Levers Practice Problems Activity Sheet for Students 1.4

Student Name: _____

Levers, Work and Mechanical Advantage *(ICP.3.2, 4.4)*

Formulas

$F = ma$ $\quad m_1 l_1 = m_2 l_2$ $\quad W = F \times d$ $\quad MA_{lever} = \frac{F_{output}}{F_{input}}$ $\quad MA_{lever} = \frac{L_{input}}{L_{output}}$

1. A is 36 inch lever with a fulcrum in the middle is sitting on a table. If a 60 g hex nut sits three inches from the fulcrum, where must a 25 g hex nut be placed to balance the lever?

2. What mass of a single hex nut must be placed at the end of the lever in problem 1 to make the 60 g hex nut balance?

3. How much work is done when a 5N force is used to move a lever 3 meters to raise an 8kg mass?

4. How much force does Purdue Pete exert doing 4,000 $N \cdot m$ of work moving a gigantic drum 20 meters?

5. How high does Purdue Pete lift his sledge hammer if he uses a force of 25 Newton to lift the hammer while doing 50 Joules of work?

6. A machine uses an input force of 200 N to produce an output force of 800 N. What is the mechanical advantage of this machine?

7. A machine is designed to lift an object with a weight of 12 N. If the input force for the machine is set at 4 N, what is the mechanical advantage of the machine?

8. A lever used to lift a heavy box has an input arm of 4 meters and an output arm of 0.8 meters. What is the mechanical advantage of the lever?

9. What is the mechanical advantage of a lever that has an input arm of 3 meters and an output arm of 2 meters?

10. You lift a 45 N bag of mulch 1.2 m and carry it a distance of 10 m to the garden. How much work was done?