Title of the STEAM Unit: Earthquake

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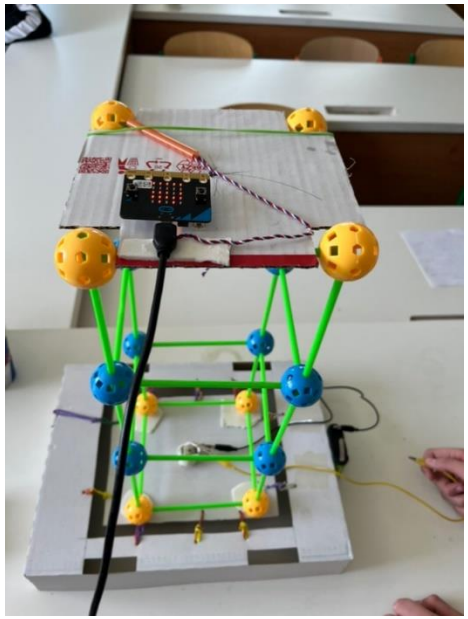
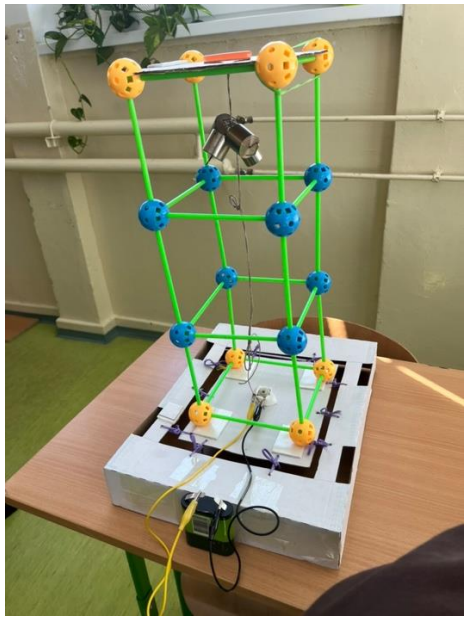
RELATED SUBJECTS	GRADE RECOMMENDATIONS	TOTAL ACTIVITY TIME	LEARNING OBJECTIVES DURING THE LESSON SUBJECT-SPECIFIC COMPETENCIES	LEARNING OBJECTIVES AFTER THE LESSON
Mathematics, physics, science, geology, technology, art, computer science	Age 14-15 / grade 9	360 min	The pupil can explain the causes of an earthquake. Works in a group, respects classmates, cares about the common outcome. Can create a model of the structure and the bedrock to demonstrate the magnitude of the movement of the structure due to earthquake waves.	To be able to tell the reason for the movement of lithospheric plates, to show on a map how lithospheric plates have moved in the geological past, to be able to state the causes of earthquakes, to give examples of the strength of an earthquake, to draw geometric shapes, to develop social and psychomotor skills. Will be able to describe the phenomenon when earthquake waves

				propagate through the surface of the earth and their effects on built houses.

OVERVIEW: TOPIC & PURPOSE

With increasing knowledge of earthquakes and advances in engineering, modern buildings can be constructed to resist ground displacement to mitigate the potential damage that can result from a major earthquake. The pupil thinks about how the shaking of a building can be reduced if an earthquake occurs. Designs a model that demonstrates the movement of the ground (bedrock), designs a building that will be perched on a moving platform. Thinks about how it would be possible to record the shaking of the building (apart from seeing it). He works with a microbit and programs it to be able to record the shaking (shake). He works with different options to prove that the shaking of a building can be reduced.





ACTIVITY PREREQUISITES

Geology - earthquakes, Mathematics - measuring length, Geometry - drawing, Technology - model conception, construction drawing, fine motor skills, Physics - simple circuit, force, Computer Science - microbit, programming, Art - colouring the substrate, Financial literacy - getting the material at the lowest price

Prior to the activity the pupil will know about earthquakes, their origin, propagation and effects. He/she can use a geographical map to show locations where an earthquake is likely to occur. The learner can design a model of a simple house. Can measure and draw line segments. The pupil has sufficiently developed psychomotor skills (cutting cardboard). The pupil has a positive attitude to work and cooperation with classmates, perceives and accepts the set goal as a result of working together, which takes him/her to a higher level.

STEAM ELEMENTS

ELEMENT 1: **context presentation**	**An earthquake can cause significant damage not only to property but also to people's lives. It is therefore important to understand the basic principles of the movement of the earth's spheres, how this movement affects different homes/buildings, in order to prevent damage.**
ELEMENT 2: **creative design**	**Creating the base of a building from cardboard.** **Installing a moving platform.** **Installing a motor with a propeller. Introducing the motor into the direct current.** **Painting the base of the building to a realistic condition.** **Construction of the building structure. Installing the H platform to which the string with weights will be attached.** **Installing microbit equipment.** **Programming the microbit equipment.**
ELEMENT 3: **emotional and social learning**	**Learning to cooperate and collaborate.** **Develop mutual respect between pupils.** **Involvement in the creation of the project.** **Enjoyment of the progress of the work.**

	The joy of accomplishing a goal.

STEAM SUBJECT ELEMENTS

STEAM SUBJECTS	SCIENCE	TECHNOLOGY	ENGINEERING	ARTS	MATHEMATICS
SHORT INTRODUCTION TO RELATED SUBJECT ELEMENTS	Earthquake	Creation of the model - cutting out, cutting out, fixing individual parts	Model design - model drawing, substructure, building construction	Painting individual parts of the model in order to get closer to the real look	Measurement and drawing of individual parts of the model, recalculation of the scale of the building

SYLLABUS

LESSONS	SUBJECTS	TOPIC OF THE UNIT	LEARNING OBJECTIVES DURING THE LESSON: SUBJECT SPECIFIC COMPETENCIES	LEARNING OBJECTIVES AFTER THE LESSON: STEAM COMPETENCIES
1	Project creation	Preparation of the activity: formulation of the task, objective of the activity, formulation of questions.	Communication, reasoning, using and working with information, problem solving, collaborating in a group, presenting	The pupil through his own organization of work can manage himself, the team, develop a schedule of his work, obtain the

			oneself, as well as working in a group.	necessary information, process them, can also look for problems to be solved, correctly name them, form a hypothesis to verify it.
2	Personal and social development Project creation.	Preparation of the activity: design of the procedure and tools.	Acquiring a positive attitude towards yourself and others.	The pupil can work as an active member of a group and accepts the rules of group work. The pupil prefers to avoid problems and conflicts or is ready to find ways of solving them.
3	Mathematics, Technology, Art	Formation of the subsoil: measuring, tracing, forming the subsoil, painting the foundations of the building.	The pupil recognizes and uses natural technical materials, tools and equipment safely. The pupil experiments with ideas, materials, technologies and techniques. The pupil feels responsible for the quality of the results of his/her work.	The pupil can distinguish and use a material on the basis of its properties. The pupil can design a building plan and measure the actual dimensions according to it. The pupil is aware of the importance of knowledge from science for human life.

			The pupil learns basic work skills and habits, organizes and plans work. The pupil sees work activity as an opportunity for self-development. The pupil learns about the means of expression of visual art - architecture. The pupil learns about mathematics as a part of human culture and an important tool for social progress.	
4	Technology	Installing equipment into the platform.	The pupil experiments with ideas, materials, technologies and techniques. Pupil applies creativity and own ideas in work activities and in making efforts to achieve a good result.	The pupil knows how to carry out the experiment according to the proposed work procedure.
5	Geometry, Mathematics, Physics	Creation of the building: drawing of the building	The pupil learns about mathematics as	The pupil can draw a building and construct

		and assembling the building from individual parts. Fixing the building to the moving platform.	a part of human culture and an important tool for social progress. The pupil applies empirical methods of work - in particular experimentation and measurement. Presents and defends his/her procedures and claims with logical reasoning based on evidence.	it according to the drawing.
6	Computer Science	Motion sensor: Programming of the microbit, its installation on the building, shaking tests of the building.	The pupil creates instructions and programs according to the given rules. The pupil reasons, argues and evaluates logically. Pupil recognizes how computing has influenced society.	The student can use the makecode programming environment to program a microbit according to the required criteria.
7	Physics, Geology, Informatics	Solution to the problem: Finding out when the building shakes the most and the least.	The pupil assesses the usefulness of scientific knowledge and technical inventions for the development of society.	The pupil is able to explain why a building shakes differently when loaded at different heights.

			The pupil acquires an interest in nature and the world of technology.	
8	Project development and presentation skills	Conclusion: project presentation.	The pupil will learn to present his/her work both in writing and verbally using information and communication technologies. Plans and implements simple projects in the field of geology.	The pupil can present his/her products and opinions in a refined manner, create a presentation plan, plan and carry out basic research, identify his/her strengths and use them in the appropriate selection of a topic, apply an appropriate formal structure to present the results of his/her research.

INSTRUCTIONAL PLAN BY LESSON

LESSON: Science, Technology, Engineering, Arts, Mathematics (360 min.)

TIME PLAN	TEACHING & LEARNING ACTIVITIES	MATERIALS	LEARNING OBJECTIVES

INTRODUCTION (45 minutes)	Project preparation.	Pen and paper	The pupil can design the project goal, procedure, tools, form a team and work in it as a full member.
LEARNING ACTIVITIES (270 minutes)	Formation of subsoil: measuring, tracing, forming the subsoil, painting the foundations of the building. Installing equipment into the platform. Creating the structure: drawing the structure and assembling the structure from the individual parts. Fixing the building to the moving platform. Motion sensor: Programming the microbit, installing it on the structure, shake testing of the structure. Problem solving.	Ruler, pencil, "razor" knife, oversize cardboard box, tempera paints, paintbrush, water cup, string, weights, microbit, sturdier straws, "marshmellow", battery (4.5 V), wires, motor, rubber bands, double-sided tape, plasticine.	
WRAP-UP & EVALUATION (45 minutes)	Conclusion: presentation of the project.	interactive board/white board, PC	

EVALUATION PLAN BY LESSON

The lesson has not been realized yet.

NOTES

It is appropriate to create a mock model based on a draft drawing. This will remove inaccuracies from the original intention that the pupils were thinking about. Pupils come up with these constraints themselves and modify them based on the new finding.

The cardboard should be harder, stronger - when painting it, thinner cardboard will quickly soak up water and ruin the building.

ACTIVITY SHEETS TO BE LINKED

EVALUATION MATERIALS TO BE LINKED

REFERENCES / SUPPORTING MATERIALS TO BE LINKED