

SIMPLE MACHINES

ACTIVITY 1 – PULLEYS

Purpose

The purpose of this station is to examine pulleys. You are to examine how they work, the mechanical advantage that can be obtained by using them, and what is sacrificed to gain from them.

Equipment

- A Variety of Pulleys
- String
- Retort Stands
- Retort Stand Clamps
- Spring Scales
- Masses
- Ruler



Procedure

1. Set up a single fixed pulley to lift a mass (alternatively, attach a spring scale in place of the load).
2. Use a spring scale to determine the effort needed to lift the load.
3. Take note of the movement in the system.
4. Create an observation table to record these values.
5. Repeat steps 2 and 3 for a single moveable pulley.
6. Repeat steps 2 and 3 for a variety of pulley systems. Be sure to record the setup and forces of each in your chart.
7. Continue to explore by changing the setup of the pulleys.
8. As you work, talk about the discussion points with your group.

Observations

Create a data table to record the information from each of the pulley systems you set up. Be sure to include all of the information you will need to complete your assignment at a later date. It might benefit you to include a quick drawing of the setup.

Discussion

1. What do you notice about the force required as you add pulleys?
2. What do you notice about the movement of the system as you add pulleys?
3. What is sacrificed to gain advantage from a pulley?
4. Discuss real-world applications of pulleys.

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ACTIVITY 2 – LEVERS

Purpose

The purpose of this station is to examine levers. You are to examine how they work, the mechanical advantage that can be obtained by using them, and what is sacrificed to gain from them.

Equipment

- Large Lever
- Tape Measure
- Meter Sticks
- Lever Clamps
- Retort Stands
- Retort Stand Clamps
- Spring Scales



Procedure

1. Use the large lever to explore the way in which a lever may be used to lift a heavier object.
2. Use the lever clamps to make a class one lever to lift a mass (alternatively, attach a spring scale in place of the load).
3. Take note of the dimensions of the lever.
4. Use a spring scale to determine the effort needed to lift the load.
5. Take note of the movement in the system.
6. Create an observation table to record these values.
7. Repeat steps 3 through 5 for a class 2 lever and a class 3 lever. Be sure to record the values obtained.
8. Continue to explore by changing the dimensions of your levers.
9. As you work, talk about the discussion points with your group.

Observations

Create a data table to record the information from each of the levers you set up. Be sure to include all of the information you will need to complete your assignment at a later date. It might benefit you to include a quick drawing of the setup.

Discussion

1. What do you notice about the force as you move the fulcrum?
2. What do you notice about the movement of the system as you move the fulcrum?
3. What is sacrificed to gain advantage from a lever?
4. Discuss real-world applications of levers.

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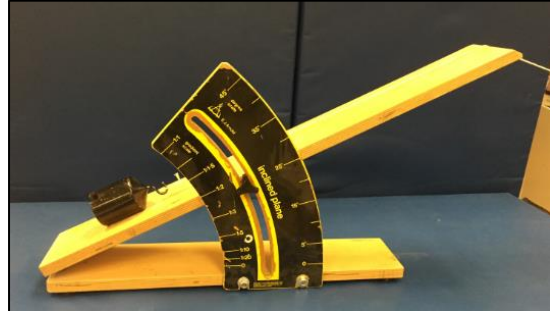
ACTIVITY 3 – INCLINED PLANES

Purpose

The purpose of this station is to examine inclined planes. You are to examine how they work, the mechanical advantage that can be obtained by using them, and what is sacrificed to gain from them.

Equipment

- Inclined Planes
- Masses
- Friction Blocks
- String
- Spring Scales



Procedure

1. Set up the inclined plane.
2. Record the dimensions of the inclined plane.
3. Use a spring scale to measure the effort required to directly lift the load and to move the load up the inclined plane.
4. Take note of the movement in the system.
5. Create an observation table to record these values.
6. Repeat steps 1 through 4, changing the angle of the plane.
7. Continue to explore by trying different loads.
8. As you work, talk about the discussion points with your group.

Observations

Create a data table to record the information from each of the inclined planes you set up. Be sure to include all of the information you will need to complete your assignment at a later date. It might benefit you to include a quick drawing of the setup.

Discussion

1. What do you notice about the force as you change the angle of the plane?
2. What do you notice about the movement of the system as you change the angle of the plane?
3. What is sacrificed to gain advantage from an inclined plane?
4. Discuss real-world applications of inclined planes.

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ACTIVITY 4 – TOOLS

Purpose

The purpose of this station is to examine a variety of tools. You are to examine how they work, the mechanical advantage that can be obtained by using them, and what is sacrificed to gain from them.

Equipment

- A Variety of Tools
- String
- Masses
- Spring Scales



Procedure

1. Choose a tool, and examine it, taking note of how it works.
2. If possible, use the spring scales and masses to measure the input and output force of the tool.
3. Take note of the movement of the tools.
4. Create an observation table to record any values you are able to obtain.
5. Repeat steps 1 through 4 for more of the tools.
6. Continue to explore by altering the location in which you are holding the tool.
7. As you work, talk about the discussion points with your group.

Note: These are real tools; you need to examine them safely. There are sharp edges, potential pinch points, and impact surfaces. Consider your safety, and the safety of those around you.

Observations

Create a data table to record the information from each of the tools you explore. Be sure to include all of the information you will need to complete your assignment at a later date. It might benefit you to include a quick drawing of the tool.

Discussion

1. How does the tool work?
2. Discuss the force (type, direction, magnitude) obtained from the tool.
3. What is sacrificed to gain advantage from the tool?
4. Discuss when/for what the tool would be used.