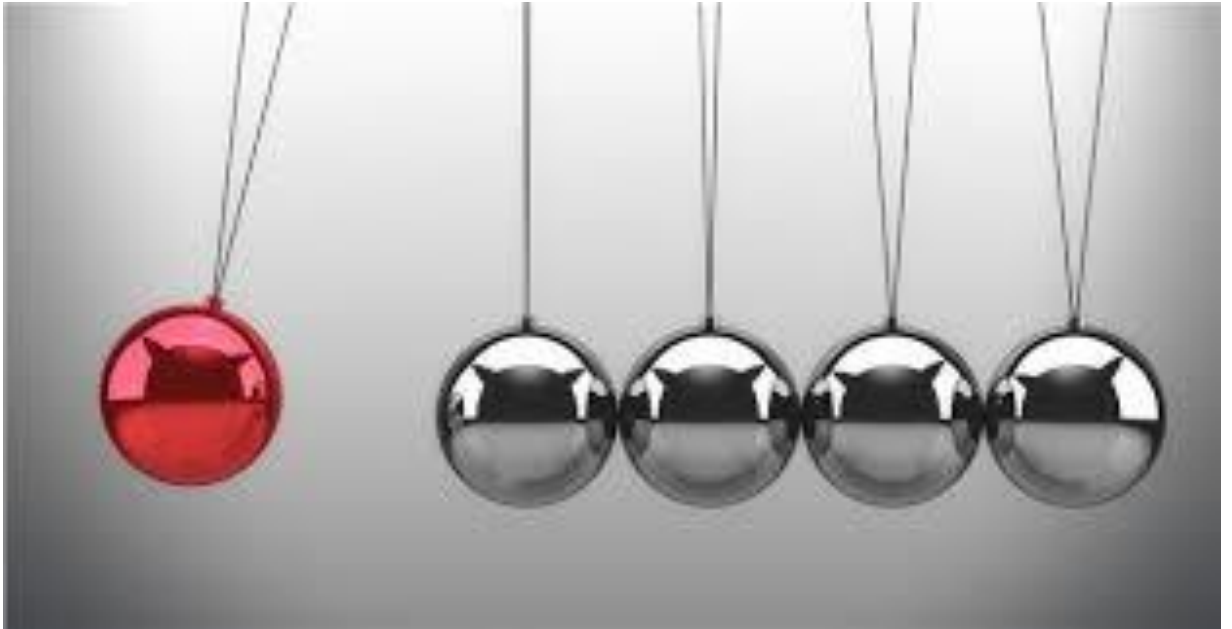




SIMPLE PENDULUM



JANUARY 1, 2020

كلية العلوم جامعة الزقازيق
قسم الفيزياء

SIMPLE PENDULUM MOTION

Aim :

Determination of the acceleration of gravity using a simple pendulum.

تعيين عجله الجاذبيه الارضيه باستخدام البندول البسيط .

Theory :

Simple pendulum consists of :

1- weightless string hanging from one end .

خييط مهمل الكتله معلق من احد طرفيه

2- mass attached to the string from the other end.

كتله معلقه في الخييط من الطرف الاخر

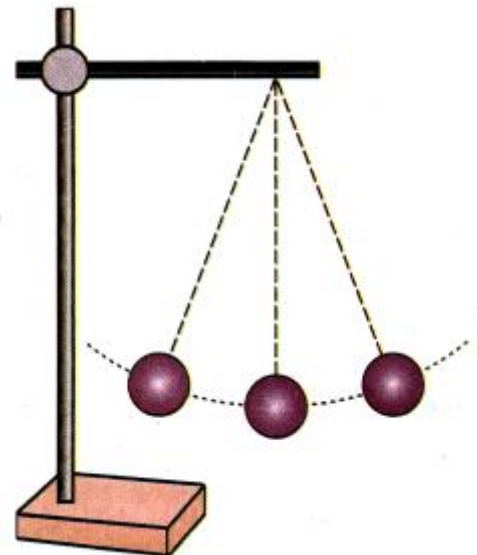


Motion of simple pendulum → Simple Harmonic motion

Simple Harmonic motion

حركه توافقيه بسيطه

The motion of a [particle](#) moving along a straight line with an [acceleration](#) whose direction is always towards a [fixed point](#) on the line and whose magnitude is proportional to the distance from the fixed point is called simple harmonic motion [SHM].

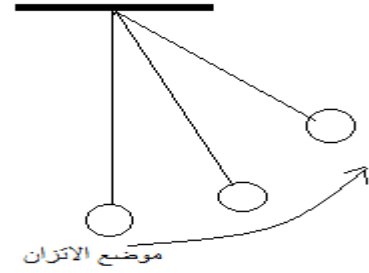


Amplitude:

سعة الاهتزاز

Maximum displacement from equilibrium position.

اقصى ازاحه يصنعها الجسم بعيداً عن موضع الاتزان

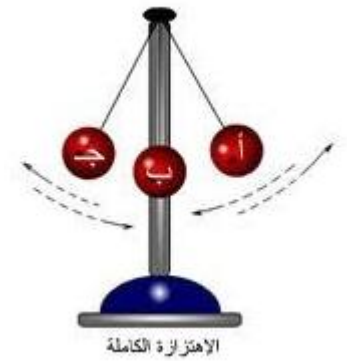


Complete oscillation :

الاهتزاز الكامل

Motion in which the body pass by a point in its path two times in the same direction.

الحركة التي يصنعها الجسم عندما يمر بنقطة ما في مسار حركته مرتين متتاليتين في نفس الاتجاه.



Periodic time T :

Time of complete oscillation

الزمن الدوري : زمن الاهتزاز الكامل

يتم حساب الزمن الدوري من العلاقة :

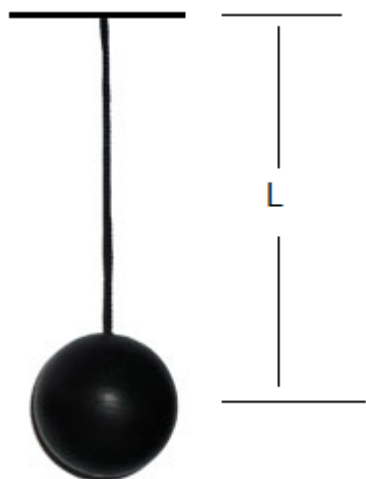
$$T = 2\pi \sqrt{\frac{l}{g}}$$

$$T^2 = 4\pi^2 \frac{L}{g}$$

بالتربيع :

ومنه يمكن حساب عجله الجاذبيه

$$g = 4\pi^2 \frac{L}{T^2} \quad (\text{cm/sec}^2)$$



Where :

$T \rightarrow$ periodic time

$L \rightarrow$ length of pendulum

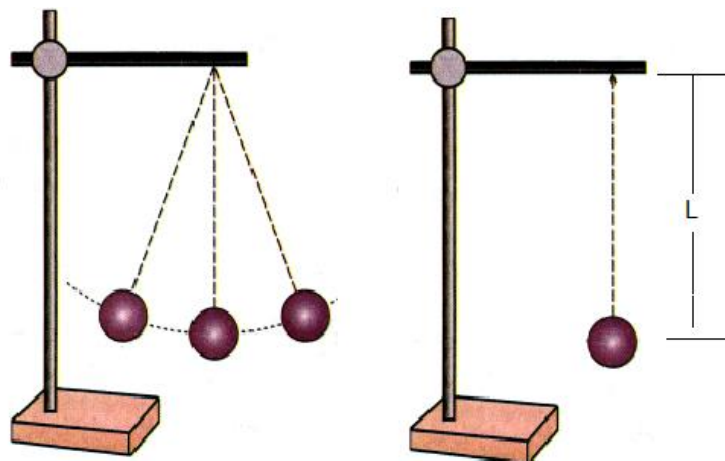
$g \rightarrow$ gravity acceleration

Apparatus :

Mass – string – holder – ruler – stop watch

Steps :

- 1- We determine the length of the pendulum using the ruler (from the hanging point to the center of the mass)
- 2- We make a small displacement of the pendulum (not exceed 15°)
- 3- Let the pendulum to oscillate and calculate the time of 10 full cycles
- 4- We calculate the time of the one cycle by dividing the total time of oscillations on the number of them.
- 5- We change the length of the thread and calculate the time of full oscillation and repeat the step several times using different lengths and calculate the time



6-tabulate the results as shown :

L	T ₁₀	$T = T_{10}/10$	T^2

7-draw a relation between L on y axis and T^2 on x axis , and determine the slope.

