

TABLE OF CONTENTS

Licensing

1: Units and Measurement

- 1.1: Prelude to Units and Measurement
- 1.2: The Scope and Scale of Physics
- 1.3: Units and Standards
- 1.4: Unit Conversion
- 1.5: Dimensional Analysis
- 1.6: Estimates and Fermi Calculations
- 1.7: Significant Figures
- 1.8: Solving Problems in Physics
- 1.A: Units and Measurement (Answers)
- 1.E: Units and Measurement (Exercises)
- 1.S: Units and Measurement (Summary)

2: Motion Along a Straight Line

- 2.1: Prelude Motion Along a Straight Line
- 2.2: Position, Displacement, and Average Velocity
- 2.3: Instantaneous Velocity and Speed
- 2.4: Average and Instantaneous Acceleration
- 2.5: Motion with Constant Acceleration (Part 1)
- 2.6: Motion with Constant Acceleration (Part 2)
- 2.7: Free Fall
- 2.8: Finding Velocity and Displacement from Acceleration
- 2.E: Motion Along a Straight Line (Exercises)
- 2.S: Motion Along a Straight Line (Summary)

3: Vectors

- 3.1: Prelude to Vectors
- 3.2: Scalars and Vectors (Part 1)
- 3.3: Scalars and Vectors (Part 2)
- 3.4: Coordinate Systems and Components of a Vector (Part 1)
- 3.5: Coordinate Systems and Components of a Vector (Part 2)
- 3.6: Algebra of Vectors
- 3.7: Algebra of Vectors Examples
- 3.8: Products of Vectors (Part 1)
- 3.9: Products of Vectors (Part 2)
- 3.A: Vectors (Answers)
- 3.E: Vectors (Exercises)
- 3.S: Vectors (Summary)

4: Motion in Two and Three Dimensions

- 4.1: Prelude to Motion in Two and Three Dimensions
- 4.2: Displacement and Velocity Vectors
- 4.3: Acceleration Vector
- 4.4: Projectile Motion

- 4.5: Uniform Circular Motion
- 4.6: Relative Motion in One and Two Dimensions
- 4.E: Motion in Two and Three Dimensions (Exercises)
- 4.S: Motion in Two and Three Dimensions (Summary)

5: Relativity

- 5.1: Prelude to Relativity
- 5.2: Invariance of Physical Laws
- 5.3: Relativity of Simultaneity
- 5.4: Time Dilation
- 5.5: Length Contraction
- 5.6: The Lorentz Transformation
- 5.7: Relativistic Velocity Transformation
- 5.8: Doppler Effect for Light
- 5.9: Relativistic Momentum
- 5.10: Relativistic Energy
- 5.A: Relativity (Answers)
- 5.E: Relativity (Exercises)
- 5.S: Relativity (Summary)

6: Newton's Laws of Motion

- 6.1: Prelude to Newton's Laws of Motion
- 6.2: Forces
- 6.3: Newton's First Law
- 6.4: Newton's Second Law
- 6.5: Mass and Weight
- 6.6: Newton's Third Law
- 6.7: Common Forces
- 6.8: Drawing Free-Body Diagrams
- 6.E: Newton's Laws of Motion (Exercises)
- 6.S: Newton's Laws of Motion (Summary)

7: Applications of Newton's Laws

- 7.1: Prelude to Applications of Newton's Laws
- 7.2: Solving Problems with Newton's Laws (Part 1)
- 7.3: Solving Problems with Newton's Laws (Part 2)
- 7.6: Centripetal Force
- 7.4: Friction (Part 1)
- 7.5: Friction (Part 2)
- 7.7: Drag Force and Terminal Speed
- 7.E: Applications of Newton's Laws (Exercises)
- 7.S: Applications of Newton's Laws (Summary)

8: Work and Kinetic Energy

- 8.1: Prelude to Work and Kinetic Energy
- 8.2: Work
- 8.3: Kinetic Energy
- 8.4: Work-Energy Theorem
- 8.5: Power
- 8.E: Work and Kinetic Energy (Exercises)

- 8.S: Work and Kinetic Energy (Summary)

9: Potential Energy and Conservation of Energy

- 9.1: Prelude to Potential Energy and Conservation of Energy
- 9.2: Potential Energy of a System
- 9.3: Conservative and Non-Conservative Forces
- 9.4: Conservation of Energy
- 9.5: Potential Energy Diagrams and Stability
- 9.6: Sources of Energy
- 9.E: Potential Energy and Conservation of Energy (Exercises)
- 9.S: Potential Energy and Conservation of Energy (Summary)

10: Linear Momentum and Collisions

- 10.1: Prelude to Linear Momentum and Collisions
- 10.2: Linear Momentum
- 10.5: Conservation of Linear Momentum (Part 1)
- 10.6: Conservation of Linear Momentum (Part 2)
- 10.3: Impulse and Collisions (Part 1)
- 10.4: Impulse and Collisions (Part 2)
- 10.7: Types of Collisions
- 10.8: Collisions in Multiple Dimensions
- 10.9: Center of Mass (Part 1)
- 10.10: Center of Mass (Part 2)
- 10.11: Rocket Propulsion
- 10.E: Linear Momentum and Collisions (Exercises)
- 10.S: Linear Momentum and Collisions (Summary)

11: Fixed-Axis Rotation Introduction

- 11.1: Prelude to Fixed-Axis Rotation Introduction
- 11.2: Rotational Variables
- 11.3: Rotation with Constant Angular Acceleration
- 11.4: Relating Angular and Translational Quantities
- 11.5: Moment of Inertia and Rotational Kinetic Energy
- 11.6: Calculating Moments of Inertia
- 11.7: Torque
- 11.8: Newton's Second Law for Rotation
- 11.9: Work and Power for Rotational Motion
- 11.E: Fixed-Axis Rotation Introduction (Exercises)
- 11.S: Fixed-Axis Rotation Introduction (Summary)

12: Angular Momentum

- 12.1: Prelude to Angular Momentum
- 12.2: Rolling Motion
- 12.3: Angular Momentum
- 12.4: Conservation of Angular Momentum
- 12.5: Precession of a Gyroscope
- 12.E: Angular Momentum (Exercises)
- 12.S: Angular Momentum (Summary)

13: Gravitation

- [13.1: Prelude to Gravitation](#)
- [13.2: Newton's Law of Universal Gravitation](#)
- [13.3: Gravitation Near Earth's Surface](#)
- [13.4: Gravitational Potential Energy and Total Energy](#)
- [13.5: Satellite Orbits and Energy](#)
- [13.6: Kepler's Laws of Planetary Motion](#)
- [13.7: Tidal Forces](#)
- [13.8: Einstein's Theory of Gravity](#)
- [13.E: Gravitation \(Exercises\)](#)
- [13.S: Gravitation \(Summary\)](#)

[Index](#)

[Glossary](#)

[Detailed Licensing](#)