Name _____

Date _____ Period _____

Pulleys

A pulley is a grooved wheel with rope or cable. There are two types of pulleys, fixed pulleys and moveable pulleys. A fixed pulley is a pulley that doesn't move, and changes the direction of the applied force. A moveable pulley is a pulley that is supported by strands of rope along which it slides. A pulley system containing both fixed and moveable pulleys is called a block and tackle. The number of supporting strands of rope the moveable pulley has determines the mechanical advantage. While the mechanical advantage comes from the supporting strands of rope, the pulley, a grooved wheel that glides along the rope, reduces friction.
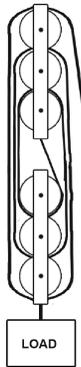
Sorry Dude! Adding more supporting strands to your pulley so you can lift more weight won't make you stronger!

Sample Problem
Refer to the diagram of the pulley system to the right:

What is the mechanical advantage?
 6
How much force is needed to lift a 60 N load?

$$F_{in} = \frac{F_{out}}{MA} = \frac{60N}{6} = 10N$$

How much rope will need to be pulled out to lift the load 75 cm?

$$d_{in} = d_{out} \times MA = (75cm)(6) = 450cm$$

LOAD

Based on the examples above, solve the problems below. Show your work. Use the proper units in your answers.

1. What is the mechanical advantage of the pulley system to the right? What force is needed to lift a 150 N load? How much rope must be pulled out to lift the load 30 cm?

3. What is the mechanical advantage of the pulley system to the right? What force is needed to lift a 90 N load? How much rope must be pulled out to lift the load 40 cm?
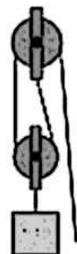
2. What is the mechanical advantage of the pulley system to the right? What force is needed to lift a 120 N load? How much rope must be pulled out to lift the load 50 cm?

4. What is the mechanical advantage of the pulley system to the right? What force is needed to lift a 240 N load? How much rope must be pulled out to lift the load 15 cm?