Guided Lesson Notes

Name:_____ **Date:**_____

Simple Machines

Directions: Complete this study guide as you move through the lesson. By taking notes, you are more likely to remember what you are learning. The completed study guide can be used for practice activities and to prepare for quizzes and exams. Be sure to save each study guide so you can access it when you need it.

Essential Vocabulary

As you encounter these scientific terms in the lesson, enter the meaning and an example (or two) for each. You can even draw a picture. If there are other unfamiliar words you find, enter them in the blank spaces provided.

efficiency	*wheel and axle*
pulley	*inclined plane*
simple machine	*compound machine*

screw	*level*
mechanical advantage	*wedge*
classes of lever	*work output*
work input	

Machine

1. Fill in the blanks about machines.

A _____ _____ is any device that only requires the application of a _____ _____. They help you do _____ by transferring _____ from one _____, making it _____. A _____ puts the _____ where you want it to go and where it gives you the greatest _____. The main purpose of a machine is to _____ the _____ or _____ of the _____ force.

2. List the six basic simple machines here.

The Six Simple Machines

For each of the six simple machines, write a description of the machine and give at least one example.

Simple Machine	Description	Example
Lever		
Inclined Plane		

Wheel and Axle		
Wedge		
Pulley		
Screw		

Classes of Levers

Sketch a 1st 2nd, and 3rd class lever and give an example for each.

1st Class	2nd Class	3rd Class
Example:	**Example:**	**Example:**

Mechanical Advantage and Efficiency

3. **Define mechanical advantage in words.**

4. **The formula for mechanical advantage is** $MA = \frac{F_{out}}{F_{in}}$

Define F_{out} :
Define F_{in} :

5. **Define efficiency in words.**

6. **The formula for efficiency is** $eff = \frac{W_{out}}{W_{in}}$

Define W_{out} :
Define W_{in} :

7. Fill in the blank below about efficiency.

The efficiency is always _____ 100%.

Mechanical Advantage Practice

Match the situation to its corresponding mechanical advantage.

Situation	Mechanical Advantage
An input force of 60 N lifts a load of 120 N	M.A. = 5
An input force of 17 N lifts a load of 120 N	M.A. = 2
An input force of 20 N lifts a load of 120 N	M.A. = 7
An input force of 24 N lifts a load of 120 N	M.A> = 6

Machines and Work

1. Identify an example of a machine that changes the direction of a force.

2. **What physical quantity is measured to determine mechanical advantage?**

3. **Why does every machine in the real world have an efficiency less than 100%?**

4. **What would the efficiency be for an ideal machine, one that doesn't lose anything to friction or heat?**

Bringing It All Together

Complete the table on the next page with each quantity and its supporting work for the problem given.

A pulley system is used to lift a 2,000 N grand piano 3 meters. The mover applies 300 N of force in the process.

(continue on next page)

	Mechanical Advantage	Work Output	Work Input	Efficiency
Work				
Solutions				