Chapters/ Sections will be Covered

Book: Fundamentals of Physics by David Halliday, Jearl Walker, and Robert Resnick

Chapter Title: Gravitation

Sections: Newton’s Law of Gravitation
Gravitation Near Earth’s Surface
Gravitational Potential Energy
Kepler's laws of planetary motion

Sample Quiz Question

What type of force is acting on Newton's Gravitational Law?
a) Attractive
b) Repulsive
c) Mass force interaction
d) Inverse squared distance force

Which of the following quantities does not impact gravitational acceleration?
a) Earth's rotation
b) Earth's mass distribution
c) Earth's shape
d) Earth's orbit

Sample Quiz Question

Which of the following is not Kepler's laws of planetary motion?
a) Laws of shapes
b) Laws of orbits
c) Laws of areas
d) Laws of periods

When does gravitational potential energy have null value?
a) Objects are getting close together
b) Infinite separation
c) Finite separation
d) Large and small masses

Class Activity: Math Problem #1

Fundamentals of Physics 10th Edition-Halliday, Resnick, Walker

Sample Problem 13.01 Net gravitational force, 2D, three particles

Figure 13-4*a* shows an arrangement of three particles, particle 1 of mass $m_1 = 6.0$ kg and particles 2 and 3 of mass $m_2 = m_3 = 4.0$ kg, and distance $a = 2.0$ cm. What is the net gravitational force $\vec{F}_{1,net}$ on particle 1 due to the other particles?

Class Activity: Math Problem #2

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Sample Problem 13.02 Difference in acceleration at head and feet

(a) An astronaut whose height h is 1.70 m floats "feet down" in an orbiting space shuttle at distance $r = 6.77 \times 10^6$ m away from the center of Earth. What is the difference between the gravitational acceleration at her feet and at her head?

(b) If the astronaut is now "feet down" at the same orbital radius $r = 6.77 \times 10^6$ m about a black hole of mass $M_h = 1.99 \times 10^{31}$ kg (10 times our Sun's mass), what is the difference between the gravitational acceleration at her feet and at her head? The black hole has a mathematical surface (*event horizon*) of radius $R_h = 2.95 \times 10^4$ m. Nothing, not even light, can escape from that surface or anywhere inside it. Note that the astronaut is well outside the surface (at $r = 229R_h$).

Probable Final Questions: Lecture 19

Evaluate how the earth's rotation influences gravitational acceleration.

Describe Kepler's laws of planetary motion with diagrams.