ABOUT THE UNIT

This is a unit of three science programmes that take a skills based approach to the investigation of materials, forces, energy, light and sound and that can be used to help meet the requirements of the Northern Ireland Curriculum for science and technology.

In these programmes we see children carrying out investigations on scientific topics both in the classroom and at W5 Science Centre. Many of the concepts covered are applied and illustrated through examples seen in everyday life. The content, though science-led, can be linked to other themes within the area of ‘The World Around Us’.

BROADCAST DATES

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PROGRAMME - LIGHT AND SOUND

LEARNING OUTCOMES

By the end of this programme and activities, pupils should be able to

- recognise that light travels from a source
- recognise that when a light source is blocked, a shadow is formed and when it hits a shiny surface, it is reflected
- demonstrate that sounds are produced when objects vibrate
- investigate how well sound travels through different materials
- distinguish between pitch and loudness

ABOUT THE PROGRAMME

The programme opens in Strandtown Primary School in Belfast, at their school show, a great chance for pupils to demonstrate what they can do and to introduce the great ‘double act’ of light and sound.

The first half of the programme is devoted to light, without which nothing could grow or survive. Children investigate how shadows are formed and how their size can be changed. They acknowledge the power of the light coming from the sun and carry out an investigation on the effectiveness of sun creams, using an ultra-violet light.

Attention is then turned to mirrors and how they can reflect light: the children explore the use of convex and concave mirrors in everyday life.

Back at Strandtown, where would the show be without sound? In the second half of the programme we learn that sounds are made when something moves – a vibration. Children illustrate this with a simple experiment: they talk through cardboard tubes and cause a candle flame to flicker. Various other experiments show children testing sound travelling through solids, and looking at pitch by making straw flutes of different lengths.

Different sounds, when combined, can create music. Accompanying this music with appropriate light effects, the children at Strandtown sing the show to a close.

Key words used during programme:

- Light, transparent, translucent, opaque, shadow, solar eclipse, reflection, lens, mirror, sound, vibration, medium (air/water), solids, pitch.
Programme 6: Light and Sound  

### CLASSROOM ACTIVITIES - Before the Programme

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| Reviewing        | Review children’s knowledge of light and shadows by asking them to draw and annotate a diagram to show how a shadow is formed.  
                    | Discuss this with them using vocabulary such as light source, travels, opaque etc.  
                    |                  | Science  
                    |                  | Making observations  
                    |              | English  
                    |                  | Observing the conventions of discussion                                                  |
|                  |                                                                                       |                  |                             |
|                  | To review children’s existing ideas about sound, let them try out some musical instruments and ask questions, for example:  
                    | • how do these instruments make sound?  
                    | • which sounds are high, low, loud, quiet?  
                    |                  |                             |

### CLASSROOM ACTIVITIES - After the Programme

Select from these activities to address your chosen learning outcomes

<table>
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| Observing and recording   | Make a list, from the programme, of some facts about light or sound.  
                           | Use them to make a fact sheet.  
                           | Can the children think of a way of remembering these facts - a mnemonic or a rhyme?  
                           | Worksheet  
                           | Light Fact Sheet  
                           | Sound Fact Sheet  
                           | Science  
                           | Working methodically  
                           | Recording observations |
|                            |                                                                                       |                  |                             |

http://www.bbc.co.uk/ni/education/pfocus
### Investigating

**Exploring shadows**

In groups, investigate:

What happens to a shadow if we change the distance an object is away from a light source?

OR

What happens to a shadow if we change the angle at which the light source shines on an object?

Use these questions as prompts for a good investigation -

- what do we want to find out?
- how will we do it?
- what do we need to carry out the investigation?
- how will we make it fair?
- what did we find out?

Children in P7 may be able to record measurements and present them in a line graph.

**Worksheet**

‘Carrying out a fair test’

**Science**

Light passes through some materials and not others, so forming shadows

Designing and carrying out a fair test

Making observations

Recording results systematically

Presenting findings

### Research and presentation

Split the class into groups. Each group researches one of the following:

- the invention of the electric light bulb
- solar eclipses
- lighthouses in Ireland and how they communicate with ships
- thunder
- lightning

Each group then gives a short oral presentation on their topic.

**Science**

Awareness of the importance of science in everyday life

**English**

Giving oral presentations

### Investigating

In groups, explore how mirrors can reflect light.

Answer questions such as the following -

- can you see behind you?
- can you make a beam of light move around the classroom?
- do dull surfaces reflect light as well as shiny surfaces?

Complete the worksheet.

Explain, using drawings, how mirrors can change the direction of a light beam, using an arrow to represent the direction in which the light beams travel.

**Worksheet**

‘Shiny and dull surfaces’

**Science**

Investigating the reflection of light from mirrors and other shiny surfaces
### Investigating

**Carry out activities that you saw in the programme that investigate sound -**

- talk through cardboard tubes and make candle flames flicker (vibrations)
- suspend a spoon on string, wind the other end of the string around your fingers and put them in your ears. Get someone to bang on the spoon (sounds need a medium)
- make straw flutes (pitch)

### Exploring sound

In groups, investigate:

*What material would be best for making a pair of ear muffs that muffle sound?*

Give children a range of materials - for example, bubblewrap, foam sheeting, artificial fur, blanket material.

Use these questions as prompts for a good investigation -

- what do we want to find out?
- how will we do it?
- what do we need to carry out the investigation?
- how will we make it fair?
- what did we find out?

**NB SAFETY:** Children should be warned that loud sounds including music, can damage the ears. ALSO, this investigation requires children to make ear MUFFS - not PLUGS. Nothing should be put inside the ear.

### Problem Solving

In groups, create a ‘Shadow Play’ complete with narration and sound effects.

- Children write a short play/sketch
- Create figures from cardboard mounted on sticks so that they can be moved left/right and forwards/backwards on the screen
- Find ways of making sound effects – possibly using instruments they have created themselves or from sounds that they have explored
- Use an overhead projector as the light source

**Science**

- Sounds are produced when an object vibrates
- Sound travels through a variety of materials

**Science**

- Sound travels through a variety of materials
- Designing and carrying out a fair test
- Making observations
- Recording results systematically
- Presenting findings

**Science**

- Planning what they are going to make
- Developing manipulative skills
- Evaluating what they have done

**English**

- Engaging in role play and drama
Programme 6: Light and Sound

Resources/References:

W5 Science Centre in the Odyssey Pavilion, Belfast.

Useful websites:

http://www.w5online.co.uk  The official website of W5 in Belfast.

http://www.sciencemuseum.org.uk/education/families/

http://www.brainpop.com/science  An interactive site that covers many science topics as well as other subjects.