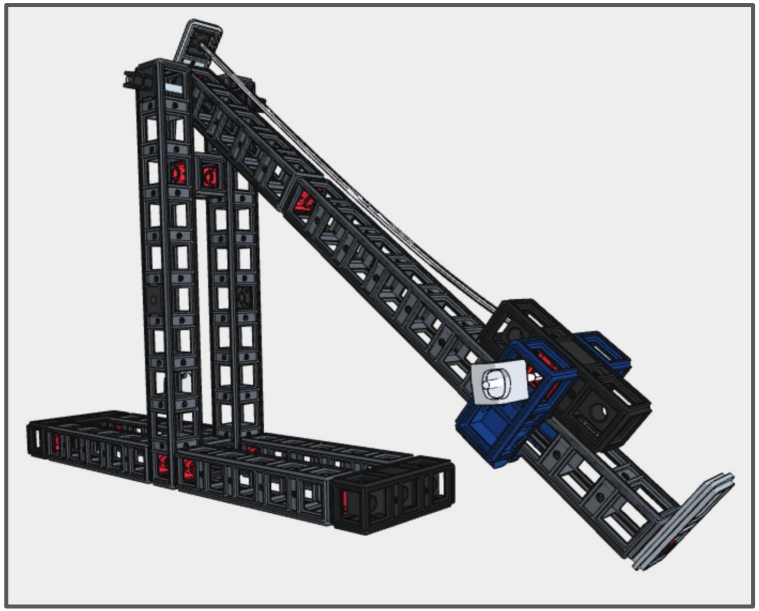
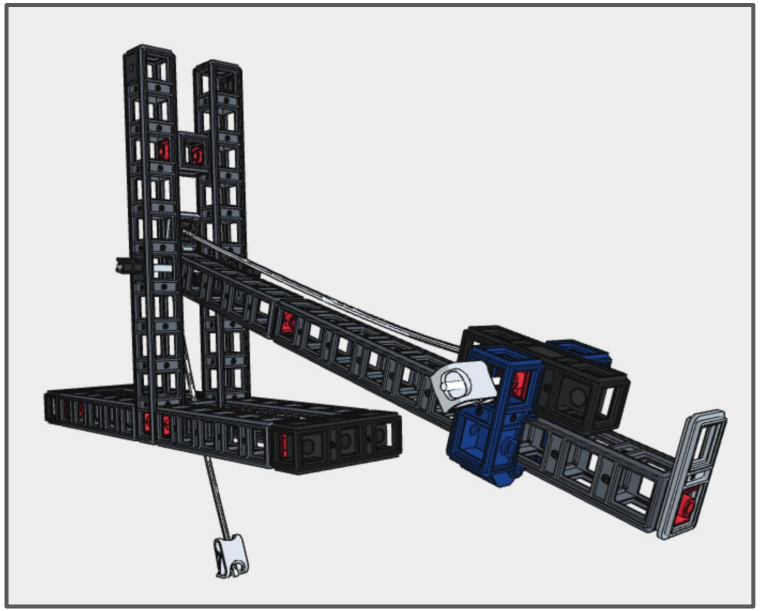
Changing the slope of the ramp

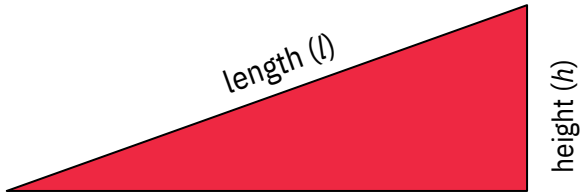


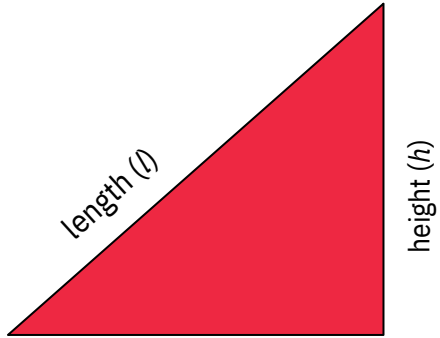
Inclined Plane 1



Inclined Plane 2

Which ramp made lifting objects easier?

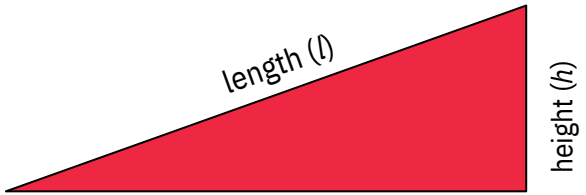




Mechanical Advantage(MA) is a change in the magnitude of force required to do work. Simple machines use MA to help minimize the force needed to complete movement.

The ideal mechanical advantage (IMA) of an inclined plane is the ratio of the length of the ramp to the height of the ramp.

$$IMA_{inclined\ plane} = \frac{l_{ramp}}{h_{ramp}}$$



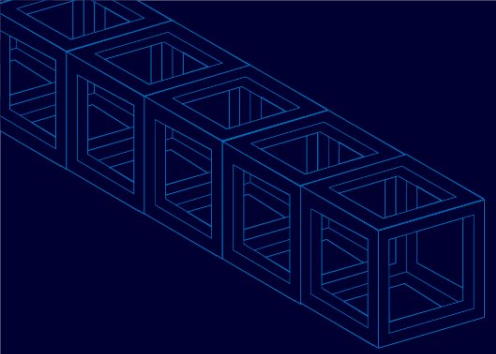
Javier says that the ax shows a new kind of simple machine, one that can be used to split wood. Brianna disagrees and says that the ax is just an inclined plane.

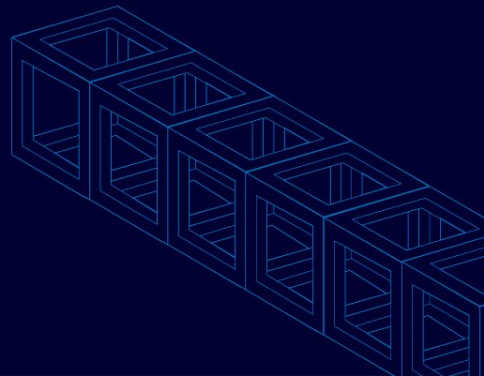
Which student do you agree with? Why?

Engineers need to adapt simple machines to fit specific purposes.

Using only the parts you've already used, modify your inclined plane model to meet the following conditions:

- The highest IMA possible
- The lowest IMA possible
- An IMA of exactly 5





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