FLINN SCIENTIFIC

Name____

Data Table

Distance between start line and finish line: ______________

Mass of Hall's carriage: ______________

Additional mass added to Hall's carriage: ______________

Inclined Plane Angle	Height of Start Line	Height of Finish Line	Mass Needed to Raise the Hall's Carriage

Results Table

Weight of Hall's carriage plus any additional mass: ______________

Inclined Plane Angle	Force Needed to Raise the Hall's Carriage	Ideal Mechanical Advantage	Actual Mechanical Advantage	Energy Required	Ideal Energy Required

Post-Lab Questions *(Use a separate sheet of paper to answer the following questions.)*

1. For each inclined plane angle, determine the force necessary to raise the Hall's carriage. Multiply the *Mass Needed to Raise Hall's Carriage* (in kilograms) by the acceleration due to gravity constant, 9.81 m/s^2. The resulting force will have units called newtons (*N*). Enter these calculations, as well as the units, in the results table.

   Also, multiply the mass of the Hall's carriage plus additional mass (in kilograms) by the acceleration due to gravity constant to determine the weight of the carriage. Record this in the results table.

2. Use Equation 2 to calculate the ideal mechanical advantage for each experimental angle of the inclined plane. Record this information in the results table.

3. Use Equation 1 to calculate the actual mechanical advantage for each experimental angle. Record this information in the results table.

4. Calculate the amount of energy that was needed to raise the carriage for each inclined plane angle. To do this, multiply the force needed to raise the carriage at a specific angle by how far the carriage traveled along the inclined plane (in meters). The resulting energy will have units called joules (*J*). Record these calculations, including units, in the results table.

5. Calculate the “ideal” energy required to raise the carriage from the start line height to the finish line height by multiplying the weight of the Hall’s carriage by total height the carriage was raised. Record this in the results table.
6. What angle of the inclined plane made raising the Hall’s carriage the easiest?
7. How does the mechanical advantage compare to the ease of raising the Hall’s carriage?
8. What is an advantage of an inclined plane?
9. What is a disadvantage of an inclined plane?
10. Explain why the energy required in each case is similar to the “ideal” energy even though the needed force was less than the weight of the carriage. If any “extra” energy was needed to raise the carriage up the inclined plane, compared to the ideal case, why was it needed?
11. Based on the results of this lab, what would be the best position of a ramp used to raise a 500-lb motorcycle into the back of a truck in the easiest possible way?