Black Horse Pike Regional School District
Highland   Timber Creek   Triton
Science Department

Syllabus
Physics CP
Course Content

Physics CP will provide students with a basic knowledge of the principles of physics that are needed for working in a technical environment. This course will develop the critical thinking skills of students through many discussions and problem-solving sessions. The course will reinforce various principles through laboratory activities. This course will focus on the Mechanics topics of Physics. No *,** sections will be covered in this course. All units will be tested in chunks.

September/October: **Basic Skills (HS-ETS1-2)**

- Develop problem-solving, decision-making, and inquiry skills
  - Rearranging equations
- Plan and conduct experiments
- Collect, analyze and evaluate evidence to build and revise models of natural phenomena
  - Graph Scientific Data
  - Convert units

October/November/December: **Kinematics (HS-ETS1-2, HS-ETS1-4)**
- Motion in one dimension
- Vectors vs. scalars
- Displacement vs. Distance
- Velocity vs. Speed
- Using the four kinematics equations to solve problems:
  - $x = x_0 + v_0 t + \frac{1}{2} a t^2$
  - $v = v^0 + at$
  - $v^2 = v_0^2 + 2aDx$
  - $v_{avg} = (v + v_0)/2$
- Graphical interpretation of motion

December/January/Febuary: **Dynamics (HS-PS2-1, HS-PS2-2, HS-PS2-3)**
- Newton's Laws
- Free body Diagrams
- Gravity near the earth's surface and "g"
- Mass versus weight (W = mg)
- Use $\Sigma F = ma$ and free body diagrams to solve problems in one dimension
- Surface Forces: Normal Force and Friction
- Apparent weight
- Static and Kinetic Friction

Febuary: **Uniform circular motion ([HS-PS2-4](#))**
- Net force required for circular motion ($a = mv^2/r$)
- Application of Free Body diagrams and Newton's Laws to circular motion problems
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March/April: **Energy ([HS-PS3-1](#), [HS-PS3-3](#))**
- Work done by a constant force ($W = Fd_{parallel}$)
- Conservation of Energy ($E_o + W = E_f$)
- Kinetic Energy ($KE = \frac{1}{2} mv^2$)
- Gravitational Potential Energy ($GPE = mgh$)
- Elastic Potential Energy ($EPE = \frac{1}{2} kx^2$)
- Internal Energy and Joule's Principle
- Conservative and non-conservative forces
- Problem solving with the Principle of Conservation of Energy.

*May/June***: Momentum ([HS-PS2-2](#), [HS-PS2-3](#))**
- Momentum ($p = mv$)
- Impulse ($I = FDt = Dp$)
- Momentum and its relation to force ($F = Dp/Dt$)
- Conservation of momentum ($Sp = Sp'$)
- Collision and Impulse Problems
- Elastic collisions in one dimension ($v_1 - v_2 = v_2' - v_1'$)
- Perfectly inelastic collisions in one dimension ($m' = m_1 + m_2$)
- Inelastic collisions in one dimension

Labs by Unit:

Kinematics:
>Bowling Law Lab
>Stomp Rockets
>Free Fall Lab
>Hopper Lab
>Marble Launchers
>Wooden Loop Lab- Inertia demonstration

Dynamics:
>Newton's Law Demo
>Friction Lab
>Inertia Lab
>Hooke's Law Lab

Centripetal Force:
>Centripetal force lab:
>Loop-de- Loop

Energy:
>Energy Lab
>Power Lab
>Marble Launcher Lab
>Roller coaster project

Momentum:
    Momentum Observation Lab:

Course Expectations & Skills

- Create an organized notebook
- Synthesize an assessment using technology as an educational medium (e.g. students make a power point
- presentation, use excel to interpret lab data graphically, digital video, web design, etc.).
- Develop a creative way to convey physical science information or explain a societal phenomenon to a high
- school audience.
- Use math to analyze, express, and predict and model the effects of energy and forces on the physical world

Textbook
None

Grading Policy

Major Assessments 40%
Minor Assessments 10%
Labs 30%
Homework /Classwork 20%