

3.5: End of Chapter Key Terms

Definition: Motion

- **Motion:** The change in position of an object over time.
- **Displacement:** The change in position of an object from its initial point to its final point, taking into account direction; measured in meters (m).
- **Distance:** The total length of the path traveled by an object, regardless of direction; measured in meters (m).
- **Speed:** The rate at which an object covers distance; calculated as distance divided by time ($s = d/t$); measured in meters per second (m/s).
- **Velocity:** The rate at which an object changes its position, including direction; calculated as displacement divided by time ($v = \Delta x/\Delta t$); measured in meters per second (m/s).
- **Acceleration:** The rate of change of velocity of an object; calculated as change in velocity divided by time ($a = \Delta v/\Delta t$); measured in meters per second squared (m/s²).
- **Uniform Motion:** Motion at a constant speed in a straight line.
- **Non-uniform Motion:** Motion that involves a change in speed or direction, or both.
- **Instantaneous Speed:** The speed of an object at a specific instant in time.
- **Average Speed:** The total distance traveled divided by the total time taken.
- **Instantaneous Velocity:** The velocity of an object at a specific instant in time.
- **Average Velocity:** The total displacement divided by the total time taken.
- **Uniform Acceleration:** Constant acceleration, such as the acceleration due to gravity.
- **Free Fall:** The motion of an object under the influence of gravitational force only.
- **Projectile Motion:** The motion of an object thrown or projected into the air, subject to only the acceleration of gravity.
- **Trajectory:** The path followed by a projectile or moving object.
- **Relative Motion:** The calculation of the motion of an object with regard to some other moving object.
- **Frame of Reference:** A coordinate system used to define and measure the position, orientation, and other properties of objects in it.
- **Linear Motion:** Motion in a straight line.
- **Rotational Motion:** Motion of an object about an internal axis.
- **Circular Motion:** Motion along a circular path or a circular orbit.
- **Centripetal Acceleration:** The acceleration directed toward the center of a circular path, necessary to maintain circular motion.
- **Centripetal Force:** The force directed toward the center of a circular path, necessary to maintain circular motion.
- **Tangential Velocity:** The linear speed of something moving along a circular path.
- **Kinematics:** The branch of mechanics that describes the motion of objects without considering the causes of motion.
- **Dynamics:** The branch of mechanics that deals with the forces and their effects on motion.
- **Newton's Laws of Motion:** Three fundamental laws describing the relationship between the motion of an object and the forces acting on it.
- **Inertia:** The tendency of an object to resist changes in its state of motion.
- **Momentum:** The product of an object's mass and velocity ($p = mv$); a measure of how difficult it is to stop a moving object.
- **Impulse:** The change in momentum resulting from a force applied over a period of time ($J = Ft$).
- **Equilibrium:** The state in which the net force on an object is zero, resulting in no acceleration.
- **Translational Motion:** Movement that changes the position of an object without rotation.
- **Angular Motion:** Rotation around a central point or axis.
- **Harmonic Motion:** Motion that repeats in cycles, such as a pendulum or a mass on a spring.
- **Damped Harmonic Motion:** Oscillatory motion that gradually decreases in amplitude over time due to friction or other resistance.
- **Simple Harmonic Motion:** Oscillatory motion under a restoring force proportional to the displacement from an equilibrium position.
- **Uniform Circular Motion:** Motion in a circle at constant speed.

- **Non-uniform Circular Motion:** Motion in a circle with changing speed.
- **Velocity-Time Graph:** A graph that shows how velocity changes over time, where the slope represents acceleration.
- **Position-Time Graph:** A graph that shows how position changes over time, where the slope represents velocity.

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