TRINITY COLLEGE FOR WOMEN
NAMAKKAL
Department of Physics

ALLIED PHYSICS-I
19UPHA01-ODD Semester

Presented by

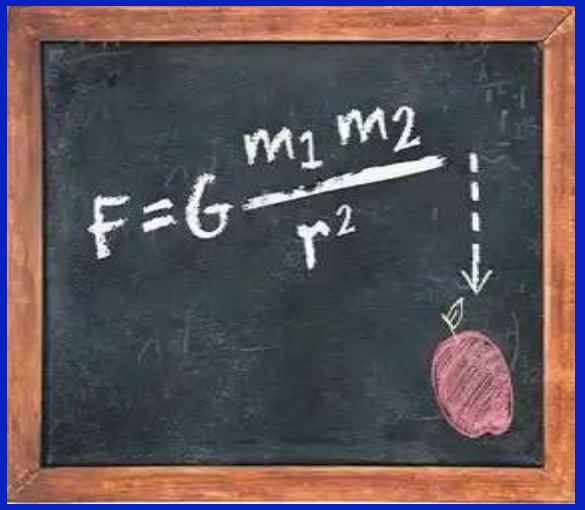
Dr. R. POONGUZHALI

Assistant Professor

Department of Physics

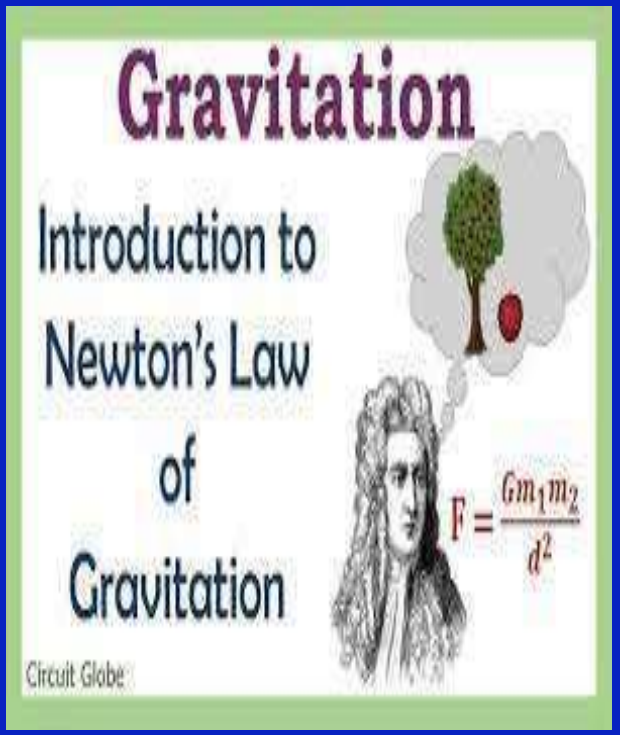
http://www.trinitycollegenkl.edu.in/

PRESENTATION
ON
NEWTONS
LAW OF GRAVITATION



INTRODUCTION

Newton's law of universal gravitation is usually stated as that **every particle attracts every other particle in the universe with a force that is directly proportional to the product of their masses and inversely proportional to the square of the distance between their centers**.



IMPORTANCE OF NEWTONS LAW OF GRAVITATION

The importance of universal law of gravitation lies in the fact that it was successful in explaining many phenomena such as: how different **objects in this universe affect others**, how gravity is responsible for the weight of a body and keeps us on the ground, how lunar motion occurs around the earth.

How is Newton derived the law of gravitation?

Sir Isaac Newton's inspiration for the Law of Universal Gravitation was **from the dropping of an apple from a tree**. Newton's insight on the inverse-square property of gravitational force was from intuition about the motion of the earth and the moon.

What do Newton's equations tell us?

This equation tells us as tha

object subjected to an external

force will accelerate and that th

amount of the acceleration is

proportional to the size of the f

$$v = u + at \quad [1]$$

$$s = ut + \frac{1}{2}at^2 \quad [2]$$

$$s = \frac{1}{2}(u + v)t \quad [3]$$

$$v^2 = u^2 + 2as \quad [4]$$

$$s = vt - \frac{1}{2}at^2 \quad [5]$$

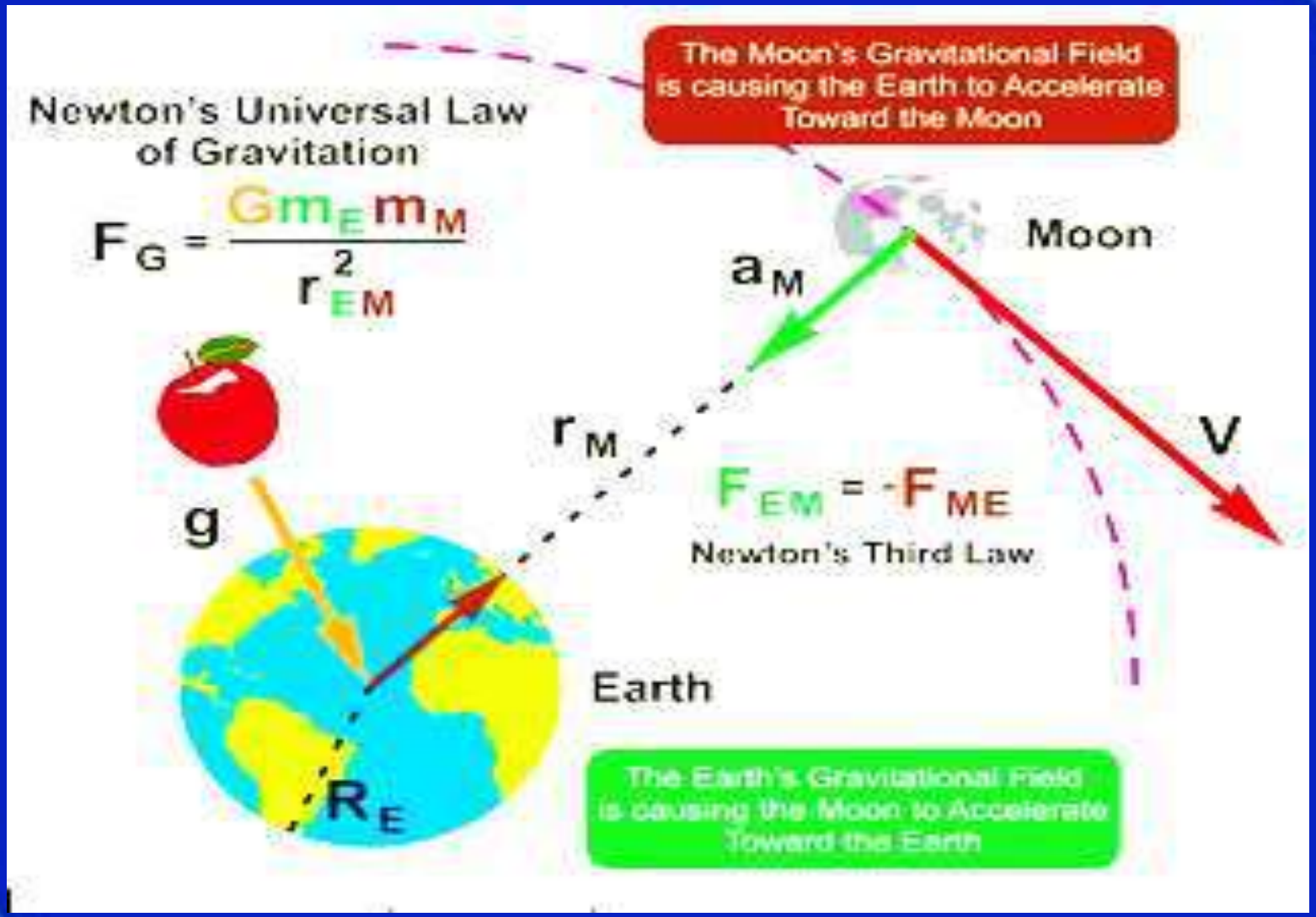
Formula

$$F = \frac{GM\ m}{r^2}$$

F = force of gravity
G = gravitational constant (6.67×10^{-11})
M = mass of one object
m = mass of other object
r = distance between the two objects

What is the importance of Newton's law of gravitation?

- It allows us to find mass of earth.
- It helps us to find orbital velocity
- It helps us to find gravitational acceleration value
- It enables us to find gravitational force between two objects
- It gives us the universal gravitational constant.

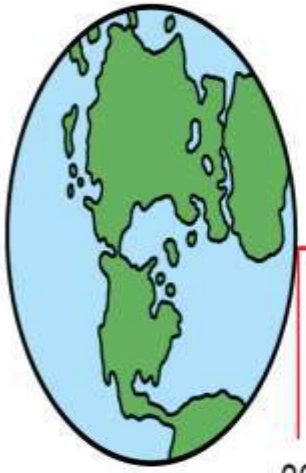

Newton's Universal Law of Gravitation
$F_G = \frac{G m_E m_M}{r_{EM}^2}$
The Moon's Gravitational Field is causing the Earth to Accelerate Toward the Moon
Moon
a_M
V
r_M
$F_{EM} = -F_{ME}$
Newton's Third Law
g
Earth
R_E
The Earth's Gravitational Field is causing the Moon to Accelerate Toward the Earth

Newton universal law of gravitation applies to:

Newton's law of universal gravitation states that any two bodies in the universe attract each other with a force that is directly proportional to the product of their masses and inversely proportional to the square of the distance between them. Since any two bodies can be there so it doesn't matter whether they are small or large.

So, It is applicable to both small and big bodies.

The force of gravity varies with distance from the Earth



	4,000 (6,437)	8,000 (12,874)	12,000 (19,312)	16,000 (25,749)	20,000 (32,186)	24,000 (38,623)	
Earth	32 (9.75)	8 (2.44)	3.6 (1.09)	2 (0.61)	1.3 (0.39)	0.9 (0.27)	0.6 (0.18)
	100 (45.4)	25 (11.3)	11 (5)	6.25 (2.8)	4 (1.8)	2.77 (1.3)	2 (0.9)

distance in miles (kilometers) from the Earth's surface

acceleration due to gravity in feet (meters) per second per second

amount a 100-pound (45.4-kilogram) person would weigh at each location in pounds (kilograms)

THANK YOU

http://www.trinitycollegenkl.edu.in/