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Guidelines for selecting Physics contents for Grades 9-11

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Introduction

The purses of this topic selection are to compensate the content that were missed due to COVID 19 pandemics in 2012 academic year content selections were done from Grade 7-12 based on the given criteria. Those criteria are; content related with student's real life situation, pre-requisite for next classes, new concept at the grade level, and that motivate students for innovation. This compensation class will be held for 45 days according temporary seclude set by the ministry of education.

Objectives

This Physics content selection designed to help students:-

- To equip students with the expected competency at that level
- To cover the content at that level in appropriate way

Necessity

- It helps to manage wastage of education due to COVID19 Pandemic.

Assumption

The assumption behind of this revision is it is known that in 2012 academic year second semester schedule not given in the case of COVID19 Pandemic. Therefore, the solution is to design selected contents and facilitate the teaching and learning through revision in the form of makeup classes to brings learner knowledge, skill and attitude in the expected grade level in all discipline.

Teachers Role

The responsibility of teachers during this revision lesson is to convey the lesson safely according to the direction given by ministry of Healthy to prevent COVID 19

Physics Grade 9 Content selected for 45 days make up class					
No	Unit	Content/sub-content	No of Period	Rationale(for selection of the content)	Description ,(knowledge, skill and attitude) and suggested methodology
1	Unit four 4.1	Work, energy and power ✓ Mechanical work ✓ work done by a constant ✓ force ✓ work done by a variable ✓ force	2	It is base for next grade level It have no horizontal Relation with contents in other subject Students will apply this concept in their real life	Student will a able to Describe the necessary conditions for work to be done ✓ Calculate the work done by a force F acting on a body at an angle ✓ Calculate the work done by a force of gravity on a body **Teaching Methodology** ✓ Demonstrative lecture ✓ Lecture ✓ Question and answer
2	4.2	Work- energy theorem ✓ kinetic energy ✓ potential energy ✓ mechanical energy		It is base for next grade level - students will apply this concept in their real life situation -It is used to identify which energy is mostly used in their country	✓ Explain the relationship between work and energy ✓ Derive the relationship between • work and kinetic energy • Work and gravitational Potential energy • Work and elastic Potential energy **Teaching Methodology** ✓ Demonstrative lecture ✓ Lecture ✓ Question and answer
3	4.3	conservation of energy ✓ the law of conservation Of Mechanical	1	It is base for next grade level Design the proper usage of energy sources	Explain the energy changes that takes place in an oscillating pendulum ✓ oscillating spring mass **Teaching Methodology** ✓ Demonstrative lecture

					✓ Lecture ✓ Question and answer
4	4.4	Mechanical Power Energy source		It is base for next grade level - for wise use of energy -utilizing energies like wind energy, solar energy, geothermal energy more efficient for local use	Define Mechanical Power ✓ State some renewable sources of energy ✓ Express the formula of mechanical power in terms of average velocity **Teaching Methodology** ✓ Demonstrative lecture ✓ Lecture ✓ Demonstration ✓ Question and answer ✓ Pair work
5	Unit 5 5.1	*Simple machines* ✓ purpose of machines	2	It is base for next grade level It have no horizontal Relation with contents in other subject Students will apply this concept in their real life	Explain the purposes of a machine ✓ List the types of simple Machine ✓ Define the terms: • Load, effort, work-output, work-input, MA, VR and • Efficiency of Machines **Teaching Methodology** ✓ Demonstrative lecture ✓ Lecture ✓ Demonstration ✓ Question and answer ✓ Pair work
7	5.2	✓ inclined plane, wedge, and screw		It is base for next grade level It have no horizontal Relation with contents in other subject Students will apply this concept in their real life	Calculate MA, VR and efficiency of inclined plane, wedge and screw **Teaching Methodology** ✓ Demonstrative lecture ✓ Lecture ✓ Demonstration ✓ Question and answer

					✓ Pair work
8	5.3	✓ levers ✓ wheel and axle ✓ pulleys/differenti al pulley ✓ gears, chains and belts ✓ Compound Machines	1	It is base for next grade level It have no horizontal Relation with contents in other subject Students will apply this concept in their real life	✓ Determine the MA, VR and efficiency of wheel and axle (when the load Is on the axle on the wheel). ✓ Describe the use of a jack screw. ✓ Calculate the MA, VR and efficiency of a wedge ✓ Describe the use of gears ✓ calculate MA, VR, and efficiency of a gear system ✓ Determine whether the machines are force multiplier, speed multiplier or direction changer. **Teaching Methodology** ✓ Demonstrative lecture ✓ Lecture ✓ Question and answer
9	Unit 6 6.1	✓ Fluid statics ✓ *Pressure* ✓ Air pressure ✓ The magnitude of air pressure ✓ Air pressure and breathing ✓ The magnitude of air pressure	2	-It is base for next grade level farther leaning -It have no horizontal Relation with contents in other subject -Students will apply this concept in their real life -Students will recall and reconstruct their capability Regarding the content It motive students for innovation	✓ Define the term pressure ✓ Solve problems related to • Describe atmospheric pressure • Explain the variation of atmospheric pressure with altitude **Teaching Methodology** ✓ Demonstrative lecture ✓ Lecture ✓ Question and answer
10	6.2	✓ Fluid pressure		-It is base for next grade level	✓ Define the term fluid

		✓ Siphons ✓ How does water pressure ✓ vary with depth Pascal's principle ✓ Archimedes' principle		farther leaning -It have no horizontal Relation with contents in other subject -Students will apply this concept in their real life -Students will recall and reconstruct their capability Regarding the content It motive students for	✓ State the similarities and differences between ✓ liquids and gases ✓ Define the terms density and relative density ✓ Determine the density and relative density of a body in a given problem ✓ Calculate the total pressure on a body inside a fluid ✓ State Pascal's principle & It to solve related problems ✓ Explain the use of manometer ✓ Distinguish between absolute pressure and gauge pressure. ✓ State Archimedes' principle ✓ Distinguish between true weight and apparent ✓ weight of a body ✓ Calculate the buoyant force acting on a body in a fluid ✓ State principle of floatation **Teaching Methodology** ✓ Demonstrative lecture ✓ Lecture ✓ Question and answer
11	Unit 7 7.1	Temperature and heat energy	1	-It have no horizontal Relation with contents in other subject -Students will apply this concept in their real life -Students will recall and reconstruct their capability Regarding the content It motive students for	✓ Explain the difference between heat and temperature ✓ Define the term thermal equilibrium **Teaching Methodology** ✓ Demonstrative lecture ✓ Lecture ✓ Question and answer

12	7.2	✓ Expansion of Solids ,liquids and gases ✓ laws of thermodynamics	2	-It have no horizontal Relation with contents in other subject -Students will apply this concept in their real life -Students will recall and reconstruct their capability Regarding the content It motive students for	✓ Describe the thermal expansion of solids ✓ Derive the expression of linear expansion of solids ✓ Area expansion of solids ✓ Volume expansion of solids ✓ Find the relationship between coefficient of linear, area and volume expansion ✓ Solve problems involving linear, area and volume expansion of solids ✓ Distinguish between apparent and real expansion of a liquid ✓ Solve problems involving expansion of liquids ✓ Explain the abnormal expansion of water ✓ Compare the expansion of gases with expansion of solids and liquids **Teaching Methodology** ✓ Demonstrative lecture ✓ Lecture ✓ Question and answer
13	7.3	✓ Quantity of Heat, Specific heat capacity and Heat capacity ✓ Heat exchange		-It have no horizontal Relation with contents in other subject -Students will apply this concept in their real life -Students will recall and reconstruct their capability Regarding the content It motive students for	✓ Define the terms: specific heat capacity and heat capacity of a body ✓ Describe the factors that affect the amount of heat absorbed or liberated by a body ✓ Calculate the quantity of heat absorbed or liberated by a body ✓ Compute the heat capacity of a body ✓ Explain the significance of high specific heat ✓ capacity of water **Teaching Methodology** ✓ Demonstrative lecture ✓ Lecture

					✓ Question and answer
14	7.4	✓ Change of state ✓ Latent heat	1	-It have no horizontal Relation with contents in other subject -Students will apply this concept in their real life -Students will recall and reconstruct their capability Regarding the content It motive students for	✓ Define the term ✓ Latent Heat ✓ Latent heat of fusion, ✓ Latent heat of vaporization. ✓ Solve problems involving change of state **Teaching Methodology** ✓ Demonstrative lecture ✓ Lecture ✓ Question and answer
15	Unit 8 8.1	✓ *Wave motion and sound* ✓ Wave propagation ✓ Types of waves	2	It have no horizontal Relation with contents in other subject -Students will apply this concept in their real life -Students will recall and reconstruct their capability Regarding the content It motive students for	✓ Define the terms: wave and wave pulse -List Types of wave ✓ Distinguish between Mechanical and Electromagnetic wave **Teaching Methodology** ✓ Demonstrative lecture ✓ Lecture ✓ Question and answer
16	8.2	✓ Mechanical Waves ✓ Characteristics of waves ✓ Transverse and longitudinal waves		It have no horizontal Relation with contents in other subject -Students will apply this concept in their real life -Students will recall and reconstruct their capability Regarding the content It motive students for	✓ Define the terms: crest, trough, wave length, amplitude, frequency, period of a wave. ✓ Distinguish between transvers & longitudinal wave ✓ Solve problems involving wavelength, frequency and wave speed **Teaching Methodology** ✓ Demonstrative lecture ✓ Lecture ✓ Question and answer
17	8.3	Properties of waves	1	It have no horizontal Relation	✓ Describe the Reflection ,Refraction

				with contents in other subject -Students will apply this concept in their real life -Students will recall and reconstruct their capability Regarding the content It motive students for	,Diffraction& interference of wave ✓ Solve problems involving wavelength, frequency and wave speed **Teaching Methodology** ✓ Demonstrative lecture ✓ Lecture ✓ Question and answer
18	8.4	✓ Sound waves ✓ Production and propagation of sound ✓ Speed of sound in ✓ different media ✓ Speed of sound in air		It have no horizontal Relation with contents in other subject -Students will apply this concept in their real life -Students will recall and reconstruct their capability Regarding the content It motive students for	✓ Identify that sound wave is a longitudinal mechanical wave. ✓ Explain about the production of sound ✓ Describe how sound is propagated in a material Medium ✓ Define the terms compression, rarefaction ✓ Compare the speed of sound in solids, liquids and gases. ✓ Determine the speed of sound in air at any given temperature **Teaching Methodology** ✓ Demonstrative lecture ✓ Lecture ✓ Question and answer

Physics Grade 10 Content selected for 45 days make up Class					
No	Unit	Content/sub-content	No of periods	Rationale (for selection of the content)	Description (knowledge, skill and attitude) and suggested methodology
1	4 4.2	Concepts of magnetic ✓ Magnetic field around a straight current carrying wire ✓ Magnetic field of a Solenoid	1	-Students will apply this concept in their real life -It is prerequisite for next grade level Farther learning -It motive students for innovation	- Student will a :- ▪ Describe magnetic field ▪ sketch magnetic field lines pattern of a current carrying wire ▪ apply the right –hand rule to know the direction of magnetic field lines ▪ calculate the magnetic field strength ▪ sketch the magnetic field lines pattern of a current loop ▪ compute the magnetic field strength at the center of a solenoid ▪ sketch the magnetic field lines pattern of a solenoid ➢ Teaching Methodology • Demonstrative lecture • Lecture • Question and answer
2	4.3	**Magnetic force** ✓ Magnetic force on a moving charge ✓ Magnetic force on a current carrying conductor ✓ Magnetic force between two parallel current carrying conductors	2	Students will apply this concept in their real life -It is prerequisite for next grade level Farther learning -It motive students for innovation	✓ Describe the factors on which the force on a moving charge in magnetic field depend ✓ Determine the direction of a force acting on a moving charge using right hand rule ✓ Derive the expression $F=BIl\sin\theta$ from $F=qvB\sin\theta$ perpendicular to a uniform magnetic field ✓ Compute the magnitude and direction of force

		✓ Definition of ampere ✓ Force on a rectangular current carrying wire			between two parallel current carrying conductors in a uniform magnetic field ✓ Define the SI unit Ampere ✓ Draw a diagram to show the forces acting on a rectangular current carrying wire in a uniform magnetic field ✓ Draw diagrams to show the action of a force on a ✓ simple DC motor and a moving coil, galvanometer ➢ Teaching Methodology • Demonstrative lecture • Lecture • Question and answer
3	5 5.1	***Introduction to electronics*** **Vacuum tube devices** ✓ thermionic emission ✓ cathode ray oscilloscope (CRO) & some of its use ✓ TV picture tube	1	Students will apply this concept in their real life -It is prerequisite for next grade level Farther learning -It motive students for innovation	✓ Define the term electronics ✓ Mention the importance of electronics in their daily life. ✓ State what is meant by thermionic emission ✓ Describe the ▪ Behavior of vacuum tubes ▪ The function of cathode ray ▪ The uses of a cathode ray tube ➢ Teaching Methodology • Demonstrative lecture • Lecture • Question and answer
4	5.2	**Conductors ,semi conductors and insulators**	1	Students will apply this concept in their real life -It is prerequisite for next grade level Farther learning -It motive students for	Describe properties of ▪ **Conductors** ▪ **semiconductors and** ▪ **Insulators** ✓ Explain the use of conductors, semi-conductors & insulators in Electronics

				innovation	➢ Teaching Methodology • Demonstrative lecture • Lecture • Question and answer
5	5.3	**Semiconductors** ✓ Semiconductor diode (I-V characteristic) ✓ P-n junction diode as a rectifier(qualitative treatment) ✓ LED ✓ LDR ✓ Thermistor ✓ Photodiode	3	Students will apply this concept in their real life -It is prerequisite for next grade level Farther learning -It motive students for innovation	-Distinguish between intrinsic and extrinsic semiconductors -identify semi-conductors as P-type and N-type after doping process ✓ describe the mode of conduction by the majority and minority carriers ✓ define the term diode and show it's circuit symbol ✓ state how a semi-conductor diode can be used in ▪ a half –wave rectification ▪ full wave rectification ➢ Teaching Methodology • Demonstrative lecture • Lecture • Question and answer
5	5.4	**Transistors(p-n-p, n-p-n*)*** ✓ Transistor action ✓ Logic gates		Students will apply this concept in their real life -It is prerequisite for next grade level Farther learning -It motive students for innovation	✓ show the circuit symbols of semiconductor devices ✓ distinguish between p-n-p and n-p-n transistors ✓ identify the base , emitter and collector of a transistor ✓ Define forward biased and reverse biased ✓ Describe the behavior of semiconductor devices such as thermistor, LED, LDR, photodiode, and transistors (all qualitatively) ✓ Use the circuit symbols, for the gates ✓ Draw the truth tables for the different logic gates and for a combination of logic gates ✓ Explain the action of logic gates: NOT, OR.

					➢ AND, NOR, NAND Teaching Methodology • Demonstrative lecture • Lecture • Question and answer
6	Unit 6 6.1	***Electromagnetic waves and geometrical optics*** ✓ **Electromagnetic waves** ✓ transverse nature of electromagnetic waves ✓ seed of electromagnetic waves ✓ Electromagnetic spectrum	2	Students will apply this concept in their real life -It is prerequisite for next grade level Farther learning -It motive students for innovation	✓ Explain how electromagnetic waves are produced ✓ Describe the nature of electromagnetic wavesA ✓ Compare mechanical and electromagnetic waves ✓ explain some uses electromagnetic radiation **Teaching Methodology** • Demonstrative lecture • Lecture • Question and answer
	6.2	**Reflection of light** ✓ laws of reflection ✓ image formation by a ▪ plane mirror ▪ concave mirror ▪ convex mirror ✓ mirror equation	2	Students will apply this concept in their real life -It is prerequisite for next grade level Farther learning -It motive students for innovation	✓ state the laws of reflection ✓ use the laws of reflection to explain how images are formed in a plane mirror ✓ find the position of a virtual image produced by a plane mirror using a ray tracing method ✓ distinguish between concave and convex mirrors ✓ Describe The nature of image formed by concave and convex mirrors ✓ compute distance of image from concave and convex mirrors using Mirror equation apply sign convention when using mirror equations ➢ **Teaching Methodology** • Demonstrative lecture • Lecture • Question and answer

	6.3	**- Refraction of light** ✓ laws of refraction ✓ -total internal reflection and it's uses refraction through thin lenses ✓ thin lens formula ✓ magnification ✓ power of a lens ✓ combination of thin lenses ✓ optical instruments ✓ Optics of the human eye: far and near sightedness and corrections.	2	Students will apply this concept in their real life -It is prerequisite for next grade level Farther learning -It motive students for innovation	✓ define the term refraction ✓ state the conditions in which refraction occurs ✓ draw a diagram representing the passage of light rays through a rectangular glass block ✓ give examples of observations that indicate light can be refracted ✓ Define critical angle ✓ identify the condition necessary for total internal reflection to occur ✓ Distinguish between convex and concave lenses ✓ Define power of lens ✓ use Snell's law to find index of refraction ✓ List some optical instruments ➢ **Teaching Methodology** • Demonstrative lecture • Lecture • Question and answer
		✓ Diffraction of light. ✓ Two slit diffraction ✓ Diffraction by reflection ✓ Grating dispersion of light. ✓ refraction through a ✓ prism ✓ dispersion of light	1	Students will apply this concept in their real life -It is prerequisite for next grade level Farther learning -It motive students for innovation	✓ Define the term Diffraction of light wave ✓ State dispersion of light ➢ **Teaching Methodology** • Demonstrative lecture • Lecture • Question and
		Interference of light **The Fresnel lens**	1	Students will apply this concept in their real life -It is prerequisite for next grade level Farther learning -It motive students for	➢ Define the term interference ➢ Distinguish between ➢ Constrictive and distractive interference ➢ Define Fresnel lens ➢ **Teaching Methodology** • Demonstrative lecture

				innovation	• Lecture • Question and

Physics Grade 11 Content Selection for 45 days make-up Class						
No	Unit	contents	No. of periods	Rational for the selection of the content	Competences and suggested methodology	Remark
1	5	5.2. Work Done by a Constant and Variable Force 5.3. Kinetic Energy, Work Energy theorem.	1	These contents are very crucial for physics students for the next grade levels as well as for further studies	✓ distinguish between scientific work done and general meaning of work done ✓ Define work, energy, kinetic energy and potential energy ✓ solve problems related to work and energy ➢ **SUGESTED METHODOLOGY** - Discussion - Demonstration - Question and answer	
		5.4. Notion of Potential Energy 5.5. Conservation of Energy	2	It is base for the next grade levels	- Describe potential energy - Define conservation of energy - Apply mathematical definitions to solve problems - Use and conserve energies wisely ➢ **SUGESTED METHODOLOGY** - Discussion - Demonstration - Question and answer	
		5.6. Conservative and Dissipative forces 5.7 power		Learning these contents in this class is basic and pre-requisite for next levels	• Identify and state conservative and dissipative forces • Define power • Use power wisely and properly to do work. ➢ **SUGESTED METHODOLOGY** - Discussion	

					- Demonstration - Question and answer -	
	6	6.1 Rotation about a fixed axis 6.2 Torque and angular acceleration 6.3 Rotational kinetic energy and rotational inertia	1	These contents are very crucial for physics students for the next grade levels as well as for further studies	• Describe the motion of a rigid body about a pivot point. • Give the angular speed and angular velocity of a rotating body. • Determine the velocity of a point in a rotating body. • Solve problems involving net torque and angular acceleration. • Determine the velocity and acceleration of a point in a rotating body. • Express torque as a cross product of r and F. • Apply the concepts of rotation dynamics and kinetic energy to solve problems. ➢ **SUGESTED METHODOLOGY** - Discussion - Demonstration - Question and answer	
		6.4 Rotational dynamics of a rigid body 6.5 Parallel axis theorem 6.6 Angular momentum and angular impulse	2	These contents are very crucial for physics students for the next grade levels as well as for further studies	• Derive equations of motion with constant angular acceleration • State the parallel axis theorem. • Use it to solve problems involving the moment of inertia. • Express angular momentum as a cross product of r and p. • Derive an expression for angular	

					momentum in terms of I and ω. ➢ **SUGESTED METHODOLOGY** - Discussion - Demonstration - Question and answer	
		6.7 Conservation of angular momentum 6.8 Centre of mass of a rigid body (circular ring, disc, rod and sphere)	1	These contents are very crucial for physics students for the next grade levels as well as for further studies	• State the law of conservation of angular momentum. • Apply the law of conservation of angular momentum in understanding various natural phenomena, and solving problems. • Determine the location of Centre of mass of a uniform rigid body ➢ **SUGESTED METHODOLOGY** - Discussion - Demonstration - Question and answer	
	7	7.1 Equilibrium of a particle 7.2 Moment of torque or force	1	These contents are very crucial for physics students for the next grade levels as well as for further studies	• Find the resultant of two or more concurrent forces acting at a point. • Define the term equilibrium. • State the first condition of equilibrium. • Distinguish between coplanar and concurrent forces. • Draw free body diagrams to show all the forces acting. ➢ **SUGESTED METHODOLOGY** - Discussion - Demonstration - Question and answer	

		7.3 Conditions of equilibrium 7.4 Couples	1	These contents are very crucial for physics students for the next grade levels as well as for further studies	• Differentiate static equilibrium from dynamic equilibrium. • State the second condition for equilibrium. • Verify the second condition for equilibrium is valid about any arbitrary axis of rotation. ➢ **SUGESTED METHODOLOGY** - Discussion - Demonstration - Question and answer	
	8	8.1 Elastic behavior 8.2 Fluid statics	2	These contents are very crucial for physics students for the next grade levels as well as for further studies	• Define the terms elastic limit, stress, strain, Young's modulus, shear modulus. • State Hooke's law. • Define the terms density, atmospheric pressure, absolute pressure, volume. • Describe the concepts related to hydraulic and pneumatic systems. • State and apply Archimedes' principle. • Define surface tension and surface energy. ➢ **SUGESTED METHODOLOGY** - Discussion - Demonstration - Question and answer	
		8.3 Fluid dynamics	2	These contents are very crucial for physics students	• Define the terms laminar and turbulent flow, flow rate.	

				for the next grade levels as well as for further studies	• Identify factors affecting laminar flow and give examples. • Identify factors that affect the streamlining of cars, boats and planes. • Define the Reynolds number. • State Bernoulli's principle. ➢ **SUGESTED METHODOLOGY** - Discussion - Demonstration - Question and answer	
		8.4 Heat, temperature and thermal expansion	2	These contents are very crucial for physics students for the next grade levels as well as for further studies	• Define the terms calorimeter, phase, phase change, phase diagram, state variable, critical point, triple point, latent heat, heat capacity, specific heat capacity. • Distinguish between heat, temperature, internal energy and work. • Give the units for heat, heat capacity, specific heat capacity and latent heat. • Explain the factors that determine the rate of heat flow through a material. ➢ **SUGESTED METHODOLOGY** - Discussion - Demonstration - Question and answer	