PCHS Physics
Pacing Guide

- Unit 1: Newtonian Mechanics
  - Kinematics (vectors, displacement, velocity, acceleration) (PH.5 a, c) 4 days
    - Motion in one dimension
    - Motion in two dimensions; projectile motion
  - Newton's laws of motion (PH.5 d) 5 days
    - Static equilibrium (first law)
    - Dynamics of a single particle (second law)
    - Systems of two or more objects (third law)
  - Circular motion and rotation (PH.5 b,e,f) 2 days
    - Uniform circular motion
    - Torque and rotational statics
  - Work, energy, power (PH.5 g, PH.6 a, c, PH.7 a,b) 5 days
    - Work and work-energy theorem
    - Forces and potential energy
    - Conservation of energy
    - power
  - Systems of particles, linear momentum (PH.6 a-c, PH.7 a) 2 days
    - Impulse and momentum
    - Conservation of linear momentum, collisions
  - Oscillations and gravitation (PH.5 e,f, PH.6 a, PH.7 a,b, PH.8 a) 7 days
    - Simple harmonic motion
    - Mass on a spring
    - Pendulum and other oscillations
    - Newton's law of gravity
    - Orbits of planets and satellites
      - circular
- Unit 2: Fluid Mechanics and Thermal Physics
  - Temperature and heat (PH.7 a) 4 days
    - Mechanical equivalent of heat
    - Heat transfer and thermal expansion
  - Kinetic theory and thermodynamics 5 days
    - Ideal gases
      - Kinetic model
      - Ideal gas law
    - Laws of thermodynamics
      - First law (including pV diagrams)
      - Second law (including heat engines)
  - Fluid mechanics 3 days
    - Hydrostatic pressure
    - Buoyancy

        - Fluid flow continuity
        - Bernoulli's equation
- Unit 3: Electricity and Magnetism (PH.10 a,b, PH.11 a-d) 16 days
    - Electrostatics
        - Charge and Coulomb's law
        - Electric field and electric potential
    - Conductors, capacitors, dielectrics
        - Electrostatics with conductors
        - Capacitors
            - Capacitance
            - Parallel plate
    - Electric circuits
        - Current, resistance, power
        - Steady-state direct current circuits (batteries/resistors)
        - Capacitors in circuits
            - Steady state
    - Magnetic fields
        - Forces on moving charges in magnetic fields
        - Forces on current-carrying wires in magnetic fields
        - Fields of long current-carrying wires
    - Electromagnetism
        - Electromagnetic induction
            - Faraday's law
            - Lenz's law
- Unit 4: Waves and Optics (PH.8 a-c, PH.9 a-c, PH.12 a-c)
    - Wave motion 3 days
        - Traveling waves
        - Wave propagation
        - Standing waves
        - Superposition
    - Physical optics 4 days
        - Interference and diffraction
        - Dispersion of light and the electromagnetic spectrum
    - Geometric optics 6 days
        - Reflection and refraction
        - Mirrors
        - lenses
- Unit 5: Atomic and Nuclear Physics (PH.9 a-c, PH.12 a-j) 5 days
    - Atomic physics and quantum effects
        - Photons, the photoelectric effect, Compton scattering, x-rays
        - Atomic energy levels

        - Wave-particle duality
        - Nanotechnology
    - Nuclear physics
        - Nuclear reactions (conservation of mass and charge)
        - Mass-energy equivalence
    - Relativity
- Tests 6 days
- Labs and research(PH.1 a-g, PH.2 a-e, PH.3 a-e, PH.4 a,b) 12 days
- Final exam 1 day