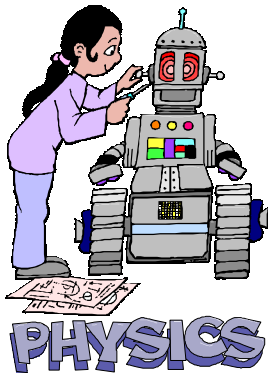


Science 9-Physics
Activity 19E—Simple Machines



10

Name _____

Due Date _____

Show Me Hand In

Correct and Hand In Again By _____

Purpose: To examine, identify and use some simple machines

Procedure:

Start at one of the stations and proceed to all stations as you do this activity. Find the station you are working on, on this handout and answer the questions for it. Stations don't have to be done in order. You may use pages 422-426 in the Text to help you.

Station 1—Name of Object _____
Name of the Simple Machine _____

Sketch of this Object

Measure & Record the Force Needed to Lift the Cart Straight up without using the simple machine (Load Force).....N.

Measure and Record the Force Needed to Drag the Cart up the plank (Effort Force)
.....N.

Calculate the **Mechanical Advantage** of this simple machine:

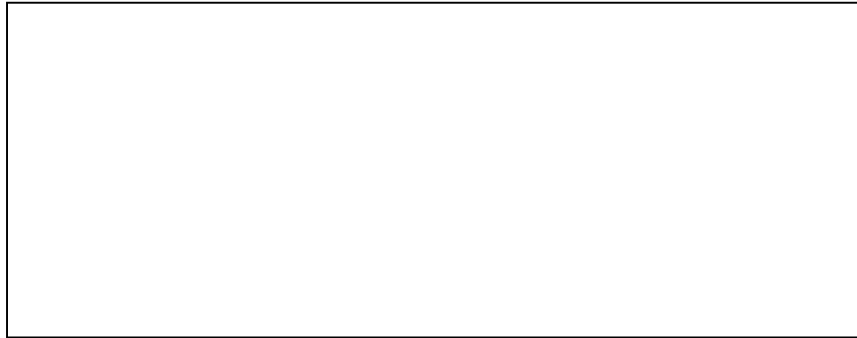
$$MA = \frac{\text{Load Force}}{\text{Effort Force}} = \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$

Which do you think would have the **greater** mechanical advantage, a steeper ramp or a ramp with a gentler slope? _____

Station 2—Name of Object _____

Name of the Simple Machine _____

Sketch of this
Object

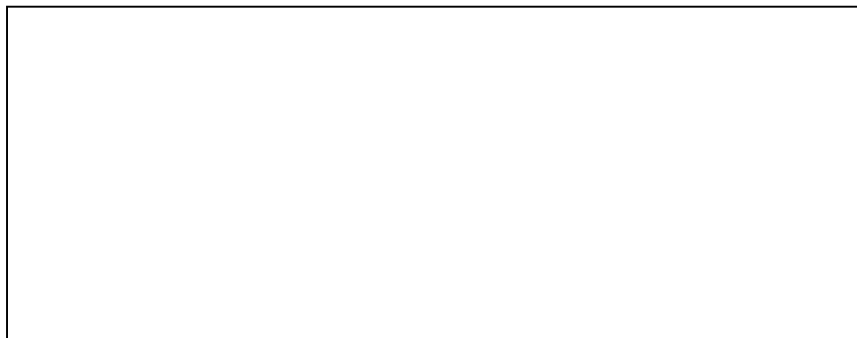


Does this simple machine have a **Force Advantage** or a **Speed Advantage**?

Station 3—Name of Object _____

Name of the Simple Machine _____

Sketch of this
Object



What is the **load force**? (The Force of Gravity on the Weight)

Remember Force (N) = Mass (kg) x 10

Answer: Load Force = _____ N

Use the spring scale to measure the **Effort Force**. **Show both Load Force and Effort Force on the following diagram:**



Calculate the **Mechanical Advantage** of this simple machine the way it is set up.

$MA = \frac{\text{Load Force}}{\text{Effort Force}} = \frac{\quad}{\quad} = \quad$

The way this machine is set up, does it have a **force advantage** or a **speed advantage**?

Answer _____ advantage.

Draw the fulcrum in the position you would put it to make this machine have a **speed** advantage:



Station 4—Name of Object _____

Name of the Simple Machine _____

Sketch of this Object

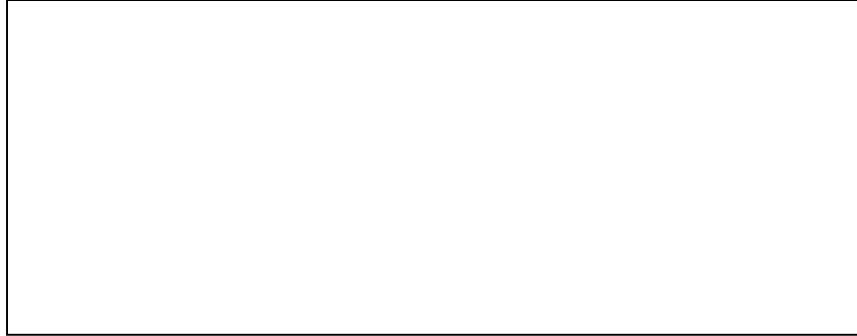
Does this machine offer a **force advantage** or a **speed advantage**?

Answer _____ advantage

Station 5—Name of Object _____

Name of the Simple Machine _____

Sketch of this
Object



On your diagram, label where the **load force** is applied (Load), where the **effort force** is applied (Effort) and where the **fulcrum** is.

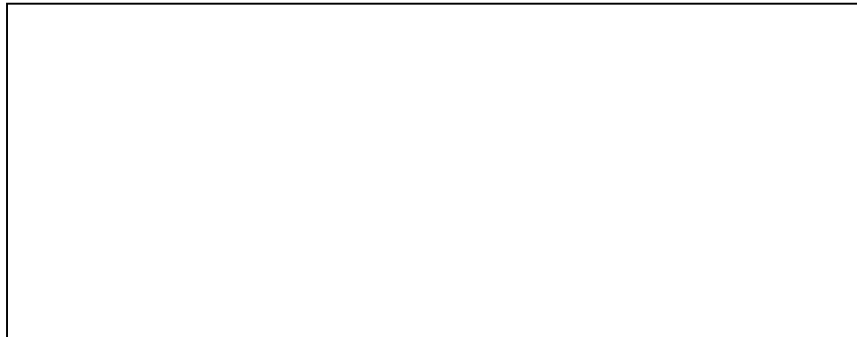
When these scissors are cutting paper which contacts the blade **right near the fulcrum**, does this device offer a **force advantage** or a **speed advantage**?

Answer _____ advantage

Station 6—Name of Object _____

Name of the Simple Machine _____

Sketch of this
Object

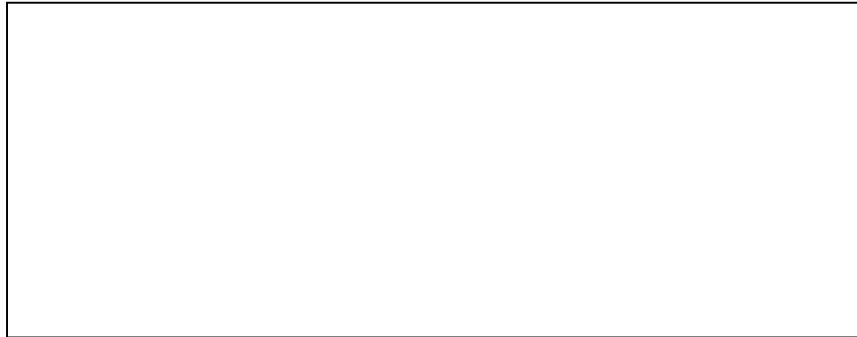


What advantages does this method of fastening things have over simple nails?

Station 7—Name of Object _____

Name(s) of the Simple Machine(s) _____

Sketch of this Object



With an arrow, show the **direction of the load force**, **direction of the effort force** and also label the **fulcrum** on the diagram above.

The lever here is a _____ class lever. Does this lever provide a force advantage or a speed advantage? _____

Having a wheel reduces the force of _____

Station 8—Name of Object _____

Name of the Simple Machine _____

Sketch of this Object



With an arrow, show the **direction of the load force**, **direction of the effort force** and also label the **fulcrum** on the diagram above.

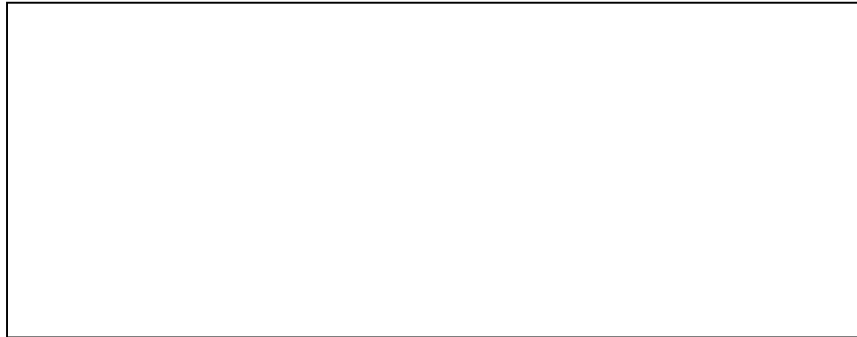
The lever here is a _____ class lever. Does this lever provide a force advantage or a speed advantage? _____

What could you do to increase the Mechanical Advantage of this machine? _____

Station 9—Name of Object _____

Name(s) of the Simple Machine(s) _____

Sketch of this Object



Imagine this device is being used to cut through metal. Which force (load or effort?) is being applied to the **handles**? _____ force. Which force (load or effort?) is being applied to the **metal between the blades**? _____ force.

The lever here is a _____ class lever.

The blades are examples of the simple machine called a _____.

What type of advantage (force or speed) does this simple machine offer? _____

Station 10—Name of Object _____

Name of the Simple Machine _____

Sketch of this Object



Label where the load force and effort force are applied and label the fulcrum.

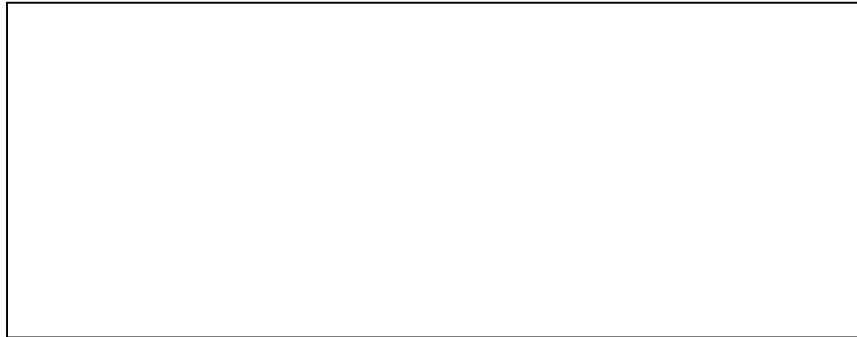
The lever here is a _____ class lever.

The machine offers a (*force/speed*) _____ advantage.

Station 11—Name of Object _____

Name(s) of the Simple Machine(s) _____

Sketch of this
Object

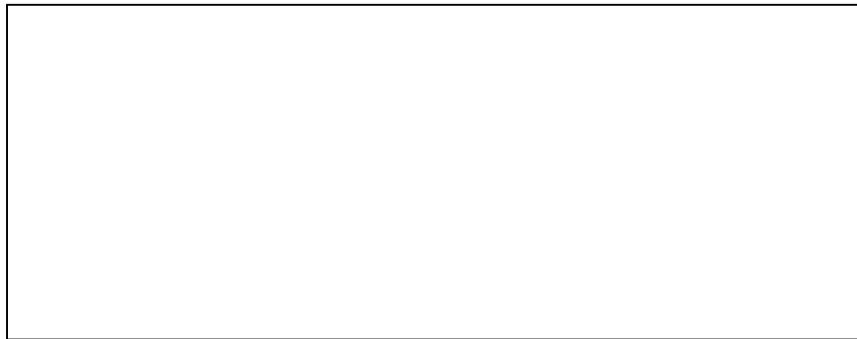


What is this device used for? _____

Station 12—Name of Object _____

Name of the Simple Machine _____

Sketch of this
Object



When using this device, your wrist acts as the _____

The load is the ball hitting the _____.

The effort force is applied between the fulcrum and the _____.

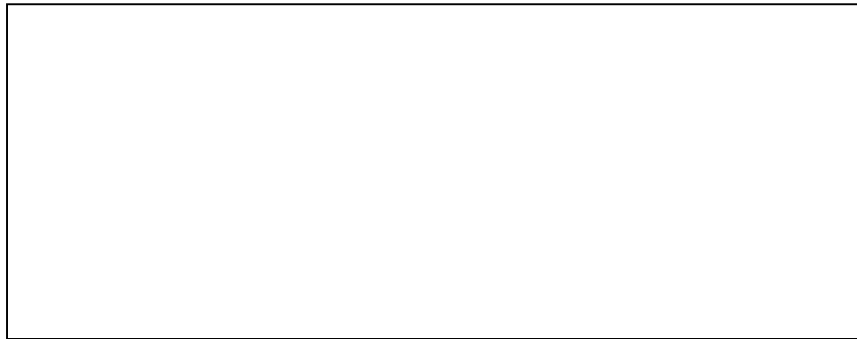
The lever here is an example of a _____ class lever.

Does this device offer a force advantage or a speed advantage? _____

Station 13—Name of Object _____

Name of the Simple Machine _____

Sketch of this Object



On your diagram, label where the **load force** and where the **effort force** is applied.

Each pulley in this system can also be called which simple machine? _____

Does this system offer a force advantage or a speed advantage? _____

What could a full sized version of this system be used for? _____

Station 14—Name of Object _____

Name of the Simple Machine _____

Sketch of this Object



When using this device, what acts as the fulcrum? _____

The load is the puck hitting the _____.

The effort force is applied between the fulcrum and the _____.

The lever here is an example of a _____ class lever.

Does this device offer a force advantage or a speed advantage? _____

Station 15—Name of Object _____

Name(s) of the Simple Machine(s) _____

Sketch of this
Object

Does this device offer a force advantage or a speed advantage? _____

Which do you think is greater, the load force or the effort force? _____

Station 16—Name of Object _____

Name of the Simple Machine(Each tooth is an example of a _____)

Sketch of this
Object

Station 17—Name of Object _____

Name of the Simple Machine _____

Sketch of this

Object

The machine offers a (*force/speed*) _____ advantage

Station 18—Name of Object _____

On the following diagram label the simple machines that are pointed to by each arrow:



Find as many other examples of simple machines as you can and label where they are on this diagram.

- Station 1-Plank
- Station 2-Axe blade
- Station 3-Meter Stick 1st class lever
- Station 4-Knob
- Station 5-Scissors
- Station 6-A screw
- Station 7-Wheelbarrow
- Station 8-Meter Stick 2nd class lever
- Station 9-Tin snips
- Station 10-Nut Cracker
- Station 11-Wine Opener
- Station 12-Racquet
- Station 13-Pulley system
- Station 14-Hockey Stick
- Station 15-Hand Drill
- Station 16-Saw blade
- Station 17-Screwdriver
- Station 18-Bicycle