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## AP Physics 1 Unit 1 Kinematics

- 1.1 Scalars and Vectors in One Dimension
- 1.2 Displacement, Velocity, and Acceleration
- 1.3 Representing Motion
- 1.4 Reference Frames and Relative Motion
- 1.5 Vectors and Motion in Two Dimensions

- Scalar
- Vector
- Quantity
- Magnitude
- Direction
- Distance
- Displacement
- Speed
- Average speed
- Instantaneous speed
- Velocity
- Average velocity
- Instantaneous velocity
- Acceleration
- Instantaneous acceleration
- *suvat* equations
- Slope of a *displacement vs. time* graph
- Slope of a *velocity vs. time* graph
- Area under a *velocity vs. time* graph
- Area under an *acceleration vs. time* graph
- Acceleration from the force of gravity near the center of the Earth
- Reference frame
- Inertial reference frame
- Parallel
- Perpendicular
- Component
- SOH-CAH-TOA
- Pythagorean theorem
- Zero dimensions
- One dimension ( $x$ )
- Two dimensions ( $x, y$ )
- Three dimensions ( $x, y, z$ )
- Four dimensions ( $x, y, z, t$ )

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**AP Physics 1**  
**Unit 2 Force and Translational Dynamics**

- 2.1 Systems and Center of Mass
- 2.2 Forces and Free-Body Diagrams
- 2.3 Newton's Third Law
- 2.4 Newton's First Law
- 2.5 Newton's Second Law
- 2.6 Gravitational Force
- 2.7 Kinetic and Static Friction
- 2.8 Spring Forces
- 2.9 Circular Motion

- Center of mass
- Force
  - o Force of gravity (weight)
  - o Normal force
  - o Force of tension
  - o Buoyant force
  - o Drag force (force of friction)
  - o Applied force
  - o Spring force
- Contact forces
- Action at a distance forces
- Free body diagram
- Inertia
- Newton's first law of motion
- Newton's second law of motion
- Newton's third law of motion
- Ideal string
- Ideal spring
- Ideal pulley
- Static equilibrium
- Dynamic/Translational equilibrium
- Newton's universal law of gravitation
- Gravitational field strength
- Apparent weight
- Weightlessness
- Inertial mass
- Gravitational mass
- Static friction

- Kinetic friction
- Coefficient of static friction
- Coefficient of dynamic friction
- Hooke's law
- Equilibrium position
- Circular motion
- Centripetal acceleration
- Radial acceleration
- Tangential acceleration
- Centripetal force
- Centrifugal force
- Period
- Frequency
- Kepler's third law

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**AP Physics 1**  
**Unit 3 Work, Energy, and Power**

3.1 Translational Kinetic Energy

3.2 Work

3.3 Potential Energy

3.4 Conservation of Energy

3.5 Power

- Translational kinetic energy
- Work
- Conservative force
- Nonconservative force
- Work-energy theorem
- Area under a *force vs. displacement* graph
- Potential energy
- Elastic potential energy of an ideal spring
  - To stretch
  - To compress
- Equilibrium length
- General form of gravitational potential energy
- Law of conservation of energy
- Mechanical energy
- Power
  - Instantaneous power

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**AP Physics 1**  
**Unit 4 Linear Momentum**

4.1 Linear Momentum

4.2 Change in Momentum and Impulse

4.3 Conservation of Linear Momentum

4.4 Elastic and Inelastic Collisions

- Linear momentum
- Collision
- Explosion
- Rate of change of momentum
- Change in momentum
- Impulse
- Area under a *force vs. time* curve
- Slope of a *momentum vs. time* curve
- Law of conservation of linear momentum
- Center of mass velocity
- Elastic collision
- Inelastic collision
- Perfectly inelastic collision

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**AP Physics 1**  
**Unit 5 Torque and Rotational Dynamics**

5.1 Rotational Kinematics

5.2 Connecting Linear and Rotational Motion

5.3 Torque

5.4 Rotational Inertia

5.5 Rotational Equilibrium and Newton's First Law in Rotational Form

5.6 Newton's Second Law in Rotational Form

- Angular position
- Angular displacement
- Angular velocity
- Angular acceleration
- Radians and degrees
- Rigid system
- Axis of rotation
- Clockwise
- Counterclockwise
- Average angular velocity
- Average angular acceleration
- Torque
- Lever arm
- Force diagram
- Rotational inertia
- Parallel axis theorem
- Rotational equilibrium
- Newton's first law in rotational form
- Newton's second law in rotational form

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**AP Physics 1**  
**Unit 6 Energy and Momentum of Rotating Systems**

6.1 Rotational Kinetic Energy

6.2 Torque and Work

6.3 Angular Momentum and Angular Impulse

6.4 Conservation of Angular Momentum

6.5 Rolling

6.6 Motion of Orbiting Satellites

- Rotational kinetic energy
- Work done by torque
- Area under a *torque vs. angular position* graph
- Angular momentum
- Angular impulse
- Area under a *torque vs. time* graph
- Change in angular momentum tells us angular impulse
- Slope of an *angular momentum vs. time* graph
- Area under a *torque vs. time* graph
- Law of conservation of angular momentum
- Translational motion
- Rotational motion
- Translational kinetic energy
- Rotational kinetic energy
- Rolling and slipping
- Rolling without slipping
- Satellite
- Circular orbit
- Elliptical orbit
- Escape speed/velocity

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**AP Physics 1**  
**Unit 7 Oscillations**

7.1 Defining Simple Harmonic Motion (SHM)

7.2 Frequency and Period of SHM

7.3 Representing and Analyzing SHM

7.4 Energy of Simple Harmonic Oscillators

- Pendulum
- Periodic motion
- Simple harmonic motion
- Equilibrium position
- Restoring force
- Frequency
- Period
- Energy of a simple harmonic oscillator
- Applying the law of conservation of energy to a simple harmonic oscillator

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## **AP Physics 1 Unit 8 Fluids**

8.1 Internal Structure and Density

8.2 Pressure

8.3 Fluids and Newton's Laws

8.4 Fluids and Conservation Laws

- Fluid
- Properties of a solid, liquid, gas
- Density
- Volume
- Ideal fluid
- Viscosity
- Pressure
- Incompressible
- Absolute pressure
- Atmospheric pressure
- Gauge pressure
- Buoyant force
- Continuity equation
- Bernoulli's equation
- Torricelli's theorem