# Introduction to Oscillations

## Introduction to Simple Harmonic Motion

The purpose of this lab is to investigate Simple Harmonic Motion in two simple systems, a mass hanging on a spring and a simple pendulum.

# Part A: Mass on a Spring

1. Predict how the time for one oscillation (period) depends on the amplitude of the oscillation. (ie: 3 times amplitude => 3 times period, or 6 times period...)

2. Predict how the time for one period depends on the mass hanging on the spring.

### Mass constant - amplitude varied

3. Hang 100 g on the spring. Time ten oscillations for the following spring extensions. PLEASE don't overstretch the springs - they die very easily!

| **amplitude** | **10 periods** | **period** |
|---|---|---|
| 1.0 cm | | |
| 2.0 cm | | |
| 3.0 cm | | |
| 4.0 cm | | |
| 5.0 cm | | |

### Amplitude constant - mass varied

4. Now keep the amplitude constant at 2.0 cm and change the hanging mass.

| **mass** | **10 periods** | **period** |
|---|---|---|
| 50 g | | |
| 60 g | | |
| 80 g | | |
| 100 g | | |
| 120 g | | |

# Part B: Simple Pendulum

1. Predict how the time for one oscillation (period) depends on the angle of the oscillation. (ie: 3 times angle => 3 times period, or 6 times period...)

2. Predict how the time for one period depends on the length of the string

## Length constant - angle varied

3. Fix the string length to be 1.0 m. Measure the time for 10 oscillations at varying angles.

| angle | 10 periods | period |
|---|---|---|
| 5° | | |
| 10° | | |
| 15° | | |
| 30° | | |
| 45° | | |

## Angle constant - length varied

4. Now keep the angle constant at 15° and change the length of the string.

| length | 10 periods | period |
|---|---|---|
| 1.0 m | | |
| 0.75 m | | |
| 0.50 m | | |
| 0.25 m | | |

# Conclusion

Summarize your findings regarding the period of motion and the variables in the mass and spring system and the simple pendulum system.