Physics

Fall 2027

Weeks 9-10

Monday, October 5

- T: 5E - explain and apply the concepts of equilibrium and inertia as represented by Newton's first law of motion using relevant real-world examples such as rockets, satellites, and automobile safety devices
- 5F - calculate the effect of forces on objects, including tension, friction, normal, gravity, centripetal, and applied forces, using free body diagrams and the relationship between force and acceleration as represented by Newton's second law of motion
- 5G - illustrate and analyze the simultaneous forces between two objects as represented in Newton's third law of motion using free body diagrams and in an experimental design scenario
- O: I will relate my learning about Newton’s Laws data
- D: by completing a PhET with my partner

Journal 2.2

- Who is your hero and why?

Wednesday October 7

- T:**5E - explain and apply the concepts of equilibrium and inertia as represented by Newton's first law of motion using relevant real-world examples such as rockets, satellites, and automobile safety devices**
- **5F - calculate the effect of forces on objects, including tension, friction, normal, gravity, centripetal, and applied forces, using free body diagrams and the relationship between force and acceleration as represented by Newton's second law of motion**
- **5G - illustrate and analyze the simultaneous forces between two objects as represented in Newton's third law of motion using free body diagrams and in an experimental design scenario**
- O: I will demonstrate my knowledge of Newton’s Laws
- D: by participating taking the Unit 2 DCA

Wednesday October 14

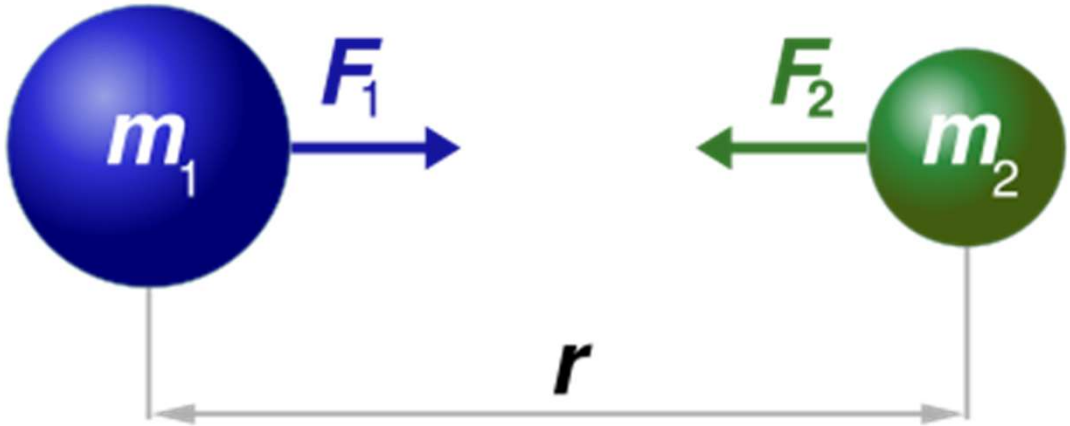
- T:**5H** - describe and calculate, using scientific notation, how the magnitude of force between two objects depends on their masses and the distance between their centers, and predict the effects on objects in linear and orbiting systems using Newton's law of universal gravitation
- O: I will begin to explore and understand universal gravity
- D: by participating in a group discussion, a class lecture, and practice problems.

Newton's Law of Universal Gravitation

- Any two objects attract each other with a gravitational force, proportional to the product of their masses and inversely proportional to the square of the distance between them.

- The force acts in the direction of the line connecting the centers of the masses.

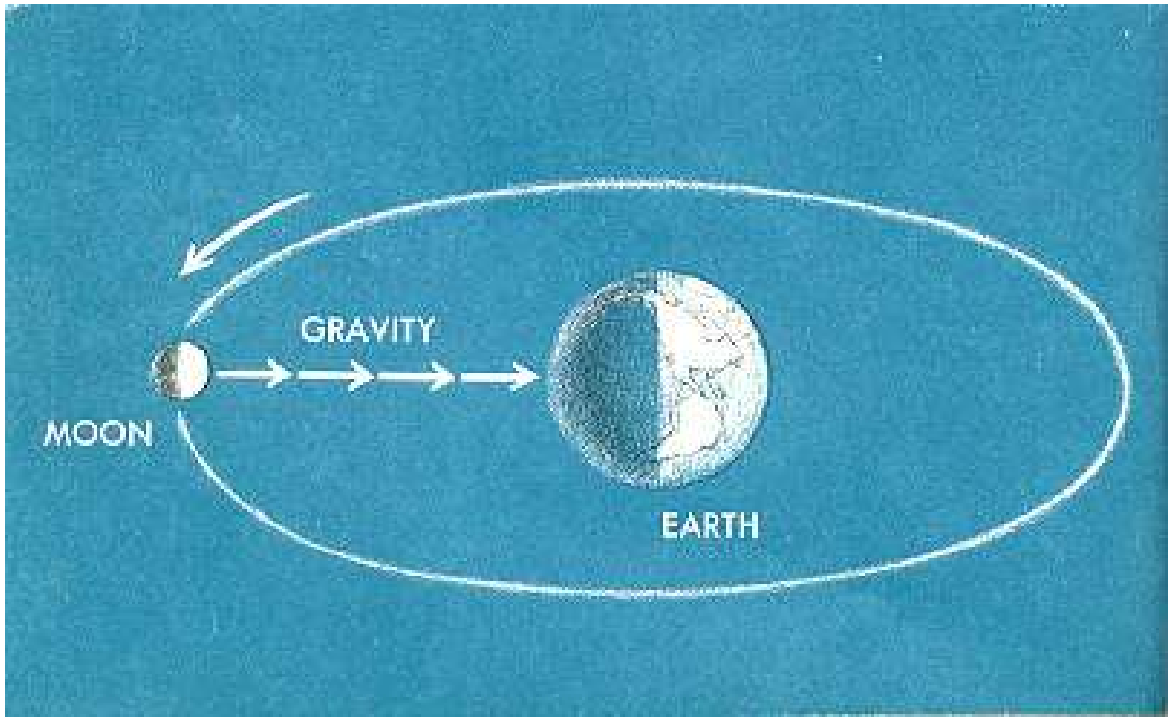
Newton's Law of Universal Gravitation



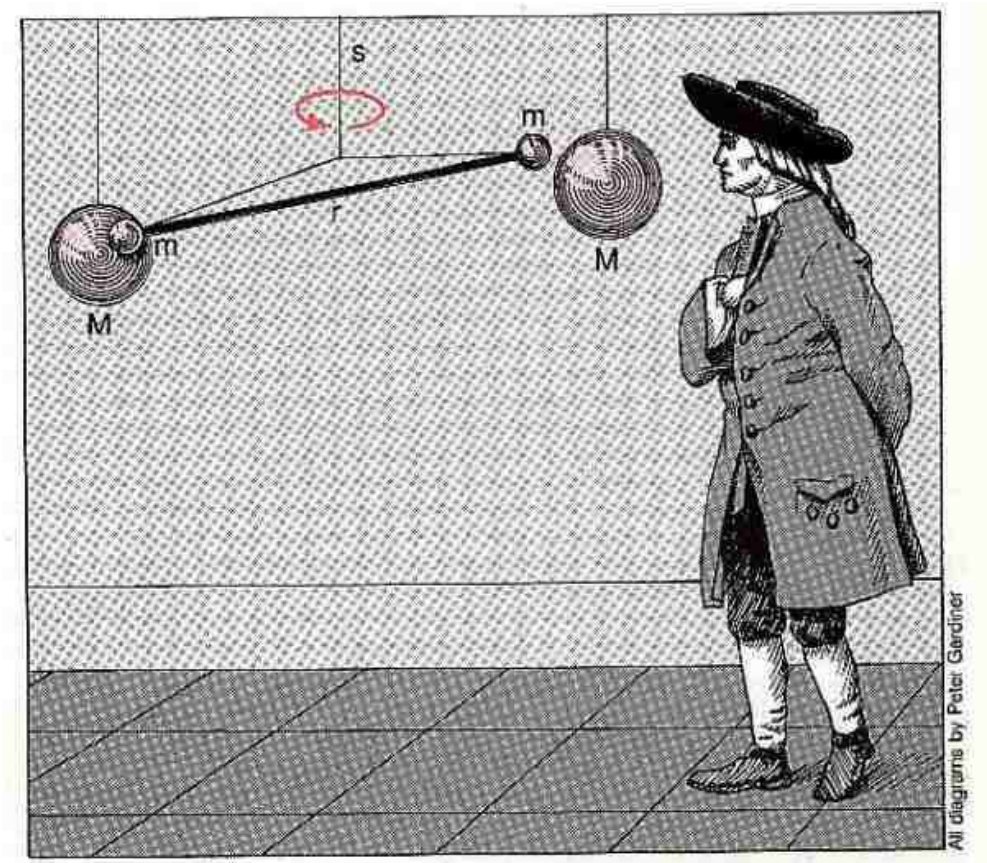
$$F_1 = F_2 = G\frac{m_1 \times m_2}{r^2}$$

http://scienceblogs.com/startswithabang/upload/2009/07/meet_our_second_moon/400px-NewtonsLawOfUniversalGravitation.svg.png

Why does the moon not fall straight down onto the earth?



Henry Cavendish's experiment determined the proportionality constant G in 1798.



Henry Cavendish with the famous torsion balance experiment that determined the gravitational constant G and demonstrated Newton's inverse-square law of gravitation. Large lead spheres placed close to small ones caused angular deflections

http://www.newscientist.com/data/images/archive/1639/16390101.jpg

The Value of G.

$$G = 6.67 \times 10^{-11}\ N\ m^2 / kg^2$$

Change of Gravitational Force with Distance

- Law of universal gravitation is known as an inverse square law.

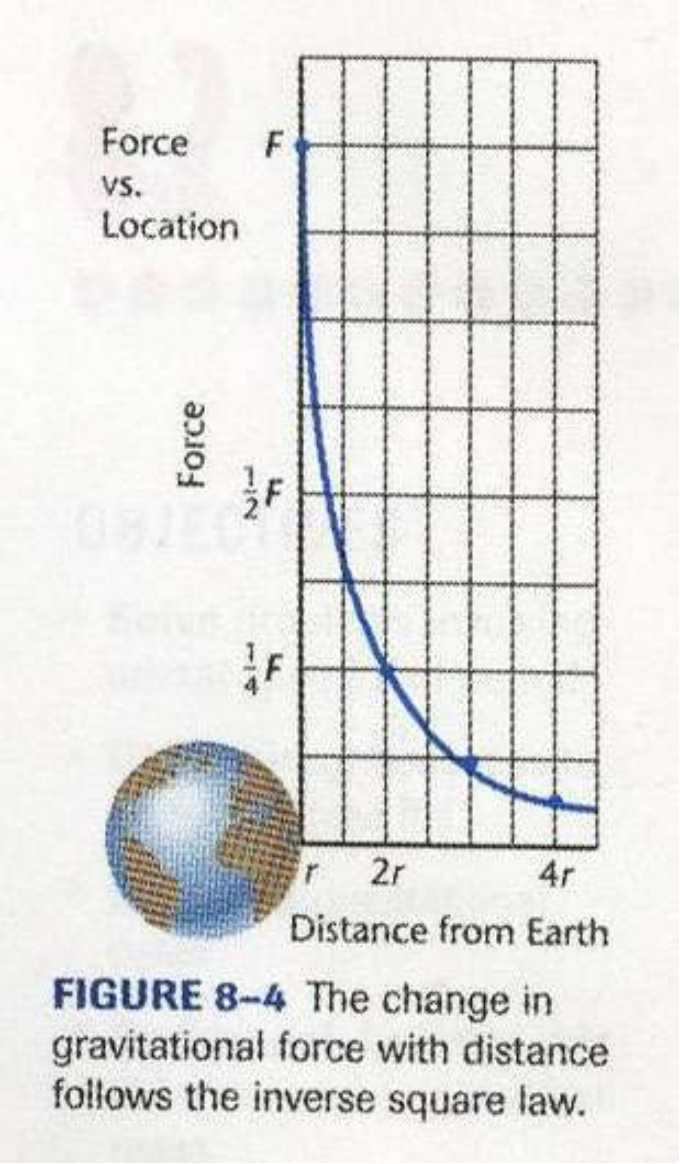


FIGURE 8–4 The change in gravitational force with distance follows the inverse square law.