

**Mohamud Harbi Primary
and secondary school**

Subject: Physics

**Chapter (1): Oscillatory
Motion**



Grade: Form four

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1) Define oscillatory motion?

- ❖ Oscillatory motion it refers to any motion which repeats itself over a period of time.

2) Define periodic motion?

- ❖ Periodic motion is a motion of an object that regularly returns to a given position after a fixed time interval.

3) What is the period ?

- ❖ Period is the time taken to make one complete cycle.

4) What is the frequency?

- ❖ Frequency is the number of cycles made in one second.

5) List some examples of repetitive motion of human body?

- ❖ Some examples of repetitive motion of human body include:
 - ✓ Heart beat
 - ✓ Breathing

6) Define simple harmonic motion (SHM)?

- ❖ Simple harmonic motion (SHM) is a motion under the influence of a type of a force described by Hook's low.
- ❖ Simple harmonic motion (SHM) is a motion in which a body moves back and forth over a fixed path, returning to each position and velocity after a definite interval of time.

6) What is the force constant?

- ❖ Force constant is the spring constant and refers to the property of the material and shows the stiffness of the spring.

7) What is the displacement of simple harmonic motion (SHM)?

- ❖ Is the distance from equilibrium position in either direction.

8) Define reference of SHM?

- ❖ Reference of SHM is the mass attached at the end of the spring displacement, velocity, acceleration, energy, and period.

9) State hook's law?

- ❖ Hook's law states that the restoring force applied by a spring is the proportional to the displacement of the spring and opposite in direction.

10) Define amplitude?

- ❖ Amplitude is the maximum displacement from mean position in either direction.

11) What is the simple pendulum?

- ❖ Simple pendulum is the mass on the end of a string which oscillates in harmonic motion.

12) What is the period of simple pendulum depends on?

- ❖ Period of simple pendulum depends on
 - ✓ The length of string
 - ✓ The acceleration due to the gravity.

13) What is the equilibrium position?

- ❖ Equilibrium position is unscratched or rest position of particle.

Table about units and its symbols

No	Name	Unit	Symbol
1.	Period	Second (S)	T
2.	Frequency	Hertz (Hz)	F
3.	Force	Newton (N)	F
4.	Acceleration	Meter per second square (M/s ²)	a
5.	Mass	Kilogram (Kg)	M
6.	Displacement	Meter (M)	X
7.	Amplitude	Meter (M)	A
8.	Spring constant	Newton per meter (N/m)	K
9.	Gravitation	Meter per second square (M/s ²)	G
10.	Angular frequency (Omega)	Rad per second (R/s)	ω
11.	Potential Energy	Joule (J)	P.E
12.	Kinetic energy	Joule (J)	K.E
13.	Velocity	Meter per second (M/s)	v
22.	Length	Meter (M)	L

FORMULAS OF CHAPTER ONE

1) Period

$$\diamond \text{ Period} = \frac{\text{Time taken}}{\text{Number of oscillation}}$$

$$\diamond \text{ Period} = \frac{1}{F}$$

$$\diamond \text{ Period} = \frac{2\pi}{\omega}$$

$$\diamond \text{ Period} = 2\pi \sqrt{\frac{M}{K}}$$

$$\diamond \text{ Period} = 2\pi \sqrt{\frac{L}{g}}$$

2) Frequency

$$\diamond \text{ Frequency} = \frac{\text{Number of oscillation}}{\text{Time taken}}$$

$$\diamond F = \frac{1}{T}$$

$$\diamond F = \frac{\omega}{2\pi}$$

$$\diamond F = \frac{1}{2\pi} \sqrt{\frac{K}{M}}$$

$$\diamond F = \frac{1}{2\pi} \sqrt{\frac{g}{L}}$$

3) Spring constant

$$\diamond K = \frac{F}{x}$$

$$\diamond K = \frac{mg}{x}$$

$$\diamond K = \frac{4\pi^2 M}{T^2}$$

4) Mass

$$\diamond M = \frac{T^2 K}{4\pi^2}$$

5) Angular frequency (ω)

$$\diamond \omega = \frac{2\pi}{T}$$

$$\diamond \omega = 2\pi F$$

$$\diamond \omega = \sqrt{\frac{K}{M}}$$

6) Force

$$\diamond \text{Force} = -kx$$

$$\diamond \text{Force} = -kA$$

$$\diamond \text{Force} = ma$$

7) Displacement (X)

$$\diamond X = \frac{F}{K}$$

8) Acceleration

$$\diamond a = -\frac{K}{M} X$$

$$\diamond a = \frac{K}{M} A$$

$$\diamond a_m = \omega^2 A$$

9) Energy of SHM

$$\diamond \text{Potential energy } P \cdot E = \frac{1}{2} K X^2$$

$$\diamond \text{Kinetic energy } K \cdot E = \frac{1}{2} M V^2$$

10) Velocity

$$\diamond v = \sqrt{\frac{K}{M}} \sqrt{A^2 - X^2}$$

$$\diamond v = \sqrt{\frac{K}{M}} A$$

$$\diamond v_m = \omega A$$

$$\diamond v = \frac{2\pi A}{T}$$

$$\diamond v = 2\pi F A$$

11) Length

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

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

12) Acceleration due to gravity

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

$$\diamond g = 4\pi^2 F^2 L$$

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