

## Inclined Plane Lab

Name \_\_\_\_\_  
Date \_\_\_\_\_ Period \_\_\_\_\_

**Background Information:** An inclined plane can be described as a sloping surface that goes from a lower level to a higher level. Ramps, stairways, and hillsides are examples of inclined planes. Two mechanical advantages can be calculated for an inclined plane. The ideal mechanical advantage (IMA) is the mechanical advantage the plane would have if there were no friction. The actual mechanical advantage (AMA) takes into account the effect of friction.

**Question:** How will the mechanical advantage change as an inclined plane becomes steeper?

**Hypothesis:**

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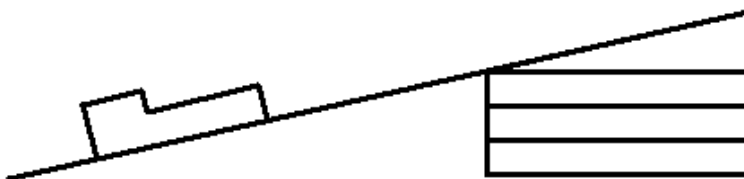
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**Materials:**

Inclined plane (ramp), momentum car, meter stick, spring, 1 kilogram mass (9.8 Newtons), 5 textbooks,

**Procedure:**

1. Hang the wooden block on the spring scale to determine the force of gravity on the block or the amount of resistance (resistance force).
2. Measure the length of the board that will become an inclined plane and record it in the data table as length.
3. Using a book create a ramp or inclined plane. Record the height of the inclined plane in the data table.
4. Using the spring scale pull the block up the ramp at a steady rate and record the amount of effort on the scale (effort force).
5. Change the height of the ramp to 3 books; continue this process increasing the number of books each time. Record your data.



**Variables:**

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_

**Data Table**

Book	Resistance Force (g)	Effort Force (g)	Height (m) Resistance Distance	Length (m) Effort Distance	Ideal Mechanical Advantage (IMA)	Actual Mechanical Advantage (AMA)
1						
3						
5						
7						
9						

**Formulas:**

$$\text{IMA} = \frac{\text{Length}}{\text{Height}}$$

$$\text{AMA} = \frac{\text{Resistance}}{\text{Effort}}$$

**Conclusion:**

1. Was your hypothesis proven or not? Use data to support your statement.

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2. Compare the ideal and actual mechanical advantage.

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3. Explain reasons why these two are different

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4. For the 5 book stack, calculate the work in and the work out.

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5. Using the data table, from which plane do you get the most mechanical advantage? Explain why.

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6. What happens to the Mechanical Advantage as the inclined plane gets steeper? On the basis of this, which of the 5 inclined planes would create the best wheelchair access ramp?

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