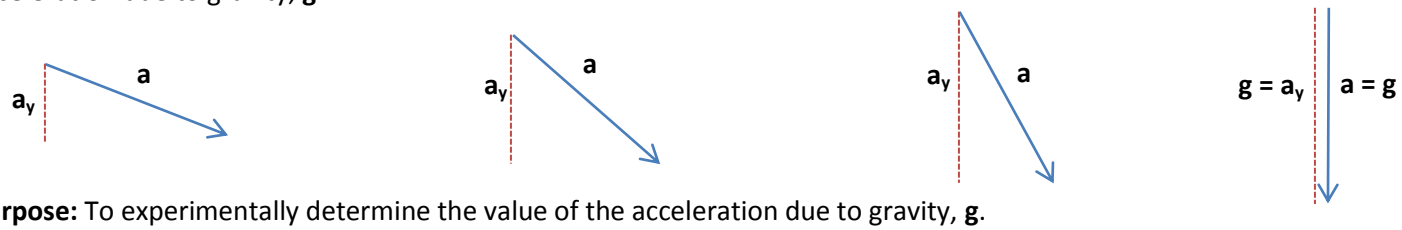
The Value of the Acceleration of Gravity Lab

Theory: Taking a look at the acceleration of a marble rolling down a ramp, we can see that as the angle of the ramp approaches 90^o the vertical component of the acceleration will approach the value of the free-fall acceleration, or the acceleration due to gravity, **g**.



Purpose: To experimentally determine the value of the acceleration due to gravity, **g**.

Equipment:

- A shelving track to use as an incline
- 5 Books used as support
- Stopwatch
- A marble
- Masking tape
- Meterstick

Set Up:

Experimental Method:

1. Set up your materials as shown in the diagram above. Measure the length of the ramp.
2. You will start your marble at the very top of your ramp. Measure the vertical height of the marble each time you change the number of books supporting your ramp.
3. Measure the time it takes the marble to travel the length of the ramp 3 times for each height.

Data:

Length of Ramp:	m

Ramp Heights Tested

	1 book	2 books	3 books	4 books	5 books
Vertical Height of Marble:	m	m	m	m	m
Time Trials					
Time 1	s	s	s	s	s
Time 2	s	s	s	s	s
Time 3	s	s	s	s	s

Analysis:

1. Perform the following calculations and show a sample calculation of each in your lab notebook:
    a. The angle of the ramp for each height tested
    b. The average time for each height tested
    c. The average acceleration (down the ramp) for each height tested
    d. The vertical component of your average accelerations
2. Draw a graph of a_y vs. sinθ. If you can, use a whole page for your graph. This will make your graph easier to read and work with.
    a. Draw a best-fit line through your data. *Remember* A best-fit line will not necessarily go through every point on your graph. If you are unsure where to draw your best-fit line, ask Ms. Carlson.
    b. Find the value of a_y when your best-fit line passes through the point where sinθ = 1. This will be your value for **g**. What is this value?