Student Name:_____
Teacher Name: Botelho
Class Name/Subject: AP Physics
Period: 5
Assignment Week #: Week 1

AP LAB 8 PART B: MASSES ON STRINGS

In this lab you will study the motion of a mass swinging on a string.

1. Lab Setup: Open this URL: https://phet.colorado.edu/sims/html/pendulum-lab/latest/pendulum-lab_en.html
    a. Select "Lab". - This simulation allows you to hang a mass on the end of a string, swing the string, and see the mass swing back and forth.
    b. Set the mass to 1.0 kg on the end of the string - you can adjust the value of the mass using the Mass slider. Click the red dot stop button to stop it swinging.
    c. Set the string length to 0.5 m - you can adjust the length with the Length slider.
    d. Check the "Period Timer" box in the lower left of the screen. This opens a timer that will measure period for you.

Lab 1: Period and Length: Find the relationship between the period of the swing and the length of the string, as follows.

a. Do 5 trials, starting with a length of 0.5 m and increasing the length by 0.1 m each trial. Don't change any other settings for these trials.
b. Move the mass to one side so the string makes an angle of 30 degrees (the simulation will show you the angle on the protractor at the top of the string), then release it for each trial.
c. Use the Period Timer to measure the period.

Lab 1 Results:

1. Record your results in a table in Excel or Google Sheets or graph paper.
2. Graph your results, and come up with an equation that relates Period (dependent variable) to Length (independent variable). Give your equation and constants on your graph.

Save your spreadsheet - you will add to it and submit it at the end of this lab.

Lab 2: Period and Mass: Find the relationship between the period of the oscillation and the mass on the string, as follows.

a. Do 5 trials, starting with a mass of 1.0 kg and increasing by 0.1 kg each trial. Keep the same length for each trial, and don't change any other settings for these trials.
b. Move the mass to one side so the string makes an angle of 30 degrees, then release it for each trial.
c. Use the Period Timer to measure the period.

Lab 2 Results:

1. Record your results in a table in Excel or Google Sheets or graph paper.

2. Describe any trend that you see:
3. As mass increases, period _____(increases or decrease or stays the same).

Save your spreadsheet - you will add to it and submit it at the end of this lab.

Lab 3: Period and Amplitude Angle: Find the relationship between the period of the oscillation and the amplitude angle, as follows.

**The amplitude angle is the angle at which you release the string to start the swing.

a. Do 5 trials, starting with a small angle and increasing the angle significantly for each trial. Keep the same length and mass for each trial, and don't change any other settings for these trials.
b. Use the Period Timer to measure the period.

Lab 3 Results:

1. Record your results in a table in Excel or Google Sheets or graph paper.
2. Describe any trend that you see:
3. As amplitude angle increases, period _____(increases or decrease or stays the same).

Save your spreadsheet - you will add to it and submit it at the end of this lab.

Lab 4: Period and Gravity: Find the relationship between the period of the oscillation and the acceleration due to gravity, as follows.

a. Do 5 trials, starting with 4.0 m/s^2 gravity and increasing it by 2 m/s^2 for each trial. Keep the same mass and length for each trial, and don't change any other settings for these trials.
b. Use the Period Timer to measure the period.

Lab 4 Results:

1. Record your results in a table in Excel or Google Sheets or graph paper.
2. Describe any trend that you see:
3. As acceleration due to gravity increases, period _____(increases or decrease or stays the same).

Save your spreadsheet - you will add to it and submit it at the end of this lab.

6. Upload Your Spreadsheet/Turn in your graph paper: You should have all parts of the lab on the same spreadsheet/graph paper (four data tables and graphs).