Name: _____

Use these two equations to help you solve the following problems

$$MA = \frac{load}{effort} \qquad Efficiency = \frac{Useful\ Work\ Output}{Work\ Input} \times 100$$

1. Ajhani uses a wheelbarrow to lift a load of bricks that weigh 400 N. The wheelbarrow requires him to use an effort of only 100 N. What is the mechanical advantage of the wheel barrow?

   MA = _____

2. A system of pulleys allow Richardson to lift a 2200 N engine.
   a. If Richardson exerts a force of 400 N on the pulley system, what is the mechanical advantage of it?

      Load = _____ Effort: _____

      MA = _____

   b. What is the mechanical advantage of the pulley system if Richardson must exert 800 N of force to lift the engine?

      Load = _____ Effort: _____

      MA = _____

3. Shari, Aiden and Sharkib are having a contest to see who can build the best simple machine. After construction was complete, they measured the input and output forces, as well as the input and output work. Below is a table of their results. Calculate the mechanical advantage and efficiency of each student's machine. (Effort is the input force and load is the output force).

	Force (N)		Work (J)		Mechanical Advantage	Efficiency
	Input	Output	Input	Output		
Shari	4	8	4	3		
Aiden	15	60	12	6		
Sharkib	25	100	10	9		

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4. A machine lifts a load of 30 kg up a distance of 5 m using an effort of 200 N through a distance of 12 m.

   a. Calculate the weight of a load of mass 30 kg. Gravity = 10 N kg^{-1}

   Weight = _____

   b. Calculate the work output

   Work Output = _____

   c. Calculate the work input

   Work Input = _____

   d. Calculate the efficiency of the machine

   Efficiency = _____%

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