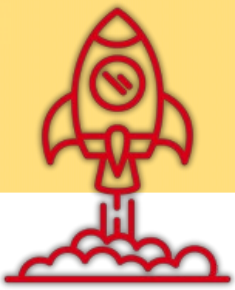
Unplugged Activity

Title: BRIDGE ENGINEERS.

Educational level: 6th grade. 3rd Cycle of Primary Education.

Curricular areas: Social Science.

Timing: at least 2 sessions of 45 minutes (in any term).



Summary

In this activity, students will have to carry out a construction challenge following instructions given by the teacher.

The work will be done in heterogeneous groups, trying to have the same number of boys and girls in each.

At the beginning of the activity, the teacher can show pictures of the structure (bridge) that the groups of pupils have to build.

As mentioned at the beginning, they will work in groups to create their own structures with the given requirements. Finally, the students will present their project, and the teacher will check that the created structure fulfills all the compulsory points.

The students will work on laterality, spatial concepts, geometry, oral communication and analytical logical thinking. As well as the identification of the characteristics of the different parts of the structure created.

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Aims

- To encourage the use of simple algorithms (step-by-step instructions).
- To learn and reinforce spatial concepts.
- To improve discussion and communication skills.
- To work collaboratively in terms of equality between men and women.
- To identify and classify parts and figures resulting from the structure, and relate them to other real objects in the environment for heritage knowledge.
- To relate the structure created to human activity in the environment and its exploitation.
- To understand the territorial distribution of parts and loads in the structure.
- To know the geometric figures.
- To name specific characteristics of the bridge they created.

Key competencies to develop: mathematics, competence in science and technology, linguistic communication, digital competence, personal, social and learning to learn competence.

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How do we do it?

1. **Preparation of the material:** the teacher should have the necessary material ready to give to each group (see resources section), and a set of pictures showing the structures that the students will have to make.

2. **Explanation of the steps:** once all the groups are made, explain to the students that they have to make a cardboard bridge containing the following requirements:

    - The structure must have a subway with the following measurements: 10 cm high by 10 cm wide in a quadrangular shape (it is not possible to make a round arch or similar).
    - The width of the bridge should be 10 cm.
    - It doesn't need to have access ramps on its sides.
    - The structure must provide at least 3kg. support.

3. **The whole class works t**ogether: once all the steps have been explained, all the groups work as a team to create the structure. **For the creation step, it is recommended to do it over two sessions,** and to use **the third session** for each group (one spokesperson) **to show and demonstrate their creations** to the rest of the class, and for the teacher to check that the structure is correct and has all the necessary elements.

4. **Presentation and loads of resistance:** the teacher will set up a table in a visible place in the classroom, where each group will explain its structure (spokesperson). In addition, they will make relations with other elements and/or constructions familiar to them or that are better known, and if these have helped to inspire them. Finally, the teacher will check the measurement requirements, and the load test by placing weights or objects with the minimum weight, and from there, increase it if the structure can resist it.

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Suggestions

To make the activity more challenging, students can think of bridge structures that are familiar to them.

The teacher can also ask students to reflect on and explain the process they followed to choose the structure, reinforcing the concept of teamwork between boys and girls.

To reinforce the contents, the teacher can ask specific questions about the work carried out: What did you base your work on to make this bridge with this shape? What extra elements did you put inside the structure? What geometric shape is the predominant one in your project? Can you calculate the maximum weight that your bridge could support?

Resources

- **Human:** teachers and students.
- **Material:** 1 piece of cardboard for each group, scissors, glue, rulers, pencils, eraser, and crayons if needed.

Space: ordinary classroom with adequate space for group work.

Type of activity: group-class (explanation and examples). Small group of 4 for practical activities.

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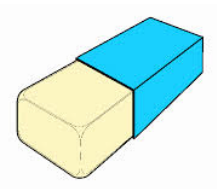
Examples of bridges to build.

CARDBOARDS

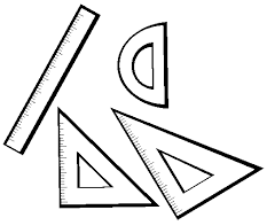
GLUE

PENCIL



RUBBER

SCISSORS



RULERS

What have we learned?

Assessment Criteria	4 Excellent	3 Very good	2 Satisfactory	1 Needs improvement
Identifies the requirements and applies them in the structure.	Always identify all requirements and apply them.	Almost always identifies the requirements and applies them.	Sometimes he identifies the requirements and applies them.	Does not identify the requirements and their application in the structure.
Relates the created structure to similar structures related to them.	Always relates the created structure to other similar structures in its closer place.	Almost always relates the created structure to other similar structures in its closer place.	Sometimes he relates the created structure to other similar structures in its closer place.	Does not make any relation of the structure created with other similar structures in its closer place.
Identifies the importance of this type of structures in the environment and their usefulness.	Always identifies the importance and usefulness of this type of structures.	Almost always identifies the importance and usefulness of this type of structures.	Sometimes identifies the importance and usefulness of this type of structures.	Does not identify the importance and usefulness of this type of structures.
Communicates well with his/her peers.	Always communicates well with colleagues.	Almost always communicates well with peers.	Sometimes he communicates well with peers.	Does not communicate properly with peers.
Works well in the group with his/her peers.	He always works well with his partners.	Almost always works well with colleagues.	Sometimes he works well with colleagues.	Does not work well with partners.

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Computational Thinking

Logic (prediction and analysis): thinking to make predictions, solve problems and make decisions based on available information.

Algorithms (steps and rules): is a step-by-step process that solves a problem or completes a task.

Decomposition (breaking down into smaller parts): breaking down problems into smaller and more manageable parts, which are easier to understand and solve.

Patterns (recognise and use similarities): recognising similarities or patterns in problems or data, which means come up with solutions quickly and effectively.

More information

QR codes to the activity resources

Examples of bridges to build.

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