

Mr. Jenkins
Physics I

Assignment Sheet
Uniform Circular Motion and Gravitation

Objectives

You will be able to:

- A. Explain why an object moving around a circle with a constant speed is accelerating.
Convert between angular velocity or frequency and linear velocity.
Convert between frequency and period.
Explain the meaning of tangential quantities in a circular motion problem.
- B. Analyze the free-body diagram of an object moving in a circle and apply Newton's second law relating centripetal force to centripetal acceleration. (horizontal circles, banked curves with and without friction, gravitron, vertical circles, artificial gravity)
- C. Compute the gravitational force that one object exerts on another.
- D. Calculate the orbital velocity or orbital radius of a satellite.
Explain why an object orbiting the earth is said to be falling freely. Use your explanation to point out why objects appear weightless under certain circumstances. Explain why a person in a rotating space station in deep space can feel like they have weight.

Reading

- A. 6.2 Circular Motion, p. 153–156
- B. Notes
Future Technology: Spinning Space Stations, p. 162
- C. 7.1 Planetary Motion and Gravitation, p. 171–178
- D. 7.2 Using the Law of Universal Gravitation, p. 179–185

Laboratory

Calculate the coefficient of friction between a stopper and a horizontal disk.
Calculate the weight of an object using a cyclotron.
Centripetal force apparatus.

Focus Questions

- 1. You are a passenger in a car and not wearing a seat belt. Without increasing or decreasing its speed, the car makes a sharp left turn, and you find yourself colliding with the right-hand door. Explain.
- 2. Why does an astronaut in orbit of the Earth feel weightless?