



Grade / Age: Secondary School Students (Grades 9-12 / Ages 14-18)

Topic: 3D Printing and Geometric Design

Subject area: Mathematics, Sciences, Arts

Keywords: 3D Printing, Geometry, Design, Collaboration, Creativity, Problem-Solving, STEAM

Single/team work: Team Work

Language: English (can be adapted to other languages)

Duration: 4-6 weeks

Description of the Task:

Geometric Explorations: Sculpting Science and Mathematics through 3D Printing



Students will work in teams to design and create a 3D-printed geometric sculpture that represents a scientific concept or mathematical theorem. The project will include the following stages:

Research and Exploration: Teams will choose a scientific concept or mathematical theorem and explore its geometric representation.

Design Phase: Using 3D modeling software, students will design a geometric sculpture that visually represents their chosen concept or theorem.

Prototyping: Teams will create prototypes using CraftBot 3D printers, iterating and refining their designs.

Final Creation: Students will print and assemble their final sculptures.

Presentation and Reflection: Teams will present their sculptures and the process to the class, reflecting on what they learned and how their work connects to mathematics, sciences, and arts.

Solutions of the Task:

The solution will vary depending on the chosen concept or theorem. Students will be assessed on their research, design process, collaboration, creativity, final product, and presentation.

Prior knowledge:

Basic understanding of geometry, familiarity with scientific concepts or mathematical theorems, and introductory experience with 3D modeling software (training can be provided).

Comments:

This project fosters collaboration, creativity, and critical thinking. It integrates mathematics, sciences, and arts through a hands-on, real-world application. Teachers may need to provide training or resources on 3D modeling and printing.

Connection to other subjects/topics/areas:

Mathematics: Exploration of geometric shapes, spatial reasoning, application of mathematical theorems.

Sciences: Connection to scientific concepts, understanding of materials and 3D printing technology.

Arts: Aesthetic design, creativity, visual representation of abstract concepts.

Technology: Use of 3D modeling software, 3D printing technology.

Language Arts: Research, presentation skills, written reflection.

This activity can be adapted to various grade levels and can be extended to include connections to other subject areas. It provides a rich, interdisciplinary experience that engages students in a meaningful, real-world project.

Objective: Transformative approach to education through 3D printing, fostering active and experiential learning, enhancing key competencies.

Methodology: Cyclical process of design, creation, reflection, and adaptation, promoting individual and collaborative problem-solving.

Tools Used: CraftBot 3D printers

Projects Realized: Printing a board game, sculptures of STEAM celebrities, simple mechanical instruments, action figures, and logos based on students' wishes.



Learning Outcomes: Enhanced autonomy and engagement, understanding of different ideas and perspectives, inclusive and diverse learning environment.

Impact on STEAM Education: 3D printing serves as a powerful tool in STEAM education, integrating digital fabrication and modeling, encouraging hands-on, inquiry-based learning, and transforming the learning experience.