**Work, Power & Machines** Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. **WORK**:
   1. Define *work*:

* 1. Work can also be defined as a transfer of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

* 1. In order for work to be done, force and displacement must be in the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ direction.

* 1. Give one example in which work is done:

* 1. Give one example in which work is not done:

* 1. For the following 3 scenarios, explain why work *is* or *is not* done:
     + A woman preparing for a trip lifts her suitcase from the floor to the bed so that she may pack more easily.

* + - A man spends 5 minutes thinking about the most efficient way to decorate his roof with Christmas lights.

* + - A student carries his book bag down the hallway.

* 1. Identify which of the pairs in each scenario illustrates *more* work being done:

\_\_\_\_\_ A boy helps a teacher by lifting a 200-N box of books 1.5 meters from the floor to the desktop.

\_\_\_\_\_ The same boy lifts a 500-N box of books the same height. *Explain your choice:*

\_\_\_\_\_ A girl throws a 1-kg softball with a force of 50 Newtons a distance of 25 meters.

\_\_\_\_\_ The same girl throws the softball with the same force a distance of 17 meters. *Explain your choice:*

* 1. The formula for calculating work is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, and the unit for work is the \_\_\_\_\_\_\_\_\_\_\_\_\_\_.

1. **POWER:**
   1. Define *power*:

* 1. How are power and work related?

* 1. Identify which of the pairs in each scenario illustrates *less* power being generated:

\_\_\_\_\_ A woman pushes a cart with 95 N of force 3 m in 10 seconds.

\_\_\_\_\_ A man pushes a cart with 95 N of force 3 m in 13 seconds. *Explain your choice:*

\_\_\_\_\_ A 340-N student climbs the stairs in 14 seconds.

\_\_\_\_\_ A 420-N student climbs the stairs in 14 seconds. *Explain your choice:*

1. **MACHINES:**
   1. A machine is a device that \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
   2. If work input is not equal to work output for a machine, how does the Law of Conservation of Energy explain this “lost” energy?

* 1. The mechanical advantage can be calculated by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

* 1. Calculate the mechanical advantage of the following machines:
     + 1200 N of force are used to push a lever down. The lever raises a 1450-N boulder 0.4 m.

* + - A machine that places the caps on plastic soda bottles requires 25 kJ of input work. The output work of the machine is 23 kJ. (hint: there are 1000J in 1kJ)

* 1. Define *mechanical advantage*: