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Conceptual Physics: _____
Date: _____

Unit IV
Work, Power and Machines
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IV

Work & Power Stations

Objective: The purpose of this lab is to investigate the effect of machines on the amount of force required to complete a work task. Complete each station as directed (order does not matter).

Pulley Station

Background: How is the ideal mechanical advantage (IMA) of a system of pulleys determined? (page 432) _____

Procedure:

1. Three different pulley systems have been constructed.
2. Determine the IMA for each pulley system (hint. If the rope you're pulling on pulls down from the pulley, don't count it).
3. Use the spring scale to determine the weight in newtons of the 100 gram weight.
4. Calculate the amount of force that will be required to lift a 100 gram weight with each of the pulley systems. Record this in the table below.
5. Use the spring scale and lift the weight. What is the actual amount of force required to lift the 100 gram weight? Record this in the table below.
6. Enter your data in the table.

Data Table A

Pulley System #	IMA	Weight (n)	Calculated force	Actual force
1				
2				
3				

Does the calculated force match the actual force? Why or why not?

How did the weight of the weight compare to its mass?

Inclined Plane Station

Background: How is the ideal mechanical advantage of an inclined plane determined? (page 424) _____

Procedure:

1. Two inclined planes have been set up.
2. Determine the IMA of each of the inclined planes.
3. Use the spring scale to determine the weight of the block of wood.
4. Calculate the amount of force that will be required to pull the block of wood up each ramp.
5. Use the spring scale to drag the block of wood up the first ramp. Record the amount of force required in the table below. Repeat this action on the second ramp and record the amount of force required.

Data Table B

Inclined Plane	IMA	Weight of block	Calculated force	Actual force
#1				
#2				

Power Station

Background: How is power calculated? (page 415) _____

Procedure:

1. A dowel rod has been configured with a string and a weight. You will use this device to determine which member of your group can generate the greatest power.
2. How much work will be required to raise the weight 1 meter? (hint: $W = Fx$) _____
3. Unwind the string from the dowel rod so that the weight hangs precisely 1 meter below the rod.
4. Use a stopwatch to time all the group members as they perform the task.
5. Holding the rod in both hands, wind the string onto the rod as fast as you can until the weight touches the rod. Stop the time. Enter your data in Table C below.
6. Use a highlighter to indicate which student generated the most power.

Data Table C

Name	Trial 1 Time	Trial 2 Time	Work (F x)	Power (W/t)