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| ACTIVITY PLAN | | | | |
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| **Theme** | **Subtopic** | **Activity Title** |
| STEAM Integration in Environmental Education | Engineering for Sustainable Infrastructure | Geodetic dome model |

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| Introduction part (or activity overview) |
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| **Introduction part (or activity overview)** | This activity aims to help explore geometric principles and sustainable architecture by creating geodesic dome models. Practically constructing these domes delves into the structural intricacies of geodesic domes, learning about their energy-efficient design and ecological implications. |
| **SETTING** | Classroom |

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| Materials Needed |
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| **Materials Needed** | Sheets of paper (draft paper can be used), adhesive tape, scissors, pencils, ruler, adhesive glue sticks. |

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| **Learning Outcomes** | - Deepen understanding of tension and compression forces and how they contribute to the integrity of engineering structures.  - Improve communication and collaboration skills in planning, designing, and constructing their models.  - Gain insight into sustainable architecture by exploring energy-saving features of geodesic dome designs.  - Acquire practical experience similar to that encountered by engineers and architects when creating structures.  - Apply mathematical principles, geometric concepts such as triangles, polygons, and spatial relationships in a practical context. |  |
| **Activity Contents** | **Activity1: Geodesic Dome Model**  **Theoretical Part (Duration: 30 minutes):** This activity begins with an introduction to geodesic domes as unique and efficient structural examples that have great appeal due to their exceptional design and functionality. It is important to emphasize that geodesic domes stand out for their geometric complexity, providing elegance and style to architectural landscapes, while also being energy-efficient and environmentally beneficial.  **Videos:**  <https://www.youtube.com/watch?v=TqxarO-5igc>  Overview: Geodesic dome structural analysis basics  Duration: Approx.16 minutes  <https://www.youtube.com/watch?v=jlD5yr45TiU&list=RDCMUCL--oBARR8PwZtH7drz5Sjw&index=42>  Overview: Construction of a Geodesic Dome  Duration: Approx.2.33 minutes  **Task (Duration: 1.5 hours):** In this practical activity, students, working in groups, will construct a geodesic dome model using paper straws. This task is designed to understand the basic principles underlying geodesic structures.  Step 1: Group formation, distribution of materials. (5 minutes)  Step 2: Making paper straw segments and assembling the geodesic dome model. Description of the workflow (Attachment 1). (70 minutes)  Step 3: Presentation of the model and a brief discussion to review the main conclusions and lessons learned. (15 minutes) |  |
| **Assessments** | * The task is evaluated with grades (Annex 2). |  |
| **Key Competences** | Cognitive competence  Creativity competence  Communication competence |  |
| **Connections with Eco STEAM** | Eco - A construction method aimed at reducing environmental impact and promoting sustainability in architectural design.  Science - Physics, geometry, and materials science.  Technology - The intersection of technology and architecture, demonstrating construction efficiency.  Engineering - Application of engineering principles in creating robust and efficient architectural structures.  Art - Visually striking architectural artwork.  Math - Mathematical modeling. |  |
| **References** | <https://www.youtube.com/watch?v=pGaJju6A6Qo>  <https://www.youtube.com/watch?v=Ym1388CcwuQ>  <https://www.youtube.com/watch?v=Gl71iOkeIDo&t=28s> |  |
| **Notes** |  |  |
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# Annex 1

# Description of the Workflow

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|  | Workflow information | Example |
| Paper Straw Making. | You need to make 65 paper straws: 35 longer ones and 30 shorter ones. The shorter straws are 88.3% of the length of the longer ones. You will cut the paper into strips of the chosen length and 5 cm width. Then, you will wrap these strips around pencils and glue them. | Example: A dome with a diameter of 38 cm is made from 35 straws, each 12 cm long, and 30 straws, each 10.6 cm long. The longer straws are made from white paper, while the shorter ones are made from blue. |
| Gluing the dome | Glue together the decagon using the longer straws (10 pieces). Use translucent adhesive tape for gluing. Leave a gap when gluing the straws so that you can bend them. | Example : |
| At each junction, connect one shorter and one longer straw. With each side of the decagon, alternate between equilateral and isosceles triangles. Use up 10 longer and 10 shorter straws. | Example: |
| Connect the vertices of triangles with shorter straws (10 pieces). | Example: |
| Connect 5 shorter straws to form pentagons. Connect 10 longer straws to form hexagons. Complete the circle with 5 longer straws. | Example: |
| Connect the last 5 shorter straws into one point, and attach the other ends to the dome. | Example: |

**Annex 2**

**Assessment Table:**

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| Evaluation criteria: | Points | Comments |
| Model accuracy | \_\_/5 |  |
| Model aesthetics | \_\_/5 |  |
| Collaboration | \_\_/5 |  |
| Presentation | \_\_/5 |  |