Classic Circular Force Lab

<http://www.thephysicsaviary.com/Physics/Programs/Labs/ClassicCircularForceLab/index.html>

This lab will let you determine the speed needed to keep an object in circular motion. You will be able to **change the force** holding the object in a circle by **clicking on the washers** (each washer is 10 grams). You can adjust the **radius** of the circle by **clicking on the masking tape** that is just below the tube. You can also change the **mass** of the **moving object using the arrows**.   
  
**Find the velocity** of the object by **timing at least 10 revolutions**. When you are ready to start the experiment, click on the begin button.

**Part 1. Speed vs. Force**

* Independent Variable = Force (do this by using 5 different washer amounts)
* Constants = moving mass and radius

*Table 1. Force Table*

**Speed Calculation**

Speed = (2ΠR)(N)

t

N = number of Revolutions

t = time

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| --- | --- | --- |
| **# Washers** | **Mass of washers** | **Force of Weight**  **Fw= mass \* 9.8m/s2** |
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|  |  |  |
|  |  |  |

*Table 2. Speed Table*

|  |  |  |  |
| --- | --- | --- | --- |
| **Radius** | **# Revolutions** | **Time** | **Speed** |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

*Figure 1. Speed vs. Force Graph*



**Part 2. Speed vs. Mass**

* Independent Variable = Mass (choose 5 different moving masses)
* Constants = # washers (Force) and Radius

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| --- | --- | --- | --- |
| **Radius** | **# Revolutions** | **Time** | **Speed** |
|  |  |  |  |
|  |  |  |  |
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*Table 3. Mass*

|  |
| --- |
| **Mass** |
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|  |
|  |
|  |
|  |

*Table 4. Speed Table*

*Figure 2. Speed vs. Mass Graph*



**Part 3. Speed vs. Mass**

* Independent Variable = Radius (choose 5 different moving radii)
* Constants = # washers (Force) and moving mass

|  |
| --- |
| **Radius** |
|  |
|  |
|  |
|  |
|  |

*Table 5. Radius*

*Table 6. Speed*

|  |  |  |  |
| --- | --- | --- | --- |
| **Radius** | **# Revolutions** | **Time** | **Speed** |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

*Figure 3. Speed vs. Radius Graph*



**Conclusion Questions**

1. For circular motion, what is the relationship between speed and force?
2. For circular motion, what is the relationship between speed and mass?
3. For circular motion, what is the relationship between speed and radius?
4. Explain why we are using the term speed in this lab instead of velocity.
5. Is the moving mass accelerating? Explain why.