Pulley Lab

Name_____**Date**_____**Group**_____**Period**___

Would you believe that a small child could lift a weight that is more than double their own body weight with just muscle power? It's true! You could do it by building a **simple machine** with some **rope** and **pulleys**. In this experiment you will learn how to build machines which allow you to lift large weights with small forces.

When doing this activity, you will find out that the amount of input force you use to lift a constant weight is going to change as you make changes to the pulley set up.

Variables: By the time you finish this experiment ,you will need to identify the different types of variables present in this investigation. Consult your notes for definitions of the types of variables.

Independent Variables:_____

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Dependent Variables: the amount of input force used to lift the resistance

_____

Controlled Variables: the resistance weight being lifted,number of pulleys in top and bottom block,same spring scale

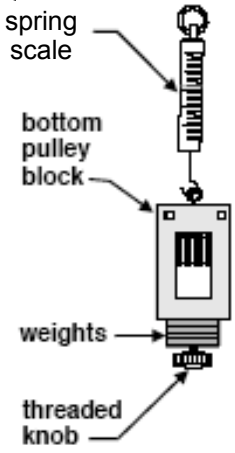
_____

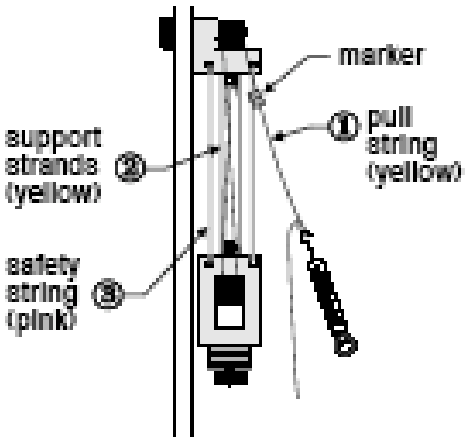
Procedures:

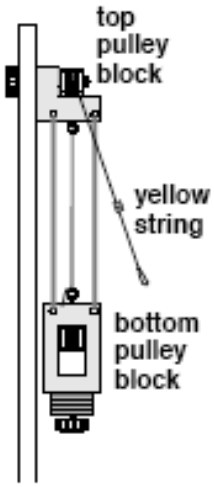
Setting Up: Attach **four** weights to the **bottom** block. Now use a spring/force scale to lift the bottom block until the pink safety strings go slack and record the weight here (in Newton's).

Record weight here of bottom block in Newton's:_____

Attach the top block near the top of the Physics Stand. Start with the yellow string clipped to the bottom block. The yellow string can be clipped to either the top block or the bottom block.



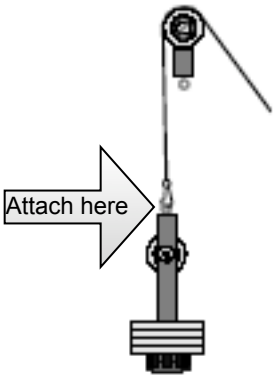




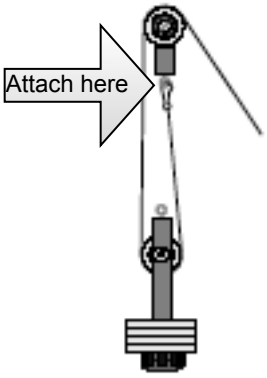
Why all the strings?

1. The yellow string will be used to move the bottom pulley block with the weights up and down. You will pull on the end of the yellow string.
2. The yellow string may have several strands that support the bottom pulley block. These are called the **supporting strands**.
3. The pink string is the **safety string**. It holds up the bottom block while you rearrange the yellow string.

Trial	Number of Support Strands	Input Force to Lift Bottom Pulley Block (N)
1		
2		
3		
4		
5		
6		



This arrangement has one supporting strand of the yellow string.



This arrangement has two supporting strands of the yellow string.

To Do the Experiment:

- 1. Clip the end of the yellow string to the bottom pulley block. Pass the string over the middle pulley of the top block.
- 2. Use the marker (cord stop) stop to hook the force scale to the string.
- 3. Measure the force it takes to slowly lift the bottom pulley block. Pull downward on the force scale.
- 4. This arrangement has one strand supporting the bottom pulley block. Record the force needed in the table in the row corresponding to one strand.
- 5. Loop the end of the yellow string under the middle pulley on the bottom block and pass it over the top pulley block. Arrange the string so one strand goes over each of the two end pulleys. There are three supporting strands now. Pull downward on the force scale.
- 6. Repeat step 5 and this time you'll have five supporting strands.
- 7. Take the yellow string off and clip the end to the top block next. Pass the string around the middle pulley in the bottom block and back over the middle pulley in the top block.
- 8. Move the marker and measure the force it takes to slowly lift the bottom pulley block.
- 9. Record this force in the row for two supporting strands.
- 10. Rearrange the yellow strings so that you get 4 and 6 supporting strands. Measure and record the force it takes to lift the bottom pulley block for each new setup.

Question 1. As you add more supporting strands, what happens to the amount of input force needed to lift the bottom block?

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Question 2. Write a rule which describes how the amount of input force and the number of support strings relates to the weight of the block . Look at your data for when there are two and then three support strands.

Sources of Error : Identify ***two*** things that people may have done incorrectly that would have caused them to get totally different answers from the rest of the class. These errors must be unique,in other words they have not been applicable in previous labs. They must be ***new*** sources of error. Be ***specific*** about what might have been done.

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