Simple Machines Practice Test

1. Which of the following is NOT one of the 6 basic types of simple machines?
    a. Gears
    b. Pulleys
    c. Lever
    d. Wheel and Axle

2. Fill in the blanks on the following statement:
    Machines can multiply _____, but according to Conservation of Energy, they cannot ever multiply _____.

3. A 100 Newton force applied to a grouping of pulleys lifts a 400N object. What is the actual mechanical advantage of this grouping of pulleys?

4. A certain ramp has an actual mechanical advantage of 3. A 200N effort force is required to push a certain box up the ramp. What is the weight of the box?

5. Calculate the AMA of the lever in the given diagram.
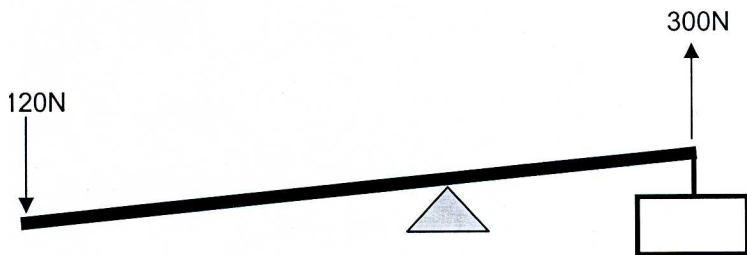
6. Fill in the blank in the following statement:
    Anytime a machine is used and force is gained, _____ is sacrificed.

7. An ideal lever is used to lift a 500N object a distance of 40cm above its initial position. A 350N effort force is required to accomplish this.
        A. Calculate the work output by the lever.

        B. Calculate the effort distance, through which 350N effort force was exerted.

8. An effort force of 8 Newtons is applied to an ideal pulley system to lift up a 1.5 Newton object. If the effort force is exerted through a distance of 6 meters, calculate the distance that the object is raised about its initial position.

9. Label the following levers: 1st, 2nd, 3rd for the class that is represents
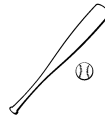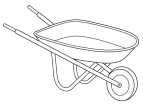
10. Brooke applied a force of 50 N for 10 m to lift a 40 N weight 10 m high. How efficient is the pulley?

11. Jacob pushes a class 1 lever so that the end he pushes down on is .5 m from the fulcrum. The object he is trying to lift is .1 m from the fulcrum. What is the IMA of the lever as he has it set up?

12. Fill in this blank: _____ is a flat surface, a sloped surface, or a ramp.

13. Which of the following is true about a single, fixed pulley?
    1.   It has a mechanical advantage less than 1
    2.   *It has a mechanical advantage equal to 1*
    3.   It has a mechanical advantage greater than 1
    4.   It has no friction.

14. Which of the following would most likely make a machine more efficient?
    1.   Increasing the Mechanical Advantage
    2.   Increasing the effort distance by decreasing the effort force
    3.   Increasing the effort force by decreasing the effort distance
    4.   *Decreasing the friction by using wheels or lubricant*

15. If a simple machine has an efficiency of 80% and you input 400J of work, how much work will the machine output?

Extra challenge question #1:
A woman uses a lever to pry a rock from her yard. She exerts a 200N force through a distance of 50cm, and the lever outputs a force of 500N through 10cm. Is the lever an example of an ideal machine? How do you know, using calculations in your explanation?

Extra challenge question #2:
A 250N effort force is exerted on an ideal machine with an actual mechanical advantage of 4. If the effort distance is 3 meters, calculate the resistance distance. (hint: you'll have trouble solving this in one step. But think about what measurement you could solve for in one step, and if that measurement would help answer the question.)