Grade 8 Science – **Mechanical Advantage of Simple Machines – 2**

Name: _____

We have already calculated Mechanical Advantage using the distances from the Effort and Load to the Fulcrum, but we can also use the Forces involved. In this case too MA is calculated by getting the ratio but the mechanical advantage is opposite – with forces, it is the load force divided by the effort force.

$$MA = \frac{\text{Load force}}{\text{Effort force}} \quad \text{or} \quad \frac{\text{Output Force}}{\text{Input Force}}$$

So, if you were to exert a force of 12 N on a Lever and it resulted in a Load force of 60 N, the mechanical advantage of the lever would be 60 N ÷ 12 N or 5.

$$MA = \frac{\text{Load force}}{\text{Effort force}}$$

$$MA = \frac{60\ N}{12\ N}$$

$$MA = 5$$

The mechanical advantage would be 5.

Now try these – use all steps.

1. You are a passenger in a truck that gets stuck in mud. You and the driver use a tree branch as a lever to lift up the truck. You apply an effort force of 600 N to the branch. The back of the truck weighs 2400 N. What is the mechanical advantage of the branch-lever?

2. Suppose that you are riding a bicycle. You exert an effort force of 93N downward as you push on the pedals. The resulting load force that causes the bicycle to move forward is 837N. What is the mechanical advantage of the bicycle?

3. A balance scale is used to measure the weight of things. In order to not bring heavy weights, a merchant uses a scale with a mechanical advantage of 5. How much would a 1000g item be balanced by on the other side of the scale?

4. A lever is used to raise a bucket that weighs 60 N. How much effort is required if the mechanical advantage is 1?