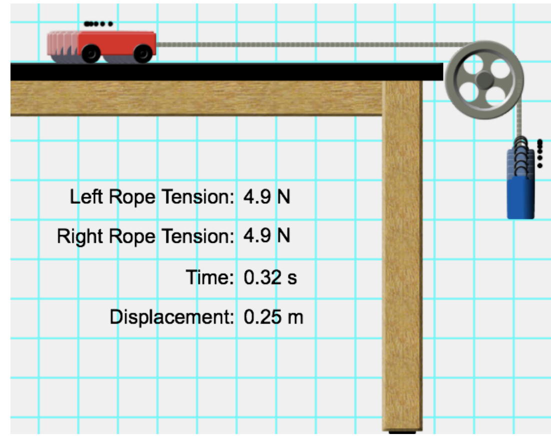
Newton's 2nd Law Atwood Lab
Physics

Name ________________________________
1 2 3 4 5 6 7 8

In this lab, you will use video motion analysis to determine the relationships between force, mass, and acceleration.



Before you begin, solve the following equation for acceleration (a):

$$d = \frac{1}{2}at^2$$

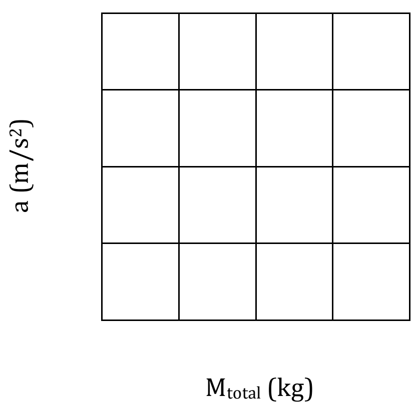
a =

PART I - Constant Hanging Weight, Changing Total Mass

1. Use the videos at www.simbucket.com -> Videos -> "Horizontal Atwood Lab" to fill out the table below:

M_{car} (kg)	$M_{hanging}$ (kg)	M_{total} (kg)	d (m)	t (s)	a ($\frac{m}{s^2}$)
0.25	0.25	0.50			
0.75	0.25	1.00			
1.25	0.25	1.50			

2. Create a graph of acceleration (a) vs total mass (M_{total}) below:



3. Are acceleration and total mass **directly** or **inversely** proportional? ____________________

4. As the total mass of the system increases, the acceleration…

[decreases / stays the same / increases].

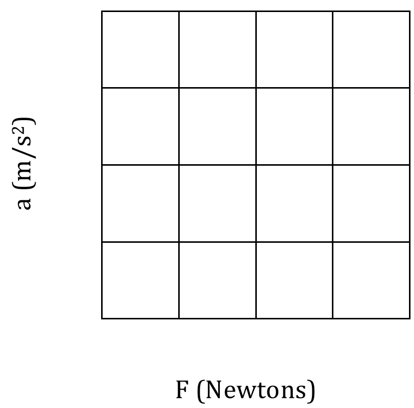
PART II - Constant Total Mass, Changing Hanging Weight

5. In Part II, use the "Changing Hanging Weight" videos to fill out the table below. In these videos, the total mass is always 1.50 kg, but more and more weight is hung on the string to increase the amount of force pulling down.

M_{car} (kg)	$M_{hanging}$ (kg)	M_{total} (kg)	Hanging Weight*** (N)	d (m)	t (s)	a ($\frac{m}{s^2}$)
1.25	0.25	1.50				
1.00	0.50	1.50				
0.75	0.75	1.50				

***The "Hanging Weight" is an applied force (F).

6. Create a graph of acceleration (a) vs force applied (F) below:



7. Are acceleration and force applied **directly** or **inversely** proportional? ____________________

8. As increasing amounts of force are applied to a system with a mass of 1.50 kg, the acceleration…

[decreases / stays the same / increases].

PART III – Creating a Law of Motion

Write an equation that combines the results of PART I and PART II into a single statement:

a =