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Ireland esero

# Classroom Resource Booklet

## Engineering our Environment

Science Foundation Ireland sfi For what's next

# DPSM/ESERO
## Framework for Inquiry

| THEME | Overall theme | |
|---|---|---|
| CURRICULUM | Strand: | |
| | Strand Unit: | |
| | Curriculum Objectives: | |
| | Skills Development: | |

| ENGAGE | | |
|---|---|---|
| THE TRIGGER | WONDERING | EXPLORING |
| | | |

| INVESTIGATE | | | |
|---|---|---|---|
| STARTER QUESTION | PREDICTING | CONDUCTING THE INVESTIGATION | SHARING: INTERPRETING THE DATA / RESULTS |
| | | | |

| TAKE THE NEXT STEP | | |
|---|---|---|
| APPLYING LEARNING | MAKING CONNECTIONS | THOUGHTFUL ACTIONS |
| | | |

| REFLECTION | |
|---|---|

# DPSM/ESERO
## Framework for Inquiry

| THEME | Overall theme | |
|---|---|---|
| CURRICULUM | Strand: | Use the DPSM Planning Guide to identify the strand/strand units and the appropriate curriculum/learning objectives that your pupils should achieve. |
| | Strand Unit: | |
| | Curriculum Objectives: | |
| | Skills Development: | |

## ENGAGE

| THE TRIGGER | WONDERING | EXPLORING |
|---|---|---|
| • Relating the new experience to the children<br>• Using objects (e.g. torch for simple circuits, sycamore seeds for spinners etc.)<br>• Play with toys, objects (e.g. magnets)<br>• Use DVD clips, digital images of the scientific phenomenon<br>• Story<br>• The mystery box<br>A mystery demonstration | • Discuss everyday experiences<br>• Concept mapping<br>• Concept cartoons<br>• Think and draw<br>• Question and answer session<br>• Free writing<br>• Brainstorming<br>• Manipulation of materials<br>• Newspaper article (fictional/actual)<br>• The science talk ball | • The Invitation to learn<br>• New experience presented to the children<br>• The children discuss this and try to provide explanation<br>• Teacher identifies children's 'alternative ideas'<br>• Children's questions about the exploration<br>• Provides them with opportunities to explore the phenomenon |

## INVESTIGATE

| STARTER QUESTION | PREDICTING | CONDUCTING THE INVESTIGATION | SHARING: INTERPRETING THE DATA / RESULTS |
|---|---|---|---|
| • Starter question for investigation<br>• Teacher or children pose the question/scenario/present the problem to be investigated | • Children record predictions and provide reasons for their predictions | • In groups the children design, plan and conduct inquiry<br>• Collect and organise data | • Children interpret and discuss their results<br>• Present their findings: Propose explanations and solutions based on the data<br>• Drawing conclusions |

## TAKE THE NEXT STEP

| APPLYING LEARNING | MAKING CONNECTIONS | THOUGHTFUL ACTIONS |
|---|---|---|

- Discuss implications of their findings e.g. bigger spinner falls more slowly than smaller one. Therefore if I was to jump out of a plane I would choose a bigger parachute as it would fall more slowly.
- Debating
- Making connections
- Apply their knowledge to a new learning situation.
- Consider how to extend their new understanding and skills - further exploration, address new questions.

| REFLECTION | |
|---|---|
| | • Did I meet my learning objectives?<br>• Are the children moving on with their science skills?<br>• Are there cross curriculum opportunities here?<br>• What questions worked very well?<br>• What questions didn't work well?<br>• Ask the children would they change anything or do anything differently. |

# DESIGN A BRIDGE

## Skills:

Designing and making.

## Class level:

5th - 6th classes.

## Skill development:

Through completing the strand units of the science curriculum the child should be enabled to carry out simple investigations where the problems, materials and methods are suggested by the teacher - SESE: Science Curriculum page 37. Exploring how to make a paper bridge stronger would enable the children to achieve this objective.

## Content:

- Strands and Strand Units.
- Energy and forces: Forces, materials, properties and characteristics of materials.
- The child should be enabled to investigate how forces act on objects - SESE: Science Curriculum page 45.
- The child should be enabled to investigate how materials may be used in construction - SESE: Science Curriculum page 66.

## Materials/Equipment:

- Paper, coins, blocks or books (*i.e. things to make two banks of a river*). Other materials as available.

## Background Information:

- Children will have played with building blocks and made simple structures.
- The material from which a structure is made is important but you can strengthen a material by changing its shape. Bridge designers often use different shapes, e.g. arches and triangles.
- The curve of the arch spreads the load on the bridge and makes it stronger.

## Safety:

- Care with coins (weights) falling.

## Cross - curricular links:

- **History:** Local studies/ Explore some feature of local environment, e.g. a bridge/ My locality through the ages/ Important events...erection of bridges/ Early people and ancient societies/ Where people settled in Ireland (*near rivers and built bridges, e.g. Ath Cliath*)/ Continuity and change over time/ Technological and scientific developments over long periods.
- **Geography:** Human environment/ Features of the built and natural environment/ County, regional and national centres/ Origins and geographical significance of place names, e.g. Newbridge.
- **Visual arts:** Construction/ Making constructions / Make drawings from observations to analyse the structures of buildings/ Construction/ Looking and responding/ Look at collections or photographs of built structures.
- **Mathematics:** Shape and space / 3-D shapes.

## Preparation:

- Gather the materials.
- Decide a suitable span for the bridges made during the activity.
- For fair testing a width of 'river' of 14 cm, and A4 paper lengthways works well.

# DESIGN A BRIDGE

## Setting the scene:

- Find a context where children have to think about crossing a river. This might be a story or a local river crossing.
- Find out what children think and know about bridges. They may mention tunnels as well as a means of getting across.
- Have a display of pictures of bridges.
- Visit a local bridge.

Do this introductory work on the day prior to doing the activity.

## Trigger questions:

- What is a bridge?
- Where would you find bridges?
- What are bridges made of?
- What makes a good bridge?
- What types of bridges are there? Can you name any? *(Bridge designs include arch, suspension etc.)*
- Can you find out about the tallest bridge in the world, opened in December 2004?
- Ask the children to draw a bridge they know or have crossed.
- They can count how many bridges (*if any*) they meet on the way home.

## Development of activity:

- What can be changed about a bridge? Ask the children. (*Generally the shape and the materials.*)
- Decide where the river will be. Two piles of books the same distance apart on each table will provide opportunities for children to test any bridges they make.
- Get the children to make a simple bridge using e.g. 1 page of A4 paper. The children can test its strength by adding coins or other masses.

# DESIGN A BRIDGE

## Activity:

**Explore how to make a paper bridge stronger.**

- Using the blocks or books, paper and coins ask the children to design a bridge that will take the heaviest weight. (*For fair testing use the same width of 'river', e.g. 14 cm, and use A4 paper lengthways*).

**Try the following and record the results:**

1) Make a bridge from one piece of paper and test its strength by adding coins or other masses until the bridge collapses.

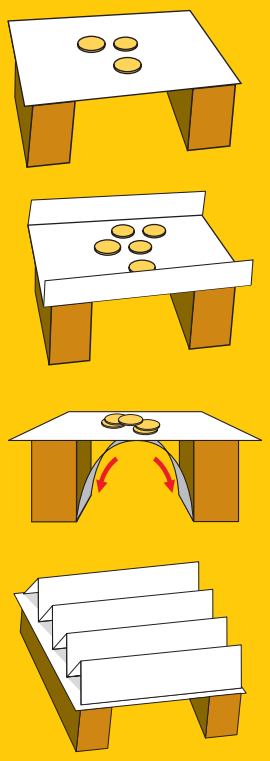
2) Use two pieces of paper and test again.

3) Use one piece of paper and fold up sides, i.e. a walled bridge.

4) Make an arch (*using two pieces of paper*).

5) Make a corrugated bridge.

6) Make a bridge out of a different material.



## Review:

- Ask the children to review their investigation.
- What have they found out about bridges?
- What have they changed about the bridges they made?
  (*They have changed the materials and the shape of their bridges.*)
- What else could they change?
- If you change the distance between the supports will the bridge support the same load?
  (*Try it, make the river wider!*)

## Note:

*A shape which is weak in one direction may be stronger in another. The weakest bridge is often the flat sheet of paper. Then, in order of increasing strength, the walled bridge, the arched bridge, and finally the corrugated bridge. The children may be amazed at the strength of the corrugated bridge. Sheets of steel which are used to make the floor of a car have folds put in them. But this sort of bridge might be hard to drive across - how could you make a smooth roadway across a corrugated bridge?*

# DESIGN A BRIDGE

## Assessment:

- Ask the children to draw a picture of their favorite bridge and to explain the design features.
- Discussion and observation – the teacher and the child/children could discuss their work about bridges. The teacher could 'actively and purposefully' observe the children's work, She/he could make notes about how the children are learning and what they are learning and understanding.

## Follow-Up Activities:

- A similar open-ended activity could be conducted using art straws instead of paper.
- The children could be asked:
  Can you come up with a design of your own?
  How would you build your bridge?
  How would you build a bridge that would support 1 kg (e.g. a bag of sugar)?
- For more work on bridges see
  http://www.exploratorium.edu/structures/index.html

Maths Extension for

# DESIGN A BRIDGE

## **Maths:** Strands and Strand Units

**Number:** Place value (*ordering*), operations.

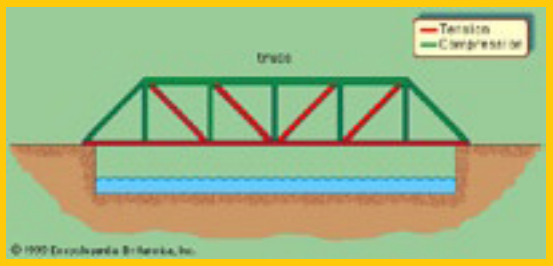
**Shape and Space:** 2D shapes, 3D shapes, Lines and Angles.

**Measures:** Length, Area, Weight.

**Data:** Represent and interpret simple tables and charts.

## 1) Lines, Shapes and Angles:

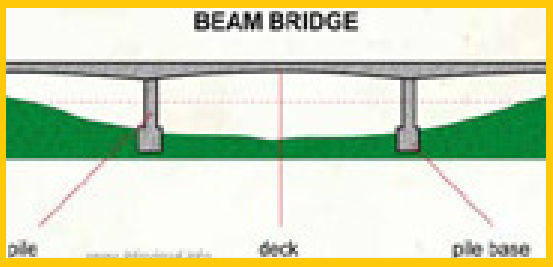
(a) Have a look at these pictures of bridges and see what shapes you can see in them:




Truss Bridge

Arch Bridge

Suspension Bridge




Beam Bridge

(b) Draw sketches of some of the bridges and colour in any parallel lines.

(c ) Can you mark horizontal lines in one colour, and vertical lines in another colour?

(d) Can you mark in any acute angles? Right angles?

(e) Can you draw a bridge in your local area? What shapes are in it? Is it like any of the bridges in these pictures?

# AMAZING TRIANGLES

## Skills:

Experimenting, designing and making, investigating, observing, analysing.

## Content:

Forces, materials and their properties.

## Materials:

- Box of cocktail sticks.
- Bag of marshmallows, mini-marshmallows or any soft sweets.

## Background Information:

- The triangle is a strong shape and is used to support structures. Under a heavy load, a square distorts easily – it ends up looking like a parallelogram. If you put a brace diagonally across the square, you create two triangles and a much stronger shape. In fact, the triangle is the only shape that cannot be deformed without changing the length of one of its sides. Because it is not easily deformed, the triangle is an extremely popular building shape.

## Trigger Questions:

- What shapes do you know?
  Can you pick out any shapes in this room?
- If you look at a bicycle (*or a picture of one*) can you pick out any shapes?
- What shapes help the bicycle move? (*Circles, wheels*)
- What shapes make the bicycle strong? (*Triangles in the frame*)
- How would you make a corner stronger on a bench or a table? (*Add a strut across the corners to make a triangle*)

## Follow-Up Activities:

- Look up pictures of different structures – e.g. bicycles, Eiffel Tower, truss bridges, etc. Can you find triangles in them? Can you make strong structures with straws and split pins/ paper fasteners?

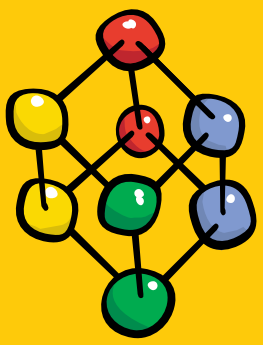
## Safety:

- Careful with points of cocktail sticks.

# AMAZING TRIANGLES

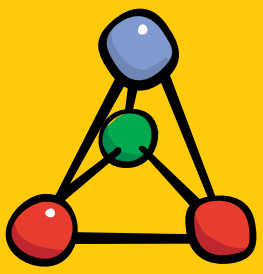
## Activity:

**1) Squares and Cubes**



- This takes 8 sweets and 12 cocktail sticks.
- Take 4 cocktail sticks and 4 sweets.
- Poke the cocktail sticks into the sweets to make a square with a sweet at each corner.
- Poke another cocktail stick into the top of each sweet.
- Put a sweet on top of each cocktail stick.
- Connect the sweets with cocktail sticks to make a cube.

**2) Triangles and Pyramids**

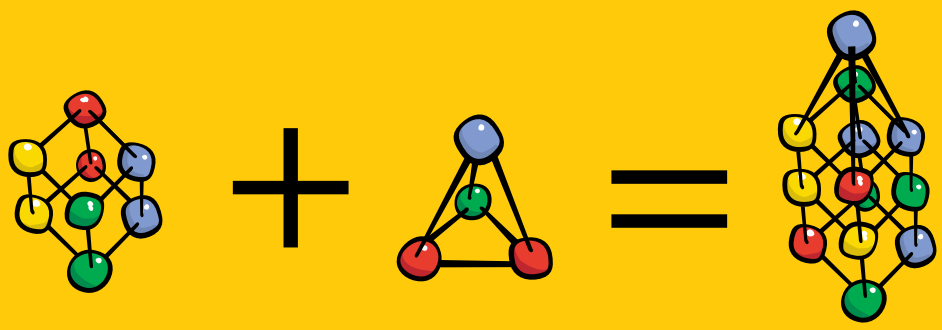


- A triangular-based pyramid takes 4 sweets and 6 cocktail sticks.
- Make a triangle using 3 sweets and 3 cocktail sticks.
- Poke a cocktail stick into the top of each sweet and bend these 3 into the centre; now poke them into the 4th sweet to make a pyramid.
- Now make a square based pyramid by first building a square base and then 4 triangular sides.

**Press down on these shapes. Which shape is the strongest?**

**3) Construction challenge:**

- When you make a structure that uses both triangles and squares you can make large structures.
- Set the rules: limit the number of cocktail sticks available per person or per pair, and decide on the criteria for winning, e.g. it could be the tallest structure (*skyscraper*) or the strongest structure (*i.e. the one that can take the most weight*), the one that most resembles a famous building such as the Eiffel tower, etc. A time limit may be set if you wish.



# DESIGN AND MAKE TRAFFIC LIGHTS

## Skills:

Experimenting, designing and making.

## Class Level:

5th - 6th classes (*for electrical version*).

Younger classes (*for version using torch*).

## Content:

**Science:**

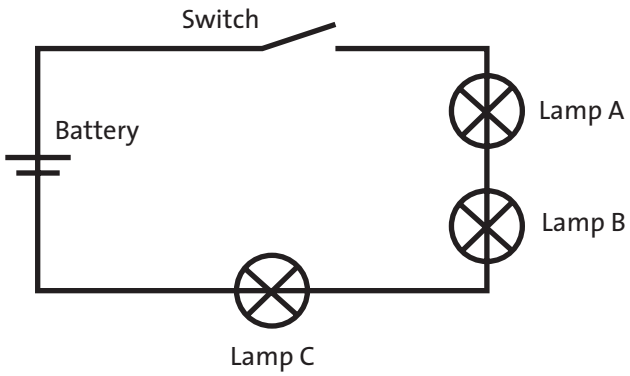
Energy and Forces: Electricity and light.

**Maths:**

Number: operations,
Shape and Space: 2-D shapes,
Measures: Length, scale.

## Background Information:

The electric circuit in this activity is a series one, i.e. the bulbs are joined together in a line with the battery:




In this arrangement, the electrical energy provided by the battery is shared out between the three bulbs, so the more bulbs you add, the less energy each bulb gets (*therefore the brightness of each bulb is diminished*).

The word 'amber' is often used for the orange light in traffic lights. In this activity the description 'orange' will be used.

## Safety:

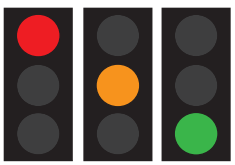
Careful with scissors cutting out the circles in the tissue box – this can be tricky if the scissors slips. An adult could start to make the hole for younger children.

## Cross-Curricular Links:

- Art
- SPHE: Road safety

## Trigger Questions:

- Where do you see traffic lights? (*At road junctions*)
- Why are they there? (*They control competing flows of traffic*).
- Are they used anywhere else? (*To let pedestrians cross busy roads*).
- What are the colours of traffic lights? What does each colour mean?
- What do red /yellow cards in football mean?
- In what order are the lights arranged on the traffic signals; i.e. which is on top, middle and bottom? (*Red on top, orange in the middle and green on the bottom*).
- In what order do the colours light up? (*Red, green, orange*).
- Is this the same in all countries? (*No. In the UK, the lights go: Red, red and orange, green, orange*)



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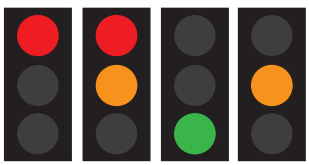


U.K

- If you don't have a battery with enough voltage (*electrical energy*) what do you think will happen? (*The bulbs won't light*).
- If you have a battery with too high a voltage what do you think will happen? (*The bulbs will blow*).

# DESIGN AND MAKE TRAFFIC LIGHTS

## Preparation:

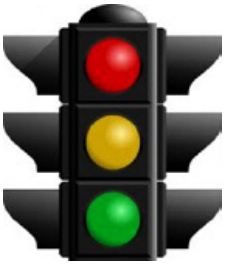
**This activity is time-consuming. Allow plenty of time for it, i.e. a double class.**

- As stated below in 'Materials/Equipment', the battery and bulbs should be chosen carefully: it will be important that the children only connect the bulbs to the battery after the bulbs have been connected up in series (i.e. in a line). If one bulb is connected up to the battery on its own it may 'blow' because it is getting all the energy from the battery, instead of the energy being shared out between the 3 bulbs.
- Children should have carried out an activity on simple circuits, including a 'series' one (i.e. three bulbs connected together in a line to a battery), to see the effect of adding another bulb to the circuit. This should help them to understand the connection between the voltage of the bulbs and the battery (the sum of the bulb voltages, e.g. 3 x1.5v = 4.5v) should not be a huge amount less than or greater than the voltage of the battery):
- Too much voltage (energy): bulbs 'blow'
- Too little voltage (energy): bulbs will not light

## Materials/Equipment:

**Older children:**

- Empty tissue box
- Black paper
- Scissors
- Sellotape or glue
- Cellophane paper (red, orange and green);
- 4 crocodile leads with clips (or wires and screwdriver)
- 3 bulbs + holders, battery.
- N.B. The voltages of the battery and bulbs should be chosen carefully: e.g. 3 x 1.5v or 2.5 volt bulbs should light with a 4.5 volt battery.
- For the switch: small piece of cardboard, 2 paper fasteners, 1 paper clip



**Younger children:**

- Empty tissue box
- Black paper
- Scissors,
- Sellotape or glue
- Cellophane paper (red, orange, green)
- A torch.
- Optional: tissue paper (red, orange, green).

# DESIGN AND MAKE TRAFFIC LIGHTS

## Activity:

**Older children:**

Children can design and make (*remember: Explore, Plan, Make, Evaluate*) their own traffic lights.

One possible way is as follows:

- Cover the bottom and sides of the tissue box with black paper. Leave the top (*where you pull the tissues out*) uncovered, in order to insert the electrical parts in from the back.
- Draw and cut out 3 circles, approximately 6 cms in diameter, at equal intervals and in a line vertically on the base of the box (*which is covered with black paper*).
- Cut the 3 different colours of cellophane to fit over the holes. Glue them over the holes in the correct order.

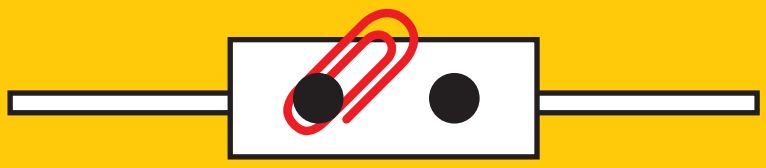
**Now for the electrical part:**

- Put the 3 bulbs in the bulb-holders, connect them in a line (*using crocodile leads or wire*) and attach them to the tissue box so that each bulb is opposite a hole with cellophane.
- Connect the free ends of the crocodile leads or wire to the battery.
- What happens?

An empty kitchen roll can be inserted into the box to make the post for the traffic lights to stand on.

A switch can be inserted in the circuit as follows:

- Insert two paper fasteners into cardboard the length of a paper-clip apart.
- Join them with a paper-clip so that the latter can swivel.
- Join the wires from the circuit to each paper fastener at the back of the cardboard.



**Younger children:**

Younger children could also do this activity:

- Instead of using the electrical circuits they could shine a torch behind the three different coloured cellophanes in turn.
- They could discuss the difference between transparent (cellophane) and opaque (tissue box) things.
- Coloured tissue paper could be used also. They may be able to put faces on the paper using appropriate materials.

# DESIGN AND MAKE TRAFFIC LIGHTS

## Maths: Mainly for Seniors

1) What shaped signs give:

(a) Orders

(b) Warnings

(c) Information


2) Coming from a certain direction at a road junction: the green light is on for 20 seconds, the orange for 4 seconds, and the red for 20 seconds. How many times will the light go green in 5 minutes?

3) A set of traffic lights in Cork has the following measurements (*i.e. the rectangular part not counting the pole*) : 100 cms high, 40 cms wide. The diameter of each of the 3 lights is 20 cms.

Draw a plan of these lights to a suitable scale (*leave just a small gap between the lights*). What scale did you use?

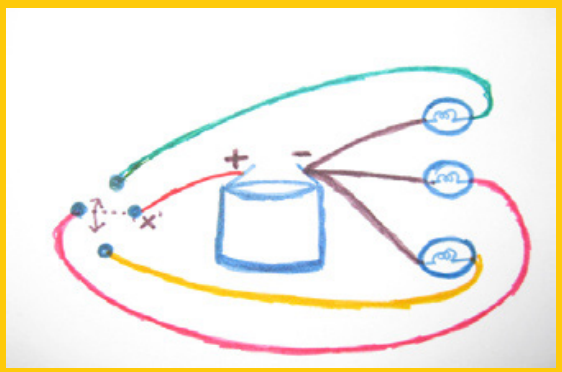
## Follow-up Activities:

1) Can the children think of other materials which could be used to make a set of traffic lights?

2) The more advanced children could try making a set of traffic lights in which only one light would be switched on at a time, using just the one battery with a 3-way switch.

**Hint:** a 3-way switch can be made using 4 drawing pins or paper fasteners attached to cardboard in a diamond shape.

- Connect the 3 bulbs separately to the negative terminal of the battery; the other side of the bulbholders should each then be connected to a different drawing pin.
- Connect the fourth drawing pin (call it 'x') to the positive terminal of the battery. Attach a small metal object, e.g. a paper-clip, to drawing pin X and swivel it around so that it can touch each of the other 3 drawing pins, one at a time.
- The children could try working the above out for themselves. If they need a hint, the following diagram might be helpful:




*3-way switch: The paper clip attached to 'x' can swivel around to touch any of the other three pins depending on which bulb you want to light up.*

'Traffic light' (stop/go) games could then be played using the traffic lights as it would be possible to light just one colour at a time.

# DPSM/ESERO
## Framework for Inquiry

| THEME | Engineering our Environment | |
|---|---|---|
| CURRICULUM | **Strand:** | Energy and Forces, Materials, Environmental Awareness and Care. |
| | **Strand Unit:** | Light, Magnetism and Electricity; Properties and Characteristics of Materials; Environmental awareness and care, Science and the Environment. |
| | **Curriculum Objectives:** | Investigate how materials may be used in construction. Explore how different materials may be used in construction structures, Investigate how forces act on objects. Identify positive aspects of natural and built environments through observation, discussion and recording. Investigate current electricity. Investigate materials for different properties (transparent/opaque). Group materials according to certain criteria (transparent/opaque). Identify some ways in which science and technology contribute positively to society (transport). Appreciate the application of science and technology in familiar contexts. |
| | **Skills Development:** | Experimenting, Designing and making |

## ENGAGE

| THE TRIGGER | WONDERING | EXPLORING |
|---|---|---|
| • National Geographic video: The Impossible Bridge (Öresund Bridge linking Denmark and Sweden) https://www.youtube.com/watch?time_continue=27&v=-yLZYETYlmM<br>• Alternative (younger classes): Read the story The Three Billy Goat's Gruff. | • What is a bridge?<br>• Where would you find bridges?<br>• What are bridges made from?<br>• Why are bridges used?<br>• What shapes can we see in different bridges?<br>• How can you make a bridge very strong?<br>• What types of bridges are there? Can you name any?<br>• How could you control when traffic crosses the bridge?<br>• What are the colours in traffic lights?<br>• Do traffic lights always work in the same sequence? | • Take a class walk to the nearest bridge in the locality.<br>• What shapes do you notice in the bridge?<br>• What is the function of this bridge?<br>• What materials are used in this bridge?<br>• Using coloured acetates, explore the mixing of colours.<br>• What are the primary colours of light?<br>• What are the secondary colours of light?<br>• Use coloured paper, coloured card, coloured felt, coloured crepe paper, coloured acetates and coloured tissue paper to investigate how light can shine through each material. |

## INVESTIGATION 1 - DESIGN A BRIDGE

| STARTER QUESTION | PREDICTING | CONDUCTING THE INVESTIGATION | SHARING: INTERPRETING THE DATA / RESULTS |
|---|---|---|---|
| • How can we design a strong bridge?<br>• How can we test which kind of bridge is strongest?<br>• Which variable will we keep constant and which will we change (size, shape, material)? | • Keep the test fair-each bridge must be made of two sheets of A4 paper.<br>• Predict which bridge can support the most 2c coins. | • Use sheets of paper and supports to try making different kinds of bridges.<br>• Use counters to test which bridge is strongest (bridges made from same material and same size, but shape varies).<br>• Retest using bridges made of different materials (where size and shape are constant).<br>• Retest using bridges of different sizes (where materials and shape are constant). | • Arrange the bridges in order from strongest bridge to weakest bridge.<br>• Record and show on a pictogram or block graph how many 2c coins each bridge can support.<br>• Plot a graph that shows the relationship between the size of the bridge and the number of 2c coins it can support. |

## INVESTIGATION 2 - DESIGN AND MAKE TRAFFIC LIGHTS

| STARTER QUESTION | PREDICTING | CONDUCTING THE INVESTIGATION | SHARING: INTERPRETING THE DATA / RESULTS |
|---|---|---|---|
| • How can we make a good model of working traffic lights?<br>• Which materials will make good lights?<br>• Which materials are transparent/opaque | • Discuss which coloured materials would make good coverings for a white light bulb.<br>• Which material would be most/least suitable? | • Take a class walk to the nearest set of working traffic lights.<br>• In pairs answer these questions:<br>• What are the colours in traffic lights?<br>• Do traffic lights always work in the same sequence?<br>• How do pedestrian lights work in conjunction with the traffic lights for cars? | • Order materials from the ones that are the most suitable as coverings for traffic light bulbs to the one that are the least suitable.<br>• Draw pictures illustrating the sequence of the local traffic lights.<br>• Using toilet paper rolls or tissue boxes and coloured acetates or crepe paper, make model traffic lights (Design and Make, Art). |

## INVESTIGATION 3 – AMAZING TRIANGLES

| STARTER QUESTION | PREDICTING | CONDUCTING THE INVESTIGATION | SHARING: INTERPRETING THE DATA / RESULTS |
|---|---|---|---|
| • What shapes do you see on the Öresund Bridge?<br>• What shapes make the bridge strong?<br>• Could we use triangles to construct other objects?<br>• How would you make a corner stronger on a bench or a table?<br>• Why use triangles rather than squares? | • Which shape will be the strongest: square and cubes or triangles and pyramids? | • Use sweet and cocktail sticks to create cubes and triangular pyramids.<br>• Use the cubes and pyramids to construct larger structures.<br>• Construct the tallest and/or strongest structure using a set number of cocktail sticks (fair test). | • Record and show on a block graph how many blocks/books each construction can support. |

## TAKE THE NEXT STEP

| APPLYING LEARNING | MAKING CONNECTIONS | THOUGHTFUL ACTIONS |
|---|---|---|

- Talk about the different types of bridges: girder bridges, cantilever bridges, bridges with arches, suspension bridges, truss bridges, beam bridges and bridges that can rise to let boats pass underneath (English/Gaeilge - oral language).
- Make bridges from other classroom materials, e.g. LEGO, marshmallows and spaghetti, magnetix, art straws (Art - design and make).
- My locality through the ages, erection of bridges, early people and ancient societies, Continuity and change over time (History).
- Where people have settled in Ireland, manmade and natural features (Geography).
- Making drawings/constructions from observations to analyse the structure of bridges, Looking at photos of different types of bridges (Art).
- 2D and 3D shapes, lines and angles, ordering information, calculating area of bridges, ratio and drawing to scale (Maths).
- Investigating light sources... natural light sources vs man made light sources (Science-light).
- Investigating primary and secondary colours of light (Science-light).
- Investigating shadows (Science-light).
- Investigating primary and secondary colours of paint (Art).
- Measuring lengths, making scaled models (Maths).
- For senior classes: Making the lights light up (Science-electricity, bulbs in series, making and using switches).

## REFLECTION

- Did I meet my learning objectives?
- What went well, what would I change?
- Are there cross curriculum opportunities here?
- Are the children moving on with their science skills?
- What questions worked very well?
- What questions didn't work well? Ask the children would they change anything or do anything differently.

# Cross-curricular Links:

## Engineering our Environment

There are many opportunities to extend Engineering or Environment to other curricular areas. Here are some suggestions:

### Maths

- 2D and 3D shapes, lines and angles, ordering information, calculating area of bridges, ratio and drawing to scale, data.

### SESE Geography

- Where people have settled in Ireland, Manmade and natural features. Famous bridges from around the world.
- How traffic lights look and work in other countries.

### SESE History

- My locality through the ages, erection of bridges, early people and ancient societies, Continuity and change over time.
- When and where were the first traffic lights used?

### Literacy

- Gaeilge-oral language: Talk about different types of bridges: girder bridges, cantilever bridges, bridges with arches, suspension bridges, truss bridges, beam bridges and bridges that can rise to let boats pass underneath.

### SPHE

- Road safety - How to cross the road safely. Discuss the meaning of the colours of traffic and pedestrian lights, and the meaning of different road signs? How can people who are colour blind learn to cross the road?

### Art

- Design and make: Make bridges from other classroom materials, e.g. LEGO, marshmallows and spaghetti, magnetix, art straws.
- Make drawings/constructions from observations to analyse the structure of bridges, Looking at photos of different types of bridges.
- Investigating primary and secondary colours of paint, design and make traffic lights.

### Music

- Road Safety songs.

### PE

- Traffic lights game.

# Cross-curricular Links:

## Engineering our Environment

There are many opportunities to extend Engineering or Environment to other curricular areas.
Here are some suggestions:

### Other SESE Science Links

- Light: Investigating light sources (natural vs man made), shadows, primary and secondary colours of light. (For senior classes: making the lights light up, bulbs in series, making and using switches).
- Using a toilet roll core, black paper and a CD, design and make a spectroscope and use it to show the break-up of light into several colours (See ESERO: Colours in light).
- Using bulbs, batteries, switches and wires, add working lights to your model traffic lights.
- Can you build a bridge (from paper of straws) that would support a 1kg weight (e.g. a bag of sugar)?

You can download the activities in this booklet on the www.primaryscience.ie website along with hundreds of other STEM activities and ideas.

DPSM/ESERO Facilitator Jane McLoughlin has used the "Engineering or Environment" Framework with her 2nd Class in Scoil Chaitríona Junior School in Galway. Check out their blog to see how they got on:

http://scoilchaitrionajnrmsmcloughlin.blogspot.ie/2014/11/investigating-bridges.html

http://scoilchaitrionajnrmsmcloughlin.blogspot.ie/2014/09/engineering-in-our-class.html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