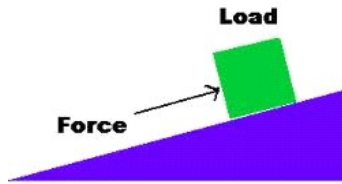


Mechanical Advantage and the Inclined Plane

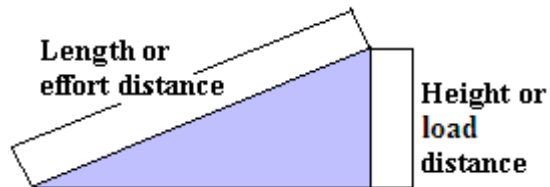
SPH4C

A **load** is a _____ that is being _____ (and possibly being _____).



The **load distance** for the inclined plane is the _____, or _____, of the inclined plane.

The **effort distance** is the total distance the load is being moved: the _____ of the inclined plane.



The **ideal mechanical advantage** (or **IMA**) is defined as the _____ of the effort distance to the load distance:

Example: A wheelchair ramp is 9.0 m long and has a vertical rise of 1.5 m. What is the ideal mechanical advantage of the ramp?

This mechanical advantage should also be reflected in the _____ required to move the load.

The **load force** is the _____ of the load

and the **effort force** is the force that is _____ to move the load.

The _____ **mechanical advantage** (or **AMA**) is defined as the ratio of the load force to the effort force:

Example: A person exerts a force of 207 N to move herself and her wheelchair (with a total mass of 95 kg) up the ramp. What was the actual mechanical advantage of the ramp?

Actual mechanical advantage is always going to be _____ than ideal mechanical advantage. Why?

Because the effort force also has to overcome _____.

The percent efficiency of a machine is determined by:

For the wheelchair ramp in our example, the efficiency would be:

More Practice

1. Match each of the following terms on the left to their definition on the right:

_____ effort distance

A. the weight of the load

_____ effort force

B. the height the load is moved up the inclined plane

_____ load distance

C. the length the load is moved up the inclined plane

_____ load force

D. the force actually exerted to move the load

_____ actual mechanical advantage

E. the ratio of the length of the inclined plane to its height

_____ ideal mechanical advantage

F. the ratio of the weight to the force actually exerted

2. Which will be higher: actual mechanical advantage or ideal mechanical advantage? Explain why.

3. A cart of weight 14 N is pulled 1.2 m up a ramp with a force of magnitude 5.0 N, raising the cart 0.40 m.

(a) Calculate the IMA.

(b) Calculate the AMA.

(c) Calculate the percent efficiency.