Simple Machines Online Lab **Name: _____ Block: _____**

Log on to this website: http://www.cosi.org/downloads/activities/simplemachines/sm1.html OR type **COSI simple machines** into google and it is the first option. Follow the directions and answer the questions for each part of the simulation. There are three parts total. You can navigate through the different parts by the bottom section of the simulation. For any calculations, use GUTS!

Part I: The Essence of Simple Machines

1. What is a simple machine?

2. Find the amount of work when a box moves 3.7 meters with a force of 12 N?

G U T S

3. List the six simple machines in their two categories:

Lever Family Wedge Family

4. What is the disadvantage of a block and tackle system?

5. What is the equation for efficiency?

Efficiency = _____

Click on the **incline plane** and complete the following questions:

1. Draw an example of a REAL LIFE incline plane. What is the name of your incline plane?

2. What is the mechanical advantage equation for an inclined plane? Put this equation in a triangle.

Mechanical Advantage = _____ Triangle:

3. What is the mechanical advantage of an incline plane if the height of the incline plane is 5 meters and the slope is 20 meters long?

G U T S

Click on the **lever** and complete the following questions:

1. Draw an example of a REAL LIFE lever. What is the name of your lever?

2. What is the mechanical advantage equation for a lever (use either one)? Put this equation in a triangle.

   Mechanical Advantage = _____ Triangle:

3. What is the resistance force of a lever, is the mechanical advantage is 3 and the effort force is 15 N?

G U T S

4. What does a first class lever always change?

5. Draw one example of a second class lever and label their fulcrum. This cannot be the example you did for questions #1.

6. How does a decrease in force occur in a third class lever?

Click on the **screw** and complete the following questions:

1. Draw an example of a REAL LIFE screw (you CANNOT draw a hardware screw). What is the name of your screw?

2. What is the mechanical advantage equation for a screw. Put it in a triangle.

   Mechanical Advantage = _____ Triangle:

3. A screw usually does not work by itself. Name the other simple machines that are used to move a screw.

Click on the **wheel and axle** and complete the following questions:

1. Draw an example of a REAL LIFE wheel and axle. What is the name of your wheel and axle (or where complex machine did it come from)?

2. What is the mechanical advantage equation for a wheel and axle (hint: a ratio is a division problem)? Put this equation in a triangle.

   Mechanical Advantage = _____ Triangle:

3. Jerry is using a wheel and axle in his rube goldberg project. He measures the radius of the axle to be 4 cm and the radius of the wheel to be 50 cm. What is Jerry's mechanical advantage?

G U T S

Click on the **wedge** and complete the following questions:

1. Draw an example of a REAL LIFE wedge. What is the name of your wedge?

2. What is the mechanical advantage equation for a wedge. Put it into a triangle.

   Mechanical Advantage = _____ Triangle:

3. Natasha has an axe that is 6 inches in thickness. Her brother comes along and hands her an axe that is 3 inches thick. Which axe should Natasha use to split a log? Explain WHY.

Click on the **pulley** and complete the following questions:

1. Draw an example of a REAL LIFE pulley (you CANNOT draw a hardware pulley). What is the name of your pulley?

2. What is another name for a pulley system?

3. The mechanical advantage of a pulley system is equal to _____.

Part II: Find the Simple Machine

Read through the directions on the screen. There are six thumbnails total (start with the thumbnail that shows the bottom of the lawnmower). For each thumbnail, identify the simple machine. Put your answers below.

Thumbnail #1:

Thumbnail #2:

Thumbnail #3:

Thumbnail #4:

Thumbnail #5:

Thumbnail #6:

Part III: Putting Simple Machines to Work

Follow along with the animation and fill in the questions below (they are the same questions that are on the animation).

1. How much effort (in pounds) is required to lift the tools?

2. What is the mechanical advantage of the wheelbarrow?

3. If the ramp is 10 feet long and the wall is 2 feet high, what is the mechanical advantage?

4. Look at the diagram of how your arm and the hammer form a lever. Can you tell what class of lever you've formed?

5. If the mechanical advantage of the block and tackle is 4, and the floor of the tree house weighs 200 pounds, what force will we need to lift the floor?

6. Look at the screws in the illustration. Whic one will require the least amount of effort to use?

7. If each wall weighs 50 pounds and needs to be lifted 20 feet, how much **work** do we save by using our block and tackle?