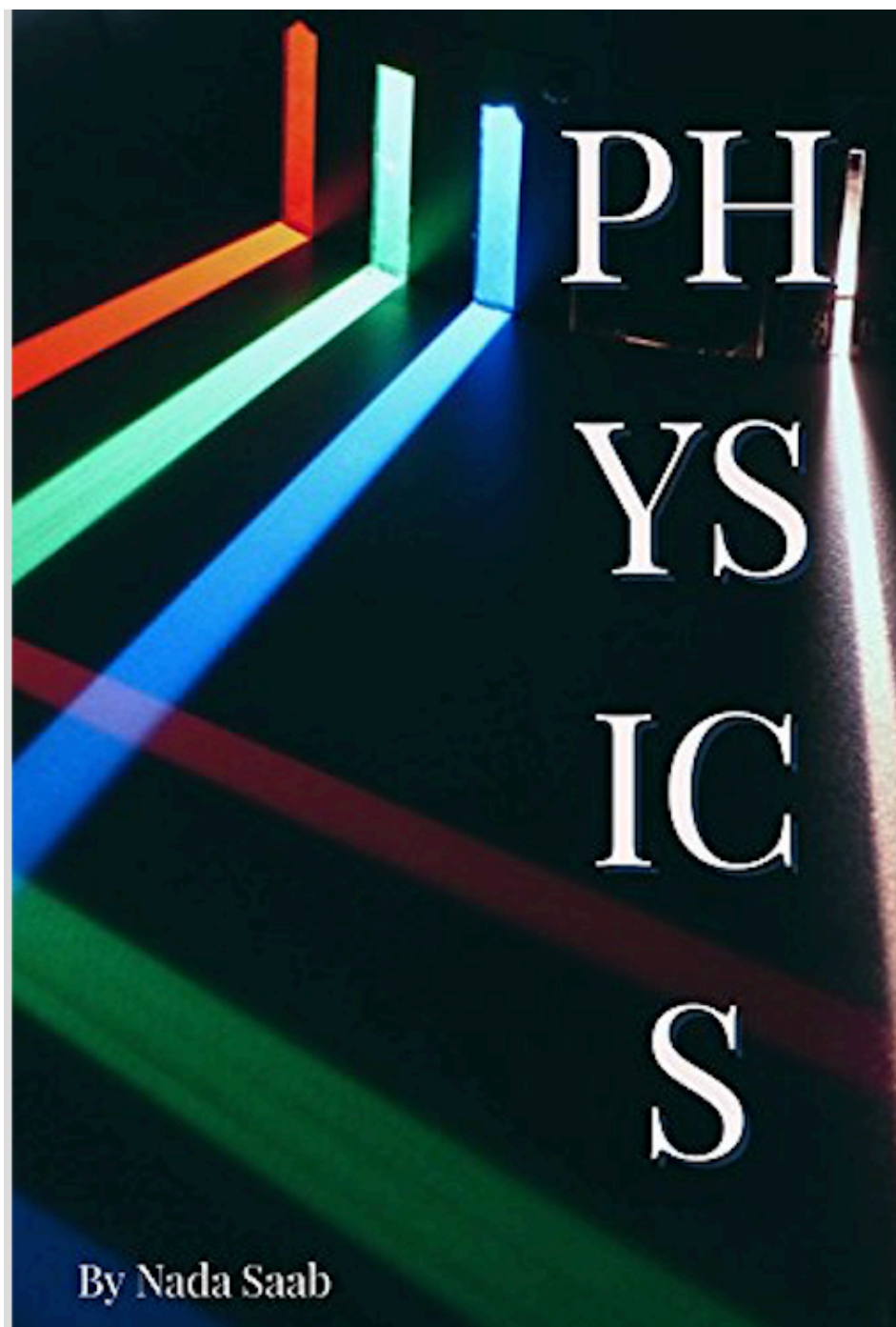# Physics By Saab

Western International High School (DPSCD)

Detroit - School year (2021-2022)

By Nada Saab

Introduction

Overview

Physics by Saab is a collections of small concise chapters. The content covers the important physics concepts and theories. The language is simple. The approach is delicate and straightforward. The purpose is to help the students absorb the foundations of the subject quickly. Physics by Saab is a self taught material. The lessons are presented in a way so that the students will easily retain the information.

For Students

Physics by Saab is written in a simple english language, appropriate for all the proficiency levels of the English language. The lessons are short and the students will not be confused or overwhelmed with unnecessary explanations. It had excellent recommendations from the students.

Students are responsible to take notes, participate actively in class, collaborate and facilitate the learning of others. Sharing of information and knowledge is important in any science class. Students and teacher will analyze the interesting and current applications of physics laws in the development of modern science aspects to advance the quality of life.

About the teacher

Nada Saab-Ismail has a Ph.D. In medicinal chemistry, a master of art in secondary education, a second master is educational studies focused on international baccalaureate and a professional teaching certificate (Chemistry, Physics and Arabic). She has been in the field of education and research since 1988 and a teacher at DPSCD for 5 years. As a researcher, she has many publications. As a teacher, she constantly earned excellent evaluation from her students. She taught all grades starting from Kindergarten to college and university.
For more information, please visit the author's website: nhsaab.weebly.com
Youtube Channel: nada saabismail

Resources

Materials and Lessons: The lessons will be posted in English, Arabic and Spanish. The material will be posted on:

1- Schoology

2- Website: nhsaab.weebly.com/Physics.

3- Videos for lessons will be on Youtube channel: nada saabismail

4- Book; Glencoe Physics- Online on Schoology.

Quiz, Test, Exam: all are multiple choices on Schoology.

Assignments: All posted on Schoology; **Submit to** Schoology

True Grades: are all on Power School.

Khan Academy: Join Class Code: U7G9Q43Z

https://www.khanacademy.org/join/U7G9Q43Z

Khan Academy

How to join your teacher's Khan Academy class

(1) Go to khanacademy.org/join

(2) Enter your class code and press "Add".

Class code: _____

(3) If you don't already have an account, press "Create a new account". Enter your date of birth, then sign up using Google, your school email, or by creating a username.

(4) Enter your grade and course. Now you're ready to start learning!

Concepts to be Covered (2021-2022)

1. **Motion of Objects - Kinematic in One Direction**

    1.A) Speed and Velocity
    1. Scalar and Vector quantities.
    2. Distance and Displacement
    3. Speed Using and Time.
    4. Velocity Using Displacement and Time.

    1.B) Acceleration
    1. Acceleration, Velocity and Time.
    2. Positive Acceleration.
    3. Negative Acceleration (Deceleration)

    1.C) Kinematic in One Dimension
    1. The Five Kinematic Variables.
    2. Equations Related to Uniform Motion.
    3. Free-Fall.

    1.D) Graphical Velocity and Acceleration
    1. Velocity: Slope of Position versus Time Graph.
    2. Instantaneous Velocity.
    3. Acceleration: Slope of Velocity versus Time Graph.

    1.G) Concept Map-Motion of Objects

2. Kinematic in Two Dimensions- Projectiles

    2.A) Projectile Motion
    1. Projectile.
    2. Projectile Launched at an Angle.
    3. Symmetry in the Motion of Projectile.

    2.B) Projectile Launched at an Angle

1. Variable along the x axis.
2. Variable along the y axis.
3. Maximum Height Reached.
4. Hang Time.
5. Range.

2.C) Projectile Launched Horizontally

2.D) Math/Trigonometry

2.E) Concept Map-Kinematic in Two Dimensions

3. Newton's Laws of Motion

3.A) Newton's First Law of Motion
1. Newton's First Law of Motion.
2. Net Force.
3. Calculation of the Net Force.

3.B) Newton's Second Law of Motion
1. Newton's Second Law of Motion.
2. Net Force, Acceleration.

3.C) Newton's Second Law of Motion - Vector Component
1. Newton's Second Law of Motion.
2. X and Y Components of the Net Force.
3. Acceleration along the X and Y axis.
4. X and Y Components of Displacement.

3.D) Newton's Third Law of Motion
1. Newton's Third Law of Motion.
2. Normal Force (FN).
3. Equilibrium Relationship to Fnet and Acceleration.

3.E) Newton's Law of Universal Gravitation
1. Law of Universal Gravitation.
2. Acceleration due to gravity of the Earth.

3. Planetary gravitation.

3.F) Newton's Inverse Square Law for Gravity
      1. Kepler's Laws of Planetary Motions.
      2. Kepler's 3rd Law of Motion and Newton's Inverse Square Law of Gravity.
      3. Einstein and Nature of Gravity.

3.G) Mass and Weight
      1. Mass.
      2. Acceleration Due to Gravity (g).
      3. Weight.

3.H) Apparent Weight

3.I) Forces and Newton's Laws
      1. Frictional Static Force.
      2. Frictional Kinetic Force.
      3. Tension Force.

3.M) Concept Map-Newton's Laws of Motion

4. Work

4.A) Work
      1. Work.
      2. Power.
      3. Work and Energy.

4.D) Concept Map-Work

5. Energy

5.A) Energy
      1. Renewable and Nonrenewable Resources.
      2. Some Types of Energy.

5.B) Kinetic Energy and Work
1. Kinetic Energy.
2. Work-Energy Theorem.

5.C) Gravitational Potential Energy and Work
1. Gravitational Potential Energy.
2. Work-Energy Theorem.

5.D) Conservation of Energy
1. Mechanical Energy.
2. Conservation of Energy.

5.E) Impact Speed
1. Mechanical Energy.
2. Conservation of Mechanical Energy.
3. Speed of Impact.

5.F) Concept Map-Energy

6. Momentum and Impulse

6.A) Momentum
1. Linear Momentum.
2. Comparing the Momentum of Two Moving Objects.
3. Angular Momentum.

6.B) Impulse-Momentum 1. Impulse.
2. Linear Momentum and Impulse.
3. Impulse-Momentum Theorem.
4. Factors Affecting Impulse.

6.C) Linear Momentum
1. Conservation of Momentum.
2. Collision and Coupling of Two Objects Moving in the Same Direction.
3. From Rest, Two Objects Push off against Each Other.
4. Types of Collisions and Kinetic Energy.

6.D) Conservation of Momentum
       1. Conservation of Momentum.
       2. Collision and Coupling of Two Objects Moving in the Same Direction.
       3. Collision and Coupling of Two Objects Moving in Opposite Directions.
       4. Collision and Coupling of Two Objects, One at Rest and One is Moving.
       5. Ballistic Pendulum.

6.E) Concept Map-Momentum and Impulse

7. Harmonic Motion

7.A) Ideal Spring
       1. Hooke's Law, Spring.

7.B) Pendulum
       1. Pendulum.
       2. Period of Pendulum.
       3. Transformation of Energy.
       4. Period of Planets.

7.C) Concept Map-Harmonic Motion

8. Thermodynamic Laws
8.A) Heat/Thermal Energy
       1. Heat Energy.
       2. Specific Heat Capacity.
       3. Conservation of Heat Energy.

8.B) Randomness/Entropy
       1. Entropy.
       2. Entropy and Second Law of Thermodynamics.
       3. Third Law of Thermodynamics.

8.C) Thermodynamic Laws
       1. Thermodynamics.

2. First Law of Thermodynamics.
3. Second Law of Thermodynamics.
4. Heat Engine and Refrigeration Process.
5. Efficiency.
8.D) Concept Map-Thermodynamic Laws

9. Electricity

9.A) Electricity
1. Net Electric Charge.
2. Conductor and Insulators.
3. Charging by Contact, Friction, Induction.

9.B) Coulomb's Law
1. Net Electric Charge.
2. Coulomb's Law.
3. Net Electrostatic Force.

9.C) Electric Field
1. Electric Field.
2. Electric Field Calculation.
3. Electrostatic Force.

9.D) Electric Potential, Current, Resistance
1. Electric Potential Energy.
2. Work and Electric Potential.
3. Electric Current.
4. Resistance in Electric Circuit.
5. Electric Circuit.

9.E) Electric Circuit, Ohm's Law
1. Electric Circuit.
2. Capacitor.
3. Ohm's Law.
4. Power in Electric Circuit. 5. Electric Energy.

9.F) Kirchhoff's Laws

1. Kirchhoff's Voltage Law (Loop Rule).
2. Kirchhoff's Current Law (Junction Rule).

9.G) Series Circuits
1. Series Circuits.
2. Equivalent Voltage.
3. Equivalent Resistor.

9.H) Parallel Circuits
1. Parallel Circuits.
2. Equivalent Voltage.
3. Equivalent Resistor.

9.I) Concept Map-Electricity

10. Light

10.A) Light and Flat Mirrors
1. Light and Mirrors.
2. Reflection.
3. Image Formation by Plane Mirror.

10.B) Light and Concave Mirrors
1. Concave Mirror.
2. Ray Tracing and Images in Concave Mirrors.

10.C) Light and Convex Mirrors
1. Convex Mirror.
2. Ray Tracing and Images in Convex Mirror.

10.D) Mirror Equations
1. Mirror Equation.
2. Magnification Equation.
3. Summary of Sign Conventions for Spherical Mirrors.

10.E) Refraction, Snell's Law
1. Light, Refraction.
2. Index of Refraction.

3. Snell's Law of Refraction.
4. Apparent Depth.

10.F) Concept Map-Light