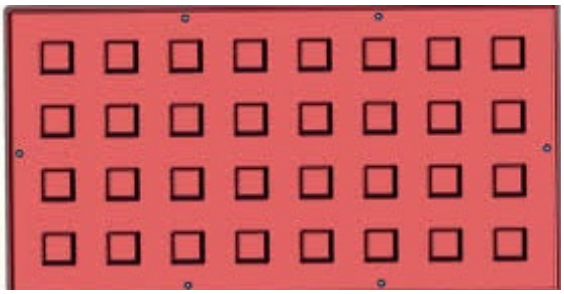
Foundation Grabber

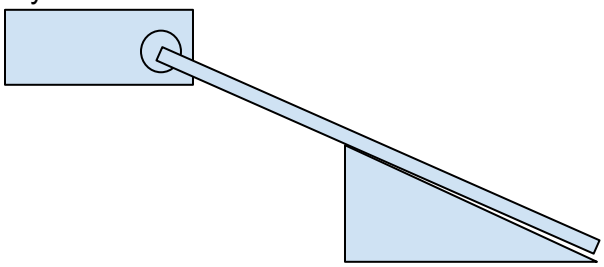
After reviewing the game rules, we found that moving the foundation granted a good amount of points. We knew that we wanted to have a robot with the ability to grab and drag it.



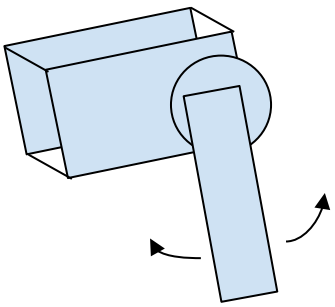
While looking at the foundation we noticed multiple things:

1. The foundation had a lot of friction and there was a fair amount of force required to drag it.
2. Depending on where it was dragged from, the foundation rotated slightly.
3. There is a lip at the edge of the foundation that sticks up a tiny bit.

From this information, we began to brainstorm designs for a mechanism that would drag the foundation when necessary but would also retract when not in use. This resulted in this design:

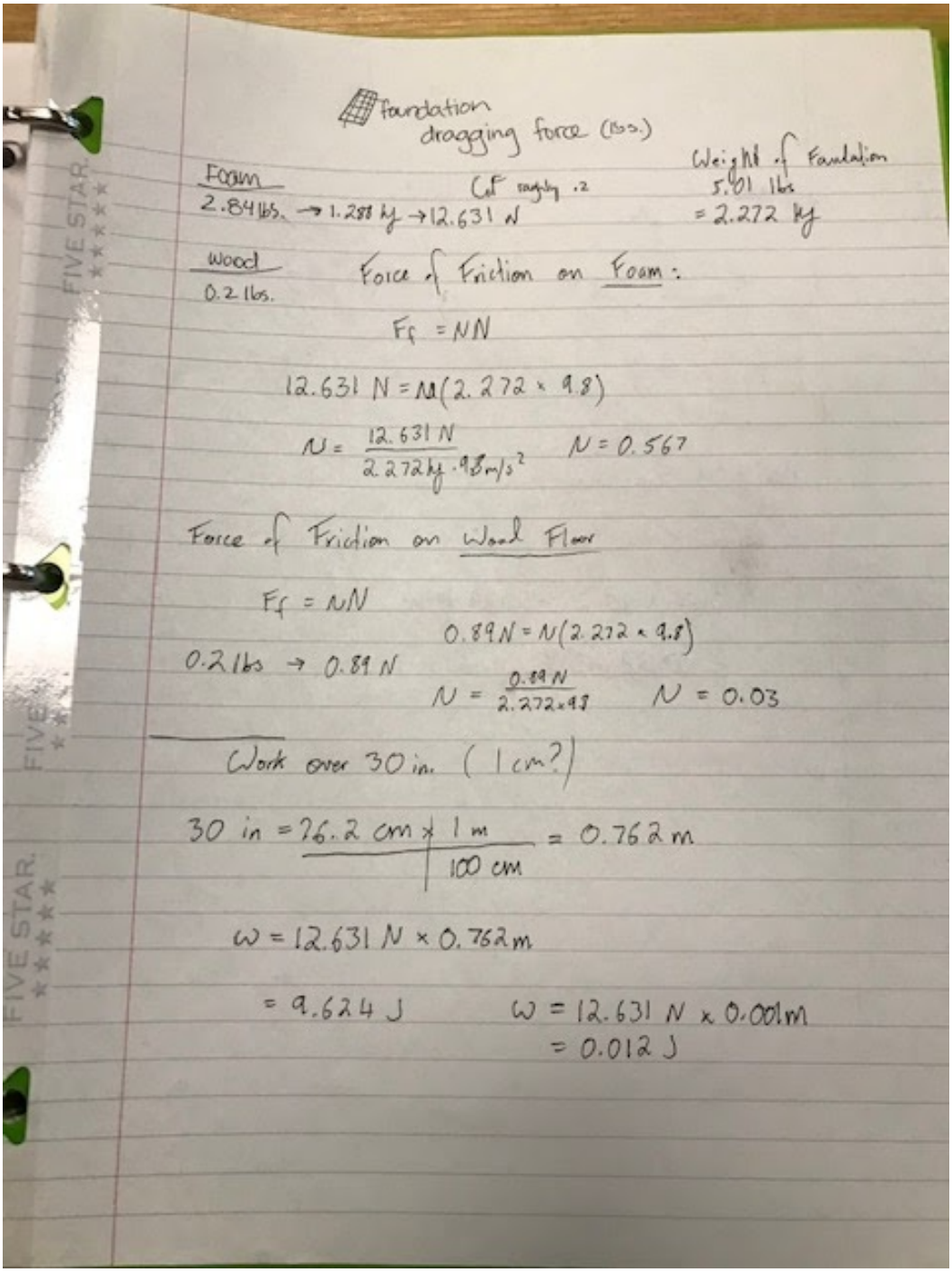


The idea was that it would drop down onto the lip in order to get a sizeable grip on the foundation. The problem with this design, though, was that it would require custom parts (the wedge) and that the force would push in the same direction as the motor. If this design were to hypothetically pull on the lip, the motor would be able to lift up and maybe even go over while attempting to drag. Our solution was to create a grabber that retracted but also stayed stiff on force.



Physics Analysis:

Because of the amount of friction on the foundation, there is a sizeable amount of force acting on the servo and the servo mounts (Fig. 1)



Through analysis and a force reading on the foundation, the amount of force acting required to pull foundation on the foam tiles of the arena floor is 12.631 N, or 2.84 lbs. Through Newton's 3rd law of motion, this logically follows that this force is applied back on the servo (every action has an equal and opposite reaction). The coefficient of friction is equal to Ff/mg, where Ff is the

force of friction, m is the mass, and g is the force due to gravity. In this case, on the foam, the coefficient of friction is equal to 0.3.