YEARLY PLAN
2022/2023

SCIENCE

FORM 5

YEARLY PLAN
SCIENCE FORM 5 5 2022/2023

WEEK	DATE	CONTENT STANDARD / LEARNING STANDARD	LEARNING OBJECIVE / NOTES	SUGGESTED ACTIVITY	HOTS/ EXPERIMENT/ TP/ PBL
Theme 1: MAINTENANCE AND CONTINUITY OF LIFE **Learning area: 1.0 MICROORGANISMS**					
1	**21/3/22 - 25/3/22**	1.1 World of microorganisms Pupil is able to: 1.1.1 Communicate about microorganisms.	Classify microorganisms into bacteria, fungi, protozoa, viruses and algae based on size, shape, habitat, reproduction and nutrition. Introduce the term 'normal flora'. .	Conduct quizzes	**HOTS:** Characterize , Compare and contract **TP1, TP2**
		1.1.2 Conduct an experiment to show the presence of microorganisms.	Compare the growth of bacteria on nutrient agar for • Unwashed hands • Hands washed with water • Hands washed with water and soap Awareness on hand hygiene should be emphasized in all daily activities, especially when handling food. .	Experimenting, Group discussion	**HOTS:** Analyzing, Synthesizing **EXPERIMENT** 1.1.2 **TP4**

2	**28/3/22 - 1/4/22**	1.1.3 Conduct an experiment to investigate factors that affect the growth of microorganisms.	Study and discuss the effects of nutrient, moisture, light, temperature and pH values on the growth of microorganism such as yeast or *Bacillus* sp.	Experimenting, Group discussion	**HOTS:** Analyzing, Synthesizing **EXPERIMENT** 1.1.3 **TP4, TP5**
3	**4/4/22 - 8/4/22**	1.2 Useful microorganisms 1.2.1 Justify the application of useful microorganisms in life.	Collect information and do multimedia presentation about the role of microorganisms in fields such as: • Medicine (antibiotics, vaccines) • Agriculture (animal digestion, nitrogen-fixing bacteria) • Industries (food, beverages, leather goods) Organize an industrial visit to understand the process of food production or other industrial products that uses microorganisms Elements of entrepreneurship can be inculcated and practice in this activity	Collect information and do the multimedia presentations	**KBAT:** Linking, Collecting and classifying **TP3, TP4**

		1.2 Useful microorganisms 1.2.2 Generate ideas on the potential use of microorganisms in biotechnology and sustainability of the environment.	Carry out active readings to discuss the potential use of microorganisms as the following: • Production of enzymes from agricultural wastes • Treatment of sewage **Reference:** *Modul Teknologi Hijau Biologi, CETREE USM* *Tajuk: Memahami impak mikroorganisma ke atas sisa untuk kehidupan lestari*	Reading, Discussion	**HOTS:** Analyzing, Synthesizing **TP4, TP5**
		1.3 **Prevention and treatment of diseases caused by microorganisms** **1.3.1** **Explain the concept of the statement prevention is better than cure' for diseases caused by microorganisms.** **1.3.2** **Explain the aseptic techniques to control the spreading of microorganisms.**	Examples of aseptic techniques are sterilization, boiling, use of disinfectant, antiseptics and radiation.	Group discussion, Gallery walk	**HOTS:** Linking, Collecting and classifying **TP3, TP4**

4	**11/4/22 - 15/4/22** **11/4/22 - 15/4/22**	**1.3** **Prevention and treatment of diseases caused by microorganisms** **1.3.3** **Conduct an experiment to study the effect of antibiotic on bacterial growth.**	Study the effect of antibiotic concentrations (penicillin) on bacterial growth (*Bacillus* sp.). Precautions should be adhered to when handling microorganisms.	Experimenting	**HOTS:** Analysizing, Synthesizing **EXPERIMENT** 1.3.3 **TP4, TP5**
		1.3.4 Communicate about methods of treatment of infectious diseases.	Do a multimedia presentation to compare the differences between the usage of antibiotic, antifungal and antiviral to treat infectious diseases: • Usage of antibiotic to treat lung infections • Usage of antifungal to treat athlete's foot • Usage of antiviral to treat shingles Discuss the non-effectiveness of antibiotic when consumed: • At irregular times as prescribed • Non-prescription intake	Multimedia presentation, Discussion	**HOTS:** Compare and contrast, Analyzing, Synthesizing TP3, TP4

PERFORMANCE LEVEL	DESCRIPTOR
1	**Recall** the knowledge and science skills on microorganisms.
2	**Understand and explain** microorganisms.
3	**Apply** knowledge about microorganisms and able to carry out simple tasks.
4	**Analyse** knowledge about microorganisms in context of problem solving on events or natural phenomena.
5	**Evaluate** knowledge about microorganisms in context of problem solving and decision making to carry out a task.
6	**Design** a task using knowledge and science skills on microorganisms in a creative and innovative ways to solve problems and making decision or carry out a task in a new situation taking into account the social/economic/cultural values of the community

WEEK	DATE	CONTENT STANDARD / LEARNING STANDARD	LEARNING OBJECIVE / NOTES	SUGGESTED ACTIVITY	HOTS/ EXPERIMENT/ TP/ PBL
Theme 1: MAINTENANCE AND CONTINUITY OF LIFE **Learning area: 2.0 NUTRITION AND FOOD TECHNOLOGY**					
5	**18/4/22 - 22/4/22**	2.1 Balanced diet and calorific value Pupil is able to: 2.1.1 Describe balanced diet.	Recall balanced diet, factors that affect calorific requirements and the amount of energy needed by an individual. **Reference:** The campaign *"Pinggan Sihat - Suku Suku Separuh"* by the Ministry of Health Malaysia (MOH).	Carry out a Q and A session	**HOTS:** Linking **TP1,TP2**

		2.1.2 Conduct an experiment to estimate the energy value in food samples	Determine the energy value in food samples (kJg-1) using calorimeter bomb. **Note:** Energy Value = 4.2 Jg-1 OC-1x water mass(g) x water temperature(OC) / mass of food sample(g) x 1000 1 ml water = 1g 1 kcal = 4.2 kJ/g	Experimenting	**HOTS:** Analyzing, Synthesizing **EXPERIMEN** 2.1.2 TP4, TP5
5	**18/4/22 - 22/4/22**	2.1.3 Justify the effects of consuming calories that do not meet individual requirements.	Collect information about the effects of consuming insufficient or excessive calories. Relate the Malaysians' lifestyle to their eating habits and its effects on their health. **Note:** Discussions should include restaurants which operate 24 hours, fast food restaurants and junk food advertising.	Collect information	**HOTS:** Linking, Application **TP1,TP2,TP3**

6	**25/4/22 - 29/4/22**	2.2 Nutrient requirements in plants 2.2.1 Explain with examples the functions of macronutrients and micronutrients to plants.	Collect information and classify the elements required by plants based on their quantity and functions: • Macronutrients - Carbon, hydrogen, oxygen, nitrogen, phosphorus, potassium, calcium, magnesium and sulphur • Micronutrients - Boron, molybdenum, zinc, manganese, copper and iron	Collect information, Classifying, Discussion	**HOTS:** Linking, Collecting and classifying TP3, TP4
		2.2.2 Conduct an experiment to study the effect of macronutrients deficiency on plants.	Study the effect of macronutrients deficiency to plant growth (nitrogen, phosphorus and potassium) **Note**: Proper pre-planning ahead of the experiment is required.	Experimenting, Group discussion, Presentation	**HOTS:** Analyzing, Synthesizing **EXPERIMEN** 2.2.2 TP4, TP5

7-8	**5/5/22 - 13/5/22**	2.3 Nitrogen Cycle 2.3.1 Communicate about the nitrogen cycle and its importance. .	Explain the processes and importance of nitrogen cycle.	Collect information and do a multimedia presentation	**HOTS:** Linking **TP1, TP2**
		2.4 Food Production Technology 2.4.1 Communicate about how to improve resources, quality and quantity of food production.	Discuss efforts to diversify food sources by various agencies to improve food quality and quantity of national food production such as: • Use quality breeds • Use modern technology • Education and guidance for farmers • Research and development • Optimal use of land and water areas • Efficient land management .	Collect information, Group discussion	**HOTS:** Linking, Application **TP1,TP2,TP3**
		2.4.2 Evaluate the use of pesticides and biological controls to increase the quality and quantity of food production. .	Discuss the effects as the following: • Side effects of insecticide use • Improper use of biological control	Discussion	**HOTS:** Linking, Problem solving **TP5**

8	**9/5/22 - 13/5/22**	2.5 Food processing technology 2.5.1 Communicate about food processing technology	Explain: a) The processing methods involved in producing several samples of food products: • Cooking • Fermentation • Dehydration/drying • Pasteurization • Canning • Freezing • Irradiation • Vacuum packaging b) Chemicals used in food processing such as preservatives, food colouring, bleaches, flavours, stabilizers, sweeteners, antioxidants and emulsifiers with examples. c) The impact of using chemicals in food processing on human and pets' health that will increase the cost of treatment and subsistence.	Multimedia presentation	**HOTS:** Linking, Application **TP2,TP3**
		2.6 Food and supplements 2.6.1 Communicate about issues related to health foods and health supplements. 2.6.2 Communicate about issues related to Halal Food Status.	Discuss about health food, health supplements and Halal Food status. Create a multimedia presentation on: • Food Act 1983 • Food Regulations 1985 • Malaysia's Halal Certification Procedure	Collect information, Discussion, Multimedia presentation	**HOTS:** Linking, Applicaation **TP2,TP3**

9	**17/5/22 - 20/5/22**	**PENILAIAN AWAL TAHUN**

PERFORMANCE LEVEL	DESCRIPTOR
1	**Recall** the knowledge and science skills on nutrition and food technology.
2	**Understand and explain** nutrition and food technology
3	**Apply** knowledge about nutrition and food technology and able to carry out simple tasks.
4	**Analyse** knowledge about nutrition and food technology in context of problem solving on events or natural phenomena.
5	**Evaluate** knowledge about nutrition and food technology in context of problem solving and decisionmaking to carry out a task.
6	**Design** a task using knowledge and science skills on nutrition and food technology in a creative and innovative ways to solve problems and making decision or carry out a task in a new situation taking into account the social/economic/cultural values of the community.

WEEK	DATE	CONTENT STANDARD / LEARNING STANDARD	LEARNING OBJECIVE / NOTES	SUGGESTED ACTIVITY	HOTS/ EXPERIMENT/ TP/ PBL
Theme 1: MAINTENANCE AND CONTINUITY OF LIFE **Learning area: 3.0 SUSTAINABILITY OF THE ENVIRONMENT**					

10	**23/5/22 - 27/5/22**	3.1 Product Life Cycle Pupil is able to: 3.1.1 Explain the meaning of carbon footprint. 3.1.2 Break down the product used by individual in a day.	Create a table to observe how a product is used in one day from the early hours of the morning until bedtime which involves the use of electricity, water, transportation, food, waste and the release of greenhouse gases. The frequency of the product used should also be mentioned. Some of the questions to be answered: • Is the product environmentally friendly? • What are the negative impact in the process of manufacturing the product? • Is the product safe to be used? • How much waste is produced after the product is used? • What other product can be produced from the waste? •Berapakah sisa yang dihasilkan apabila produk selesai digunakan? •Apakah produk lain yang boleh dihasilkan daripada sisa?	Observation, Group discussion, Presentation	**HOTS:** Analyzing, Synthesizing **TP4, TP5**
11	**30/5/22 - 3/6/22**	3.1.3 Justify the action that needs to be taken that is carbon handprint to reduce the emission of greenhouse gases in one day of one's life.	Consumers need to evaluate the product to ensure that it does not negatively impact environmental sustainability. **Reference:** *Modul Teknologi Hijau BIOLOGI, CETREE USM* *Tajuk: Enzim Teknologi Hijau*	Evaluation, Presentation .	**HOTS:** Evaluate, Make decision **TP4, TP5**

11	**30/5/22 - 3/6/22**	3.1.4 Communicate about the life cycle of a product.	Sketch the common life cycle of a product from source to disposal through recycling (cradle to cradle life cycle) or through decaying (cradle to grave life cycle). **Note:** Introduce the term upcycle.	Collect information	**HOTS:** Sort by priority Analyzing **TP4, TP5**
		3.1.5 Generate ideas about efficient management of plastic waste towards environmental sustainability.	Conduct a study on plastic pollution and collect data to organize a campaign on the impact of plastic use to raise awareness among school and local communities. **Note:** Introduce the issue of microplastic in the food chain. **References:** *Modul Teknologi Hijau KIMIA, CETREE USM.* *Tajuk: Melestarikan Polimer Mesra Alam* *Modul Teknologi Hijau FIZIK, CETREE USM.* *Tajuk: Apungan Mesra Alam*	**STEM's project Based Learning**: Plastic pollution is the accumulation of plastic products in the environment that have adverse effects on wildlife, their habitats and humans. urthermore, the chemical structure of most plastics allows them to withstand the natural decomposition process, resulting in plastics taking a longer time to decompose.	**HOTS:** Analyzing Problem solving **TP6** **PBL 1**
CUTI PENGGAL 1 4/6/2022 - 12/6/2022					

12	**13/6/22 - 17/6/22**	3.2 Environmental Pollution 3.2.1 Explain the types and sources of environmental pollution.	Class the types and sources of environmental pollution. **Note:** Pollution that need to be emphasized are: • Greenhouse effect and global warming • Acid rain • Soil pollution • Water pollution (including eutrophication) • Thermal pollution • Climate change	Use a graphic organizer	**HOTS:** Characterise, Linking **TP2, TP3**
		3.2.2 Study the water pollution level from domestic waste.	Measure the Biochemical Oxygen Demand, BOD as a water pollution parameter for different water samples. **Note:** The water pollution level is determined by the time taken for the methylene blue solution to decolourize.	Group discussion **Reference:** *Modul Teknologi Hijau KIMIA, CETREE USM..* *Tajuk: Justifikasi teknologi hijau dalam elektrokimia*	**HOTS:** Analyzing **TP 5**
		3.2.3 Create and design a purification method for contaminated water using green technology.	Use effective microorganisms to treat contaminated water. **Note:** Introduce the term effective microorganisms.	Discussion, Design **Referance:** *Modul Teknologi Hijau SAINS, CETREE USM* *Tajuk: Sisa menjadi Wira Hijau*	**HOTS:** Analyzing Design TP4, TP 5

13	**20/6/22 - 24/6/22**	3.3 Preservation and Conservation of the Environment 3.3.1 Justify the role of individuals in managing natural resources to maintain the balance in the environment.	Collect information on how to reduce carbon dioxide content in the atmosphere by using microalgae (negative emission technology). Discuss the use of Green Technology in the following sectors: • Hybrid cars • Solar technology • Biodiesel • Green buildings • Zero Carbon Emission **Note:** Introduce the term: Eco-currency	Collect informtion, Discussion **Referance:** •Modul Teknologi Hijau BIOLOGI, CETREE USM.Tajuk: Teknologi Penanaman Vertikal ke arah Pertanian Lestari. •Modul Teknologi Hijau FIZIK, CETREE USM. Tajuk: Bangunan Mesra Hijau. •Modul Teknologi Hijau FIZIK, CETREE USM. Tajuk: Tenaga Solar dan Matahariku.	**HOTS:** Linking, Analyzing, Application **TP4,TP3**
		3.3.2 Debate on the role of United Nations in addressing environmental issues globally.	Debate on the role of United Nations on the basis of several conventions that have been held like the Kyoto Protocol, the Rio Conference etcetera.	Discussion, Debate, Make conclusion	**HOTS:** Linking, Analyzing, Make conclusion **TP4,TP5**

PERFORMANCE LEVEL	DESCRIPTOR
1	**Recall** the knowledge and science skills on sustainability of the environment.
2	**Understand and explain** on sustainability of the environment.
3	**Apply** knowledge about on sustainability of the environment and able to carry out simple tasks.
4	**Analyse** knowledge about on sustainability of the environment in context of problem solving on events or natural phenomena.
5	**Evaluate** knowledge about on sustainability of the environment in context of problem solving and decision making to carry out a task.
6	**Design** a task using knowledge and science skills on on sustainability of the environment in acreative and innovative ways to solve problems and making decision or carry out a task in a new situation taking into account the social/economic/cultural values of the community.

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Theme 2: EXPLORATION OF ELEMENTS IN NATURE
Learning area: 4.0 RATE OF REACTION

14	**27/6/22 - 1/7/22**	4.1 Introduction to rate of reaction Pupil is able to: 4.1.1 Explain with examples of fast reactions and slow reactions in daily life. 4.1.2 Define the rate of reaction. 4.1.3 Determine the rate of reaction.	Carry out an activities to identify examples of fast and slow reactions and solve numerical problems involving data analysis. State the definition of rate of reaction. State at least 3 examples of rate f reaction	Problem solving	**HOTS:** Characterise, Linking **TP2, TP3**
14	**27/6/22 - 1/7/22**	4.2 Factors affecting rate of reaction 4.2.1 Carry out experiments to study factors affecting rate of reaction.	Investigate the factors such as temperature, concentration, size of reactant and catalyst that affect the rate of reaction. **Note:** Other factor that affects the rate of reaction is pressure.	Experimenting, Make conclusion, Group discussion	**HOTS:** Analyzing, Synthesizing **EXPERIMENT** 4.2.1 **TP4, TP5**
15	**4/7/22 - 8/7/22**	4.3 Application of rate of reaction 4.3.1 Communicate about the application of rate of reaction in daily life and industries.	Discuss the Haber Process. Discuss the Contact Process	Group discussion, Presentation	**HOTS:** Analyzing TP3

PERFORMANCE LEVEL	DESCRIPTOR
1	**Recall** the knowledge and science skills on rate of reaction.
2	**Understand and explain** rate of reaction.
3	**Apply** knowledge about rate of reaction and able to carry out simple tasks.
4	**Analyse** knowledge about rate of reaction in context of problem solving on events or natural phenomena.
5	**Evaluate** knowledge about rate of reaction in context of problem solving and decision making to carry out a task.
6	**Design** a task using knowledge and science skills on rate of reaction in a creative and innovative ways to solve problems and making decision or carry out a task in a new situation taking into account the social/economic/cultural values of the community.

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Theme 2: EXPLORATION OF ELEMENTS IN NATURE **Learning area: 5.0 CARBON COMPOUNDS**					
16	**12/7/22 - 15/7/22**	5.1 Introduction to carbon compounds Pupil is able to: 5.1.1 Identify carbon compounds in nature.	State the definition of organic carbon compounds and inorganic carbon compounds. State at least 5 examples of organic carbon compounds and inorganic carbon compounds	Discussion	**HOTS:** Characterise **TP1, TP2**

		5.1.2 Explain the importance of Carbon Cycle.	Illustrate a diagram of Carbon Cycle.	Illustrate Presentation	**HOTS:** **TP2, T3**
		5.2 Hydrocarbons 5.2.1 Describe hydrocarbon compounds and explain how carbon compounds are obtained from natural sources.	Carry out fractional distillation for petroleum. **Note:** Saturated and unsaturated hydrocarbons should be introduced	Demonstration Discussion Make conclusion	**HOTS:** Linking **TP3, TP4**
		2.2 Name members of the homologous group of alkanes and alkenes from carbon 1 to carbon 6. .	Build and name molecular model of alkanes and alkenes. **Note:** Only the first 6 straight-chain alkanes and alkenes are introduced.	Build and name molecular model of alkanes and alkenes.	**HOTS:** Analogy **TP3,TP4**

17 **18/7/22 - 22/7/22**

		5.2.3 Communicate about alternative energy sources and renewable energy in daily life.	Plan a project to produce methane gas from the food waste from the school canteen. Share the findings with the school community. **Note:** Precautions should be taken during the production of methane gas as it is flammable.	**STEM Project Based Learning** Waste disposal sites release carbon dioxide and methane gas due to decomposition of organic waste. There are countries that use methane gas to generate electricity. **Reference:** *Modul Teknologi Hijau SAINS*, CETREE USM. Title: *Sisa Menjadi Wira Hijau*	**HOTS:** Analyzing, Problem solving **TP6** **PBL 2**

18	**25/7/22 - 29/7/22**	5.3 Alcohol 5.3.1 Describe the preparation of alcohol.	Carry out the fermentation process using various types of fruit or starchy food. **Note:** Purification methods through distillation process should be carried out.	Carry out the fermentation process by using differences fruits.	**HOTS:** Analyzing, Synthesizing **TP3**
		5.3.2 Identify the physical properties and chemical properties of alcohol.	To study the physical properties of alcohol based on: * Colour * Smell * Physical properties at room temperature * Solubility in water * Volatility * Boiling point Carry out activities to study the chemical properties of alcohol through the process: * Combustion * Esterification	Experiment, Make conclusion, Group discussion	**HOTS:** Analyzing, Synthesizing **TP4,TP5**
		5.3.3 Communicate about the uses of alcohol in daily life.	State the uses of alcohol are as follows: * Fuel * Medicine * Cosmetics * Industry	Group discussion, Presentation Gallery Walk	**HOTS:** Linking, Application **TP2, TP3**
		5.3.4 Communicate about the effects of excessive alcohol consumption.	State the effect of excessive alcohol consuption.	Scrap book/poster	**HOTS:** Linking, Application, Synthezing **TP5,TP6**

19	**1/8/22 - 5/8/22**	5.4 Fats 5.4.1 State the content of fats and its sources. 5.4.2 Compare and contrast between saturated and unsaturated fats. 5.4.3 Explain with examples, the effects of eating food containing excess fat on health.	State: - Fat content from various sources - Saturated and unsaturated fats - The effect of excess fat intake on health	Collect information, Multimedia presentation	**HOTS:** Linking, Application **TP2, TP3**
20	**8/8/22 - 12/8/22**	5.5 Palm oil 5.5.1 Describe the structure of palm oil fruit.	Draw and label the cross section of the palm oil fruit.	Draw and label Conduct quizzes	**HOTS:** Characterize **TP1, TP2**
		5.5.2 Identify the quantity of oil from pulp and kernel.	Produce oil from palm oil fruits in the laboratory.	Experimenting, Group discussion	**HOTS:** Analyzing, Synthesizing **TP4,TP5**
		5.5.3 Explain in order the process of palm oil extraction in industry.	Explain the process of palm oil extraction in industry	Organize a visit to the palm oil processing factory or to Malaysian Palm Oil Board*,* *(*MPOB).	**HOTS:** Evalute, **TP4,TP5**

21-22	**15/8/22 -26/8/22**	**PENILAIAN 2**			
23	**29/8/22 - 2/9/22**	5.5.4 Describes components of palm oil. 5.5.5 Compare and contrast the composition of palm oil with other vegetable oils.	State the differences of composition in palm oil and other vegetable oils such as fatty acids and glycerol.	Search online and present the findings using a graphic organizer on the differences of composition in palm oil and other vegetable oils such as fatty acids and glycerol.	**HOTS:** Compare and contrast **TP4**
		5.5.6 State the chemical properties of palm oil 5.5.7 Explain the emulsification process of palm oil.	The chemical properties of palm oil are studied in the following aspects: * Oxidation * Hydrolysis * Esterification	Group discussion, Make conclusion	**HOTS:** Analyzing, Synthesizing **TP4,TP5**
		5.5.8 List the nutritional content of palm oil.	List the examples of nutrients in palm oil such as fat, vitamins, antioxidants and others	Group discussion	**HOTS:** Characterize **TP1,TP2**
		5.5.9 Justify the use of palm oil in healthcare and food.	Discuss the use of palm oil products and its effects on health. Example of palm oil products: * Medicine * Plastic surgery * Cosmetic * Prostatic	Collect information from online, Presentation	**HOTS:** Analyzing, Synthesizing **TP4,TP5**
CUTI PENGGAL 2 3/9/022 - 11/9/2022					

24	**12/9/22 - 15/9/22**	5.5.10 Carry out an experiment to produce soap through saponification process.	Use of natural fragrance to produce fragrant soap. Elements of entrepreneurship can be applied and practiced in this activity.	Experimenting **Reference:** *Modul Teknologi Hijau KIMIA, CETREE USM. Tajuk: Minyak Masak Terpakai Ke Arah Kelestarian.*	**HOTS:** Analyzing, Synthesizing **EXPERIMENT 5.5.10** **TP4,TP5**
		5.5.11 Communicate about the cleansing action of soap.	Explain: 🎬 structure of soap molecule 🎬 cleansing action of soap	View video, Simulation to discuss **Reference:** *Modul Teknologi Hijau KIMIA*, CETREE USM. *Tajuk: Minyak Masak Terpakai Ke Arah Kelestarian.*	**HOTS:** Analyzing, Syntheizing TP4,TP5
		5.5.12 Generate ideas on sustainable management and their importance in the palm oil industry.	Explain the efficient management of the oil palm industry to counter the negative perception of western country on local palm oil. **Note:** The scope of the management discussed is: * Land use * Wastewater * Air quality * Palm oil waste	Debate/Forum **References:** Modul Teknologi Hijau BIOLOGI, CETREE USM. Tajuk: Memahami Impak Mikroorganisma Ke Atas Sisa Untuk Kehidupan Yang Lestari.	**HOTS:** Analyzing, Synthesizing **TP4,TP5**

PERFORMANCE LEVEL	DESCRIPTOR
1	**Recall** the knowledge and science skills on carbon compounds.
2	**Understand and explain** carbon compounds.
3	**Apply** knowledge about carbon compounds and able to carry out simple tasks.
4	**Analyse** knowledge about carbon compounds in context of problem solving on events or natural phenomena..
5	**Evaluate** knowledge about carbon compounds in context of problem solving and decision making to carry out a task.
6	**Evaluate** knowledge about carbon compounds in context of problem solving and decision making to carry out a task.

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		Theme 2: EXPLORATION OF ELEMENTS IN NATURE **Learning area: 6.0 ELECTROCHEMISTRY**			
25	**19/9/22 - 23/9/22**	6.1 Electrolytic Cell Pupil is able to: 6.1.1 Understand electrolysis. .	Draw and label the electrolytic cell structure. Introduce terms in electrolysis terms such as anode, cathode, anion, cation, electrolyte and non-electrolyte	Draw and label	**HOTS:** Characterise, Collect information **TP1,TP2**

		6.1.2 Carry out an experiment to study electrolysis of ionic compounds in various conditions.	Carry out electrolysis on ionic compounds in solid, molten and aqueous state. **Note:** Explain the movement of ions to electrodes in the electrolysis process. **Reference**: *Modul Teknologi Hijau KIMIA*, CETREE USM. *Tajuk: Mewajarkan Teknologi Hijau dalam Elektrokimia*.	Experimenting, Group discussion	**HOTS:** Analyzing, Synthesizing **TP4,TP5**
25	**19/9/22 - 23/9/22**	6.1.3 Carry out an experiment to study the factors affecting the products in electrolysis.	Factor affecting the products in electrolysis * Position of ions in the electrochemical series * Concentration of electrolyte * Types of electrode	Experimenting, Group discussion	**HOTS:** Analyzing, Synthesizing **TP4,TP5**
26	**26/9/22 - 30/9/22**	6.1.4 Comunicate about application of electrolysis in the industries.	State the eamples of application of electrolysis in industries like: * Extraction of metal * Electroplating of metal * Purification of metal * Waste water treatment using electrocoagulation **Reference:** *Modul Teknologi Hijau KIMIA*, CETREE USM. *Tajuk: Mewajarkan Teknologi Hijau dalam Elektrokimia*	Group discussion	**HOTS:** Analyzing, Synthesizing **TP3,TP4**

26	**26/9/22 - 30/9/22**	6.2 Chemical cell 6.2.1 Explain the energy change in a simple chemical cell.	Construct a simple chemical cell Indicates the process of converting chemical energy to electrical energy	Construt simple cell, Group discussion	**HOTS:** Design **TP3,TP4**
		6.2.2 Generate ideas on application of chemical cell concepts in generating electricity from a variety of sources.	Plan one activity to produce electrical energy from * Fruits or any parts of plant * sea water	STEM Project Based Learning Generation of electrical energy can be obtained from a variety of sources. An example of simple chemical cell is a device that can converts chemical energy into electrical energy. **Reference:** *Modul Teknologi Hijau KIMIA*, CETREE USM. *Tajuk: Mewajarkan Teknologi Hijau dalam Elektrokimia*.	**HOTS:** Analyzing, Synthesizing **TP4,TP5** **PBL 3**

PERFORMANCE LEVEL	DESCRIPTOR
1	**Recall** the knowledge and science skills on electrochemistry.
2	**Understand and explain** electrochemistry
3	**Apply** knowledge about electrochemistry and able to carry out simple tasks.
4	**Analyse** knowledge about electrochemistry in context of problem solving on events or natural Phenomena.
5	**Evaluate** knowledge about electrochemistry in context of problem solving and decision making to carry out a task.
6	**Design** a task using knowledge and science skills on electrochemistry in a creative and innovative ways to solve problems and making decision or carry out a task in a new situation taking into account the social/economic/cultural values of the community.

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Theme 3: ENERGY AND SUSTAINABILITY OF LIFE
Learning area: 7.0 LIGHT AND OPTICS

27	**3/10/22 - 7/10/22**	7.1 Formation of image by lenses Pupil is able to: 7.1.1 Describe convex lenses as a converging lenses and concave lenses as a diverging lenses.	Show a convex lenses as a converging lenses and a concave lenses as a diverging lenses. Determine the focal point for convex and concave lenses.	Use an optical ray kit	**HOTS:** Anayzing, Characterise **TP2,TP3**
		7.1.2 Determine the focal length of a convex lens using a distant object.	Carry out an activity to determine the focal length for a convex lens using a distant object.	Experimenting, Group discussion	**HOTS:** Analizing, Synthesizing **TP4,TP5**
27	**3/10/22 - 7/10/22**	7.1.3 Determine the characteristics of images formed by convex and concave lenses using ray diagrams.	Determine the characteristics of images formed by convex and concave lenses for different object distances: • u>2f • u = 2f • f<u< 2f • u = f • u< f Introduce the optical terms namely principal axis, lens axis, optical center (O), focal point (F), object distance (u), image distance (v) and focal length (f). A convex lens is used as a magnifying lens when u < f.	Group Activity, Make conclusion, Draw ray diagram	**HOTS:** Linking, Nalyzing, Synthesizing **TP3,TP4**

28	**11/10/22 - 14/10/22**	7.2 Optical instruments 7.2.1 Describes the formation of the final image formed by telescopes and microscopes.	Describes the formation of final image formed by a telescope and a microscope with the help of ray diagrams. **Note:** The magnifying power of a microscope is the product of the magnifying power of the object lens and the eyepiece, thus justifying the use of specific microscope lenses to study different microscopic objects.	Draw ray diagram	**HOTS:** Linking, Analyzing, Synthesizing **TP3,TP4**
		7.2.2 Design and build a simple telescope.	Build a simple telescope model. **Note:** At normal adjustment, the distance between the object lens and the eyepiece = fo + fe fo = focal length of the object lens fe = focal length of the eyepiece	Build a simple telescope model.	**HOTS:** Design **TP3, TP4,TP5**
28	**11/10/22 - 14/10/22**	7.2.3 Communicate about the application of lenses in optical instruments.	Discuss the use of lenses in instruments such as cameras, smartphones, LCD projectors, spectacles, magnifying glass and CCTV. Further discussion on the limit of the thickness of a smartphone based on the focal length of the camera lens.	Group discussion, Multimedia presentation	**HOTS:** Linking, Analyzing, Synthesizing **TP3,TP4**

PERFORMANCE LEVEL	DESCRIPTOR
1	**Recall** the knowledge and science skills on light and optics.
2	**Understand and explain** light and optics.
3	**Apply** knowledge about light and optics and able to carry out simple tasks.
4	**Analyse** knowledge about light and optics in context of problem solving on events or natural phenomena.
5	**Evaluate** knowledge about light and optics in context of problem solving and decision making to carry out a task.
6	**Design** a task using knowledge and science skills on light and optics in a creative and innovative ways to solve problems and making decision or carry out a task in a new situation taking into account the social/economic/cultural values of the community.

WEEK	DATE	CONTENT STANDARD / LEARNING STANDARD	LEARNING OBJECIVE / NOTES	SUGGESTED ACTIVITY	HOTS/ EXPERIMENT/ TP/ PBL
Theme 3: ENERGY AND SUSTAINABILITY OF LIFE **Learning area: 8.0 FORCE AND PRESSURE**					

29	**17/10/22 - 21/10/22**	8.1 Pressure in fluids Pupil is able to: 8.1.1 Explain the concept of pressure in fluids in an enclosed system	Carry out an activity to explain Pascal's principle using Pascal's piston. Note: Pascal's principle is described as pressure being uniformly transmitted in the fluid in an enclosed system. Explanation of the four fundamental principles of hydraulic systems should be emphasized: * Liquids have no shape. * Liquids are incompressible. * Transmit pressure in all directions * Able to perform heavy tasks.	Group discussion	**HOTS:** Linking, Characterize **TP1,TP2**
		8.1.2 Communicate about the application of Pascal's principle in daily life.	Gather information on the application of Pascal's principle in daily life such as: * Hydraulic jack system * Hydraulic brake system * Dental care chair	Collect information	**HOTS:** Linking, Application **TP3,TP4**
30	**25/10/22 - 28/10/22**	8.1.3 Explain the relationship between fluid velocity and pressure. .	Explain the Bernoulli principle. Carry out an activity to describe Bernoulli's principle using a Venturi tube. Discuss natural phenomena such as the roof of a house being lifted during a storm and how to overcome the problem.	Venturi tube activity	**HOTS:** Problem solving **TP5**

31	**31/10/22 - 3/11/22**	8.1.4 Communicate about the application of Bernoulli's principle in daily life.	Explain the application of Bernoulli's principle in daily life such as the aerofoil shaped wings of an airplane, helicopters, drones, bunsen burners, safety lines at the railway stations and in various sports. **Note:** The resulting lift on the wings of an airplane results from: • Aerofoil shape • Introduce the term angle of attack	Group discussion, Gallery Walk	**HOTS:** Linking, Analyzing, Application **TP4, TP5**
		8.1.5 Design a tool using the principle of pressure in fluids.	Design a tool to simplify work using a hydraulic system.	**STEM project-based learning** Hydraulic systems work by transmitting pressure through fluids to move a piston. Machinery such as cranes, pumps, excavators and hydraulic jacks are used to lift or lower objects. **Reference:** *Modul Teknologi Hijau ASAS KELESTARIAN, CETREE USM.* *Tajuk: Sistem Pengangkat Hijau.*	**HOTS:** Design, Analyzing, Application **TP4,TP5** **PBL 4**

PERFORMANCE LEVEL	DESCRIPTOR
1	**Recall** the knowledge and science skills on force and pressure.
2	**Understand and explain** force and pressure
3	**Apply** knowledge about force and pressure and able to carry out simple tasks
4	**Analyse** knowledge about force and pressure in context of problem solving on events or natural phenomena.
5	**Evaluate** knowledge about force and pressure in context of problem solving and decision making to carry out a task.
6	**Design** a task using knowledge and science skills on force and pressure in a creative and innovative ways to solve problems and making decision or carry out a task in a new situation taking into account the social/economic/cultural values of the community

WEEK	DATE	CONTENT STANDARD / LEARNING STANDARD	LEARNING OBJECIVE / NOTES	SUGGESTED ACTIVITY	HOTS/ EXPERIMENT/ TP/ PBL

Theme 3: ENERGY AND SUSTAINABILITY OF LIFE
Learning area: EARTH AND SPACE EXPLORATION

32 26-30/07/2021	**7/11/22 - 11/11/22**	9.1 Satellite Pupil is able to: 9.1.1 Explain the types of satellite orbits	Describing the types of satellite orbits, that is Low Earth Orbit (LEO), Middle Earth Orbit (MEO), Geosynchronous Orbit (GSO), Geostationary Orbit (GEO) and High Earth Orbit (HEO)	Collect information, Presentation	**HOTS:** Linking, Characterize **TP1,TP2**
32	**7/11/22 - 11/11/22**	9.1.2 Explain with diagrams the apogee and perigee positions of a satellite in an elliptical orbit. 9.1.3 Relate the height of an orbit and the velocity of a satellite.	Identify the relationship between the height of an orbit and the velocity of satellite by: • Identifying satellites and velocity of satellites at different orbital heights • Tabulate the information obtained • Conclude the relationship between the height of the orbit with the velocity of satellite. **Note:** Examples of URL that can be used: https://in-the-sky.org/satmap_worldmap.php	Group discussion, Presentation	**HOTS:** Linking, Analyzing **TP2,TP3,TP4**

32	**7/11/22 - 11/11/22**	9.1.4 Explain how a satellite is launched and placed in orbit.	Explain how to place satellites in orbit directly or through Hohmann's transfer orbit. Find information and differentiate between single launch vehicles, expendable launch vehicles (ELV) and reusable launch vehicle (RLV).	Collect information,	**HOTS:** Linking, Analyzing, Compare and contrast **TP3,TP4**
		9.1.5 Explain the function of the space station.	Gather information about space stations, such as the International Space Station (ISS) and watch videos to discuss the functions and lives of astronauts in the ISS. **Note:** Introduce microgravity	Collect information,	**HOTS:** Linking, Analyzing, Application **TP3,TP4**
33	**14/11/22 - 18/11/22**	9.1.6 Communicate about the methods for tracking space stations	State the altitude of the orbit and velocity of the ISS and the radius of the Earth to calculate the frequency of ISS orbiting Earth in a day.	Collect information, Presentation	**HOTS:** Linking, Analyzing, Application, Synthesizing **TP3,TP4,TP5**
		9.1.7 Elaborate the impact of rapid development in space technology.	Investigate the impact of the rapid development of space technology such as: • Increased waste in space (space junks) • Increased research and development activities	Collect information	**HOTS:** Linking, Analyzing, Applicagtion **TP3,TP4**

34-35	**21/11/22 - 2/12/22**	9.2 Global Positioning System (GPS) 9.2.1 Explain Global Positioning Systems (GPS).	Explain the information: • Meaning of GPS • How GPS works • Uses of GPS	Collect information, Presentation, Evaluate	**HOTS:** Linking, Analyzing, Application **TP3,TP4**
		9.2.2 Apply GPS coordinate system for navigation purposes.	Use GPS coordinates for one location are written in the following two formats: • degrees, minutes and seconds (DMS) • decimal degree (DD)	Collect information	**HOTS:** Linking, Analyzing, Application **TP3,TP4**

PERFORMANCE LEVEL	DESCRIPTOR
1	**Recall** the knowledge and science skills on space technology.
2	**Understand and explain** space technology.
3	**Apply** knowledge about space technology and able to carry out simple tasks.
4	**Analyse** knowledge about space technology in context of problem solving on events or natural phenomena.
5	**Evaluate** knowledge about space technology in context of problem solving and decision making to carry out a task.
6	**Design** a task using knowledge and science skills on space technology in a creative and innovative ways to solve problems and making decision or carry out a task in a new situation taking into account the social/economic/cultural values of the community

36	**5/12/22 - 9/12/22**	**MINGGU ULANGKAJI**

CUTI PENGGAL 3 10/12/2022 - 1/1/2023			
37	**2/1/23 - 6/1/23**	**PECUTAN AKHIR SPM 2022**	
38	**9/1/23 - 13/1/23**	**PECUTAN AKHIR SPM 2022**	
38	**16/1/23 - 20/1/23**	**PECUTAN AKHIR SPM 2022**	
40	**23/1/23 - 27/1/23**	**PECUTAN AKHIR SPM 2022**	
41	**30/1/23 - 3/2/23**	**PECUTAN AKHIR SPM 2022**	
42	**6/2/23 - 10/2/23**	**PECUTAN AKHIR SPM 2022**	
43	**13/2/23 - 17/2/23**	**PECUTAN AKHIR SPM 2022**	