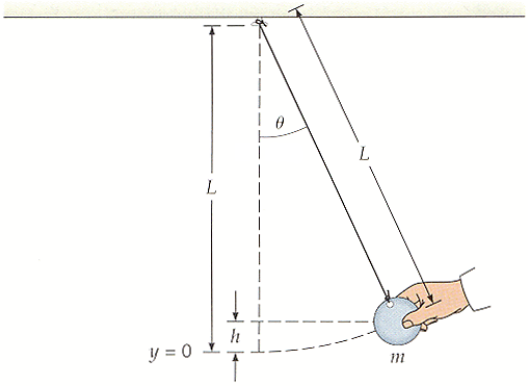
Pendulum Experiment



This is a pendulum. We will be looking at the relationship between the length of the string and how many oscillations it completes in 10 seconds. We will be looking at the graph of those results, and then take it one step further and predict the number of oscillations with a given length. Lastly, we will connect the idea of a swinging pendulum to trigonometry and more specifically, to a cosine graph.

Aim:

- To find the relationship between the length of a string, angle of the pendulum being dropped and the number of oscillations within a 10 second time period.

My Hypothesis:

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Materials:

- ruler
- tape
- protractor
- weighted object
- pencil
- timer
- string
- tape measure
- record keeping

Set it up:

- The tape measure is to measure the length of the string; this is taken out of the way when swinging the pendulum.
- The protractor is to measure the angle at which you are dropping the pendulum; I used a paper clip and a clothespin to ensure accuracy of the angle you are dropping it from.
- It is important to make sure that the pencil you are using to extend the pendulum over the edge is taped down and does not move when the pendulum is swinging.
- Have your timer and record keeping ready for use throughout this experiment!

Trial 1:

Keep standard:

- Time: 10 seconds
- Angle of Pendulum: 40°
- Change the length of string by 4 inches each time

Length of String (in)	Number of Oscillations

What does this look like in a graph?

Trial 2:

What if we …

- keep the length of the string at 12 inches
- keep the time at 10 seconds
- change the angle of the pendulum by 20° each time

Angle of the Pendulum	Number of Oscillations

What does this look like in a graph?

Trial 3:

What if we …

- keep the time at 10 seconds
- change the length of the string by 4 inches each time
- change the angle of the pendulum by 20° each time

Length of String (in)	Angle of the Pendulum	Number of Oscillations

What does this look like in a graph?

Compare these results…

1. What happens to the number of oscillations when you drop the pendulum at standard 40°, but change the length of the string?
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2. What happens to the number of oscillations when the length of the string is cm and you change the angle of the pendulum?
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3. What about these two events happening together?
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Think ahead…

- What do you think would happen if we changed the mass (weight) of the object at the end of our pendulum?
- What if we focused on the oscillations, its' displacement, etc.; what do you think that graph would look like? (use the slides to guide you, using our own numbers)
- How does this connect to trig?