Oscillating Spring - Simple Harmonic Motion - Data Sheet

A mass is attached to a suspended spring.  To start the oscillation, stretch and release the mass attached to the spring.

Period (T) is the time it takes the spring to move up AND down. One motion of up AND down is one oscillation

$$T_t = 2\,\pi \sqrt{\frac{m}{k}}$$

$T_t\ -\ Theoretical\,period\,of\,an\,oscillating\,spring$
$m\ -\ mass\,attached\,to\,the\,spring$
$k\ -\ spring\,constant$

$$T_e\ =\ \frac{Total\,Time}{Number\,of\,complete\,oscillations}$$

$T_e\ -\ Experimental\,period\,of\,the\,oscillating\,spring$

If you measure the period using a stopwatch, let the spring oscillate 10 - 20 times, to minimize error introduced through reaction time.  If you measure the period using a photogate or through video analysis you can let the pendulum swing only one time.

BEFORE PERFORMING THE EXPERIMENT DECIDED THE ORDER OF THE EXPERIMENT

A. If the Spring Constant k is not provided by the instructor, first perform ”Find k, the Spring Constant”, and then “Find the Period of an Oscillating Spring” and use the average k found previously.

B. If the Spring Constant k is provided by the instructor, first perform the “Find the Period of an Oscillating Spring” using the given k.  Then perform the “Find K, the Spring Constant” and find the error of the experimental k relative to the provided k.

## Find the Period of an Oscillating Spring

Spring Constant k = _____

If using a heavy spring, mass = mass attached + ⅓ mass of the spring

| Mass | Initial Stretch | Trial 1 | | | Trial 2 | | | Trial 3 | | | Experimental Period Average | Theoretical Period | % Error |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Oscilations | Time | $T_e$ | Oscillations | Time | $T_e$ | Oscillations | Time | $T_e$ | | | |
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## Find k, the Spring Constant

Attach a mass to the spring, and record the stretch. Repeat the procedure for 5 different masses

Since $F = -k*x$ and $W = m*g$

$k = m*g / x$

| Mass (m) | Stretch (x) | k = m*g / x | k (if provided) | %Error |
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| **Find average k if k is not provided. Used this k when finding the period.** | | | | |