Name_____

Simple Machines Lab 1: Inclined Plane, Lever and Pulley

Purpose:
To understand the advantage of using an inclined plane, lever and pulley.

Information:
Inclined Plane: An inclined plane is a ramp that allows objects to be rolled up or pushed up in place of lifting vertically. The inclined plane decreases effort by changing the path of movement from a vertical motion, to motion up a slant. This changes the lifting of the object so that is doesn't directly oppose gravity and so less force is needed to move the object. The object then requires less effort to move it but the object will now require that work will be done but over a longer distance.

Lever: A lever is a simple machine that consists of a rod that pivots on a fulcrum, where pushing down on one end causes the other end to rise. The lever makes lifting objects easier by allowing you to do more work with the strength you have. By doubling the rod length on your side of the fulcrum, you use half the effort and less force. The amount of work is the same, but is distributed over a longer distance, making it feels easier. From this, a person can lift much heavier objects than they naturally could.

Inclined Plane

Procedure:
Materials: 40cm board, 2 meter sticks taped together (100cm), 500g mass, spring scale

Steps:
1. Create a stack of objects and make a ramp with a height of 10cm using the 40cm board.
2. Place the mass at the bottom of the ramp and use the spring scale to pull it up the ramp at a slow constant speed. While pulling, record the force in the data table.
3. Repeat this process with the 100cm ramp.
4. Repeat steps 1-3 but change the ramp height to 30cm.
5. Finally, hang the mass from the spring scale and record the reading.

Results:

Ramp Height of 10cm		**Ramp Height of 30cm**		**No Ramp**
40cm Ramp Length	100cm Ramp Length	40cm Ramp Length	100cm Ramp Length	Force without Ramp

Conclusion:
What happened to the force when using different length ramps?

Did the ramp height affect the force needed to pull the mass up the ramp?

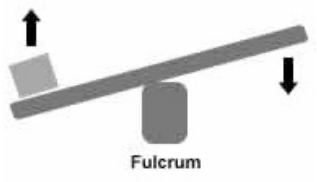
Lever

Procedure:
Materials: meter stick, 200g mass, spring scale, tissue box

Name_____

Steps:

1. Set up the meter stick so that the tissue box at the 50cm mark like in the picture below.
2. Place the mass in one end of the lever and use the spring scale to pull down on the other end of the lever at a slow constant speed. Record the amount of force needed to get the lever moving.
3. Repeat the trial, moving the tissue box closer to the mass. Make sure to place the tissue box at the location specified in the data table.



Results:

	Location of the Tissue Box (Fulcrum)	Force Exerted by The Scale (Newtons)
Trial 1	50cm	
Trial 2	55cm	
Trial 3	60cm	
Trial 4	65cm	
Trial 5	40cm	

Conclusions:

What did you find happened to the force when you moved the tissue box closer to the mass?

What happened to the force in the last trial, when you moved the tissue box closer to the spring scale? Explain your answer.

Pulley:

Procedure:

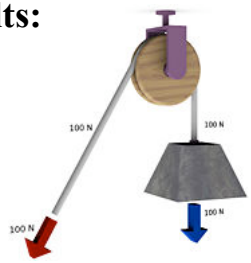
Materials: 2 pulleys, 200g mass, string, spring scale

Steps Part 1

Name_____

1. Attach the 200g mass to the spring scale and record it's mass in the data table.
2. Feed the string through the hanging pulley and attach one end to the mass and the other end to the spring scale
3. Mark the string right at the pulley on the side closest to the spring scale.
4. Pull the mass from the table to a height of 50cm at a slow constant speed and record the force.
5. Measure the length of string that was pulled through the pulley and record it in the table

Results:

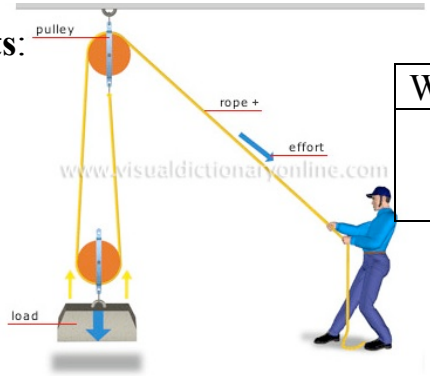


Weight of the Mass	Force When Pulling	Length of String

Steps:

1. Next, attach the string to the pulley that is hanging and create a two pulley system like the picture below.
2. Mark the string right at the pulley on the side closest to the spring scale.
3. Pull the mass from the table to a height of 50cm at a slow constant speed and record the force.
4. Measure the length of string that was pulled through the pulley and record it in the table.

Results:



Weight of the Mass	Force when Pulling	Length of String

Conclusions:

What happened to the force when you used only one pulley?

What happened to the force when you used two pulleys?