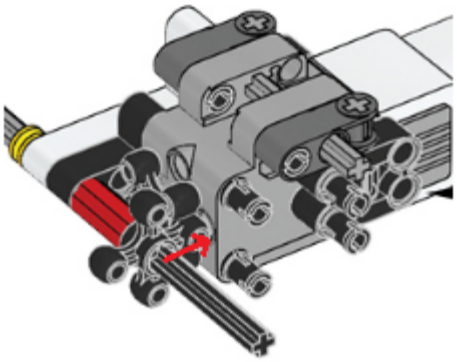
Special Note	
 Effort arm = 1.0 cm	The effort arm for this lever is very small. Since the motor is turning a gear, it is the radius of the gear we need to measure. It happens to be exactly 1.0 cm. This means the lever is set up to lift things farther, but becomes much weaker than the effort going in. The MA then will be much less than 1.

Record				
Holes Away from Red Pin	**Effort Arm Length (cm)**	**Length of Load Arm (cm)**	**Mechanical Advntage (Ideal)**	**Min. Power Needed to Lift Cuboid (%)**
4	1.0	10.0	0.100	4
8	1.0	13.5	0.074	12
9	1.0	14.0	0.071	55
10	1.0	15.0	0.067	70

Questions	
Question 1 Science	*Circle the correct Answer.* Long load arms have a low/high mechanical advantage (compared to shorter ones).
Question 2 Science	*Circle the correct Answer.* As the mechanical advantage goes down, you need more/less power to lift up the cuboid.

Phone: 905.604.8445
Email: info@logicsacademy.com
Website: www.logicsacademy.com

Question 3 Science	*Fill in the blank.* If the MA is less than _____ the lever is making you weaker. If it is greater than _____ it is making you stronger.
Question 4 Science	The power needed showed us how much force was actually needed to lift the load. This shows us the pattern for the ACTUAL mechanical advantage (which compares forces not distances). It followed the same pattern as the ideal but changed more drastically. What is one possible reason for this?
A lot of force went into the bending of the lever, and friction in the gears.	
Question 5 Science	If a longer load arm, takes greater effort, what is the benefit?
The load moves a lot farther, for your input distance.	

Extension Coding and Science	Create a paper catapult! A Catapult is an example of a lever that is designed to move things large distances very quickly. Use two axels to cradle your paper. Your task is to optimise the exact load arm needed to launch the paper the farthest. A shorter load arm will put less strain on the motor, but a longer one will make your paper move faster. RECORD the exact length of your load arm that gave the best results. Try it with a heavier projectile (something soft) and see if the lever needs to change. Load arm paper _____ cm Load arm heavy _____ cm