Students's ID Number:

Student's Name:

Deparment:

2. ATWOOD MACHINE

Purpose of Experiment: One-Dimensional Motion and Investigation of Newton's laws

Theoretical Background

The Atwood Machine consists of frictionless rotating pulley of negligible mass and two masses suspend by a rope of negligible mass.When one of the suspended masses is accelerated,magnitude of the acceleration of both masses will be same.

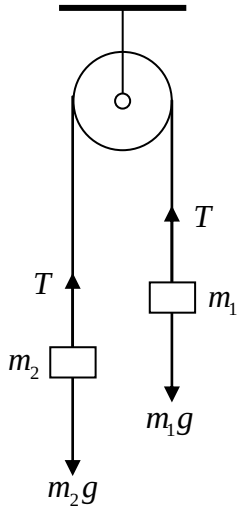

Figure-1

In the case of $m_1 > m_2$, Newton's laws of motion will be;

$$m_1 g - T = m_1 a$$
$$T - m_2 g = m_2 a$$

By adding two equations side by side,we get;

$$a = \frac{m_1 - m_2}{m_1 + m_2} g$$

If system starts from the rest, its initial velocity is zero,so the distance that object will take can be calculated with the help of following equation;

$$y = \frac{1}{2} a t^2$$

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Experiment: Atwood Machine

Experiment Procedure

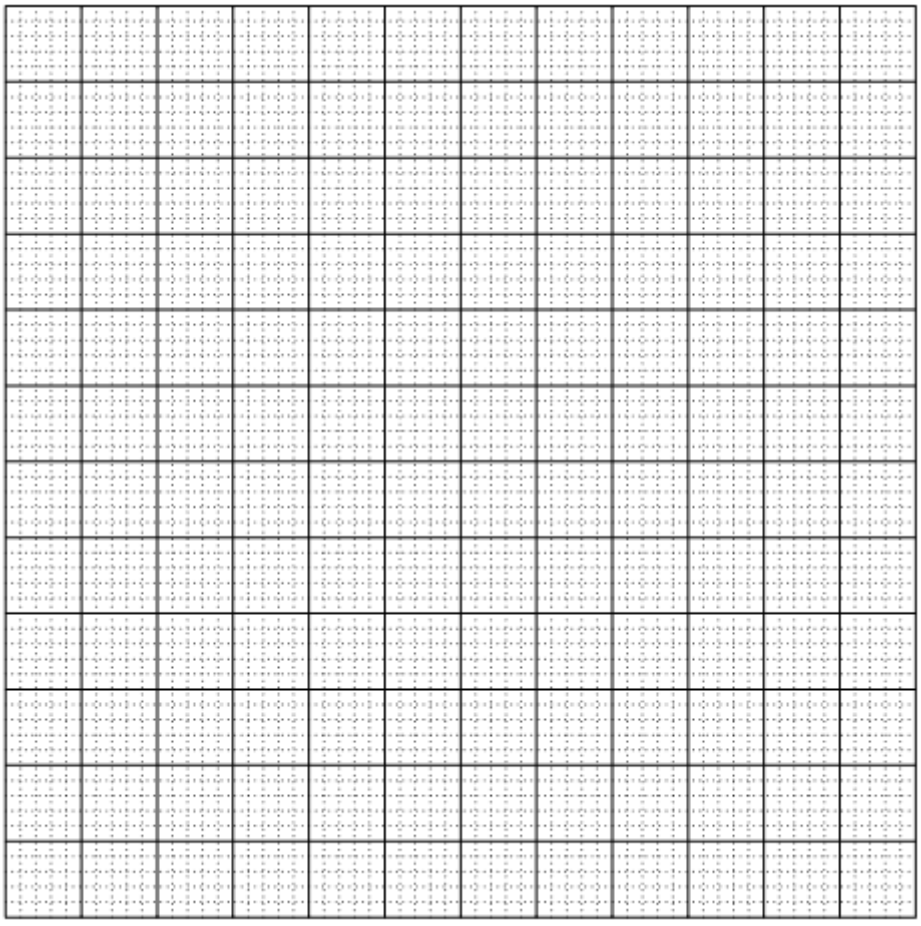
- Set up the mechanism shown in Figure-2.Write the values of m_1, m_2 masses that you used in their places in the table.
- Measure the time twice it takes to take y=30,50,65,80(cm) the distance and calculate the avarage of each.
- Calculate the squares of these average times Draw a position-time graph using average times and distances.The slope of the line obtained from $y - t^2$ graph will be:

$$\frac{\Delta y}{\Delta(t^2)} = \frac{1}{2}a$$

- Find the experimental value of acceleration (a) from the graph.
- Find the theoretical value of *(a)* from $a = g\frac{m_2 - m_1}{m_1 + m_2}$ and compare it with the experimental value.

y (cm)	t_1 (s)	t_2 (s)	$t_{ort.}$ (s)	t^2 (s^2)
30				
65				
80				

m_1 (gr)	
m_2 (gr)	
Experimental a (cm/s^2)	
Theoretical a (cm/s^2)	



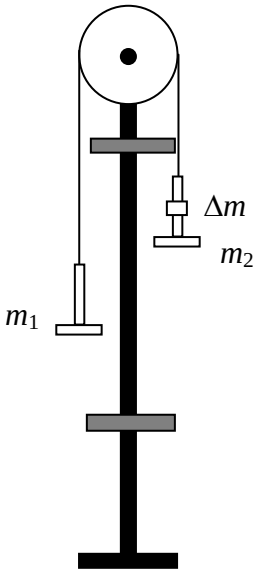


Figure-2