



Super Structures

Post-visit Activity

This lesson has been designed as a post-visit activity after the 'Super Structures' show, for schools that are part of the Discover Primary Science programme.

Lesson Overview

Pupils investigate different ways of building different structures, using the same material. They try to find the best structure for different jobs, by exploring the properties of their building material.

Learning Outcomes

- Pupils will have a greater understanding of what makes structures suitable for their purpose.
- They will have had an opportunity to experiment with structures.
- They will have had an opportunity to test and improve their construction.
- They will have worked together as a team.

Curriculum links

SOCIAL ENVIRONMENTAL AND SCIENTIFIC EDUCATION (SESE)

SCIENCE

WORKING SCIENTIFICALLY

Through completing the strand units of the science curriculum the child should be enabled to:

Predicting

- offer suggestions (hypotheses) based on a number of observations and data available about the likely results of the investigations
- make inferences based on suggestions and observations
- propose ideas or simple theories that may be tested by experimentation

Investigating and experimenting

- identify (with guidance) different ways of looking at a problem and compare results of different investigations

Estimating and measuring

- estimate and use appropriate standard units of measurement
- decide what should be measured and the degree of accuracy required

ANALYSING

Recognising patterns

- look for and recognise patterns and relationships when making observations
- identify other instances that fit an observed pattern
- use observed patterns to make predictions

Interpreting

- interpret information and offer explanations draw conclusions from suitable aspects of the evidence collected

Recording and communicating

- record and present findings and conclusions using a variety of methods

Evaluating

- review the methods used in investigations and assess their usefulness

DESIGNING AND MAKING

Planning

- organise work, taking account of constraints and resources
- evaluate the feasibility of the design proposal and possible modifications to it, bearing in mind the resources available

Making

- identify problems with, or undesirable effects of, a design during construction; propose and implement alterations as the object is made
- use a range of material

Evaluating

- discuss stability and form of other made objects and evaluate the effectiveness of the group product in the light of this investigation compare the joints in a range of objects with those in own design
- justify the ideas, materials, joins, procedures and techniques used and indicate possible improvements
- discuss and justify modifications that would improve the overall quality and stability of the outcome
- appraise results against group's initial plan and intentions.

MATHEMATICS

Through completing the strand units of the mathematics curriculum the child should be enabled to:

Applying and problem-solving

- apply concepts and processes in a variety of contexts
- analyse problems and plan an approach to solving them
- select and apply a variety of strategies to complete tasks and projects or solve problems
- reflect upon and evaluate solutions to problems

Integrating and connecting

- recognise mathematics in the environment
- understand the connections between mathematical procedures and the concepts he/she uses
- recognise and apply mathematical ideas and processes in other areas of the curriculum

STRAND: SHAPE AND SPACE

STRAND UNIT: 3-D SHAPES

The child should be enabled to

- identify and examine 3-D shapes and explore relationships

STRAND: MEASURES

STRAND UNIT: LENGTH

The child should be enabled to

- select and use appropriate instruments of measurement
- estimate and measure length using appropriate metric units

STRAND UNIT: WEIGHT

The child should be enabled to:

- solve and complete practical tasks and problems involving the addition, subtraction, multiplication and simple division of units of weight (kg and g).
- select and use appropriate instruments of measurement

LEARNING STYLES INVOLVED

Visual/Spatial, logical/mathematical, kinesthetic, interpersonal.

THINKING SKILLS INVOLVED

Managing Information, Thinking, Problem Solving and Decision Making, Being Creative, Working with Others

Lesson Plan

WHAT YOU NEED

- drinking or art straws (you need a lot of these!)
- sticky tape
- some eggs (boiled or raw, depending on how much mess you're happy with)
- some weights
- some card
- a pen or marker
- a metre ruler or measuring tape

SET UP

Before the class, write different jobs on the cards. You can use the examples below, or make up your own.

Set out all the materials at the front of the class. Organise the tables in the room so that every team has enough space to work.

Build a structure that is at least one metre tall. It has to be stable (not fall over) and should support itself.

Build a structure that can span 75 centimetres (between two tables) and carry a weight of 100 grams.

Build a structure that can safely catch an egg dropped from one metre above the structure.

Build a structure that can hang at least 30 centimetres over the edge of a table. It has to be stable (not fall down) and should support itself.

Build a structure that can cover the open top of a box of at least 20 by 20 centimetres and can carry a weight of 50 grams.

Build a structure that goes over a box of 10 by 10 by 10 centimetres. It has to be stable (not collapse) and should support itself.

INTRODUCTION

Start by reinforcing the learning from the show about structures:

What defines a structure? Can they give some examples of structures? How about some structures in nature?

Explain that today's lesson is all about experimenting with different structures. Pupils will be asked to work in teams of up to 6 people. Explain the importance of teamwork and talk about effective teamwork. You could even draw up some rules for the teams to follow. For example; everyone's ideas should be listened to; everyone in the team should contribute to the work; when the team disagrees, the majority vote counts.

ACTIVITY

Each team will draw one of the cards without looking at them. Each card will describe the type of structure the team has to build. Explain how much time the team has to complete the structure and give the team a time when all structures will be tested.

You can help the pupils by asking questions:

- How could you spread the load?
- What is the weakest link in your structure?
- Where does the structure break? How can you reinforce it?
- How can you balance the weight of your structure?

You could also reinforce that triangles, domes and cylinders are very strong shapes that can handle big loads without deforming. Ask pupils to explore how they could use these shapes in their own structures.

PLENARY

At the agreed time (or when all the teams are finished) you can test their structures. You can test the stability of the structures by gently blowing against them to see if they stay upright. You can also test some of the other structures by increasing the weight on them to test how much they can carry. Do this with small increments at a time.

Discuss how the structures are different and why they are different. Discuss which shapes work best for the different jobs of the structures. Ask pupils to reflect on their own structures. How could they be improved? Also ask them to reflect on their building material. What was good about it? What didn't work well? Could they think of another building material that would be better? Why?