



5th	Workshop	PBL process	Core STEM	Core Subjects	Activity	General description	Curriculum Strands		
							Core Concepts	Core Skills	Strands
Workshop 1	Sun-Earth-Moon	Understand the final mission First try of teamwork: how to exchange ideas	SCIENCE	Astronomy; Optics; Geography	1. Laser in water: light goes straight in air; 2. make sun-earth-moon models; 3. observe and discuss: why do we have different moon shapes in a month?	Students will explore how light and the motions of celestial bodies explain the moon phases. First, by shining a laser through clean water, they will observe that light travels in straight lines in a clear medium. This helps them understand how sunlight reaches Earth and creates shadows. Next, students will make simple Sun–Earth–Moon models using everyday materials to visualize the movements in 3D. Finally, students will explore and discover why the Moon appears in different shapes throughout the month with their models.	Light travels in straight lines in a homogeneous medium (such as air)	Exploration; Critical thinking; design and making	Astronomy
							Earth's rotation and revolution cause day, night and seasons		Light
							The moon's phases are caused by its orbit around Earth		Electronic
Workshop 2	Mechanical arm	Make the most difficult part of the model Work as different roles: organizer, designer, maker, resource manager	Science; Engineering		1. Knowledge preparing 2. Make mechanical arm with one hydraulic unit 3. CPS: discuss, design, do - at least 2 hydraulic units	Students learn knowledge about force and hydraulic units, and experience engineering work process. First, students learn what force is and how a hydraulic unit works. Then, they build a simple mechanical arm with one hydraulic unit under instruction and supervise. Finally, in teams, they design and create a more advanced hydraulic arm with at least two units by themselves to collect as many "moon samples" as possible.	Force is push and pull. Experience how force transforms in real-life examples.	Working scientifically; Designing and making	Force
							Engineering work process: design, make, test, improve.		Hydraulic
							Collaborate and communicate		Engineering
Workshop 3	Mars Rover Challenge	Work as different roles: organizer, recorder, operator, time keeper	Engineering; Math	Computer Science	1. knowledge preparing: spacial skills and 3D imagination; Know "decomposition""algorithms""debugging". 2. work in teams; figure out the funtions of the pads 3. Complete the missions 4. Summary: basic computational thinking	This workshop aims to develop spacial skills and help student understand 3 basic concepts in computer science by solving space-related problems. By using Indi car as a mars rover and the colorful pads as part of the algorithms, student needs to figure out how to program the car to go around the mars rock.	Decomposition, algorithms, debugging	Spacial skills	Programming
							Angle	Compurtational thinking	
Final	Space Station Model	Report & Exhibit Evaluate & Sumarize			Showcase & Prizegiving	Work in team/class: Design and make a space station model. Driving question: How can your space station react with the space environment? 1. Observation dome 2. Sample collecting device			

Note If the pupils didn't make moonbase models from 4th class workshops, we recommend them to do that first.

4th	Workshop	PBL process	Core STEM	Core Subjects	Activity	General description	Curriculum Strands			
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Workshop 1	Think Like a Scientist: & Microscopy!	Launch: Intro, release task, rough plan	SCIENCE MATHS	SCIENCE MATHS MICROSCOPY	<ul style="list-style-type: none"> • Guess Who Game: Who are the scientists? • Lego Challenge: Learn and use the scientific method to build a bridge. • Introduce final mission. • Find teammates and set up rules. • Microscopy: Use portable microscopes to find your favorite images and share with teammates. 	During this activity students will explore the different parts of the scientific method as they learn to think scientifically. Working in group, students will try it out by using Lego to build a bridge: question, hypothesis, experiment and conclusion. Finally, student will learn to use microscopes to observe the world around them.	The Scientific Method.	Working Scientifically	Living Things	
		Team building & rule making								
Workshop 2	The Science of Ecosystems!	Break the driving question into several small questions and make a question map/problem solving plan	SCIENCE	BIOLOGY GEOLOGY MICROSCOPY FITOLOGY ECOLOGY	<ul style="list-style-type: none"> • Make a question map & link • Build your own self-sustainable ecosystem and observe your terrarium. - material managers • Write research diary week 1 - work in team • (after-workshop) Research diary of your terrarium - work in team 	During this activity, student will explore the different components that make an ecosystem to make their own self-watering terrarium. Student will be able to observe and learn about the cycle of water and the stability of their own ecosystem.	Layers of Soil and their function Soil Formation and Erosion	Exploration Investigation Critical thinking Scientific Method	Living Things	
		Take turns to work as material managers					Plant Morphology Importance of Plants Plants life cycle		Materials	
		Work as different roles: organizer, recorder, illustrator					Water cycle Ecosystems Plant growth Requirements		Environmental Awareness	
Workshop 3	Stars and Electronics	Write down your reflection on teamwork. Communicate with your teammates and modify the team rules.	ENGINEERING TECHNOLOGY	ELECTRONICS CIRCUITS MATERIALS SCIENCE ASTRONOMY	<ul style="list-style-type: none"> • Reflect & communicate: how is our team work going? • Plan review & link • Roleplay - electrons & protons • Cola run - positively charged and negatively charged • Hand in hand - Make a circuit • Make your own circuit - material managers • Make star projectors 	During this activity students will learn about the basic elements of electric circuits and will use this knowledge to create a portable star projector to learn about their favorite constellations.	Electricity: atom, electron, proton; uncharged, negatively charged, positively charged; circuit.	Designing and Making, Working Scientifically	Energy and Forces	
		Review and follow up the plan							Materials	
Workshop 4	The Sustainable Space Explorer	Review and follow up the plan	ENGINEERING TECHNOLOGY	SCIENCE, MATHS ELECTRONICS CIRCUITS SCIENCE SUSTAINABILITY RENEWABLE ENERGY	<ul style="list-style-type: none"> • Plan review & link • Build your own wind turbine. • Test and record the electricity your wind turbines can generate. - work in team, compare data 	Building on the previous workshops, students will learn to harvest energy from the wind by building their own wind turbine and learning about how the shape and size of the blades impacts energy generation.	Energy and Forces, Magnetism and Electricity, Properties of Materials	Working Scientifically, Designing and Making	Materials	
		Work as different roles: organizer, recorder, illustrator, material manager							Energy and Forces	
									Environmental Awareness	
Workshop 5	Rocket Science	Additional knowledge about space	TECHNOLOGY ENGINEERING SCIENCE MATHS	SCIENCE, ASTRONOMY, ENGINEERING, CHEMISTRY, PHYSICS, MATHS	<ul style="list-style-type: none"> • Make and launch a paper rocket • Calculate the height 	Building on previous workshops about engineering and design principles, students will develop their own paper rockets to be launched using an air pressure rocket launcher. Students will have the STEM skills developed during previous workshops to make improvements and compete for the highest or longest time-of-flight rocket. The activity will culminate with the launch of a solid fuel rocket.	Forces; Properties of Materials; Materials and change; Science and the Environment. Materials and Change.	Designing and Making, Working Scientifically	Materials	
										Energy and Forces
										Environmental Awareness
Showcase	Moonbase Model	Showcase and Summary			<ul style="list-style-type: none"> • Review of the project & workshops • Showcase: Presentation, Q&A, Judging, Prizegiving • Summary 	Design, build and present a moonbase with 3 areas: living & lab area, power plant area. Students need to use the knowledge about electricity, ecosystem and renewable energy they learned from previous workshops. Student will work in teams. Professional guests will be invited to judge and give prizes.				