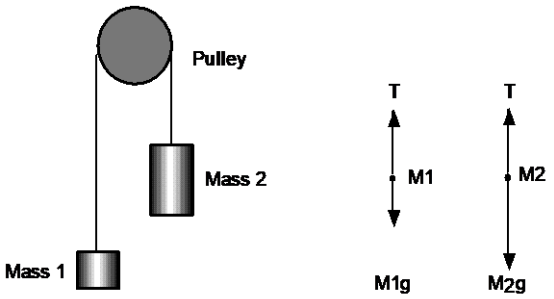
AP Physics 1- Atwood Machine (optional)

As you have learned, an Atwood machine consists of two hanging masses connected over a pulley that, when released, accelerates until it stopped. The objects in the system have the same acceleration. At this point, we are going to assume the pulley is frictionless and massless, and, thus, has no impact on the acceleration of the two blocks.



Question: How can you use an Atwood machine to investigate the net force of a system, individual forces of objects within the system, and the acceleration of the system?

Evidence: You will be collecting evidence to study the effects of the net force on a system. You will need to set-up an Atwood machine and obtain a set of masses. You will also need to devise an experimental method to find the acceleration of the system. You will need to collect evidence for the two parts to this lab and make two claims based on that evidence.

<u>Part 1: Same total mass, different net force</u>

- Add up the mass, including the hanger (if used), for each of the two hanging mass sets in your system. This is your total mass for all of part 1.
- Draw free body diagrams for each of the two objects in your system.
- Write the summation equations for the two hanging masses. Also sum the forces for the system.
- Release the masses from rest, and experimentally determine the acceleration of the system.
- Move masses from one hanging set to the other to change the force on the system.
- Repeat for five different mass combinations but keeping the total mass of the system constant.
- Graph the force vs. acceleration and using a best-fit line, determine the significance of the slope.

Claim:

<u>Part 2: Different total mass, same net force,</u>

- Set up the apparatus with different numbers of masses on each side.
- Find the total mass in the system.
- As always, draw free body diagrams and sum the forces.
- Determine the net force on the system based on your initial mass combinations.
- Release the masses from rest, and experimentally determine the acceleration of the system.
- Change the mass on each hanging set to maintain the same net force as before.
- Repeat for five different mass combinations but keeping the net force on the system constant.
- Graph the acceleration vs. mass for your five combinations.

Claim: