Session 1 Teachers’ Notes

The Block Outcome

The outcome of this block of science sessions is a shadow puppet play to be performed in a shadow puppet theatre with their own puppets all made by the children. Throughout the sessions the children will accumulate knowledge, understanding and skills on the theme of Light and Shadows to help with the performance, as well as building the resources they will need for the show.

The style and theme of the show could be anything that fits in with your class learning this term. It could be that each group works on a performance of their own traditional tale (as seen in “The 3 Little Piggies”). Alternatively the story could fit in with a current topic in English, history, or any other theme (e.g. Christmas) that might lend itself to a performance. You could consider the option of a whole class performance with each group working on a different scene that fits together to make the whole show. If you decide to do this, it is advisable for each group to make their own theatre to use in lessons for hands on practical tasks and rehearsal. You could then make a large Puppet theatre for the class performance. You could even consider a shadow performance at the end of the block that uses the children themselves as the shadow casters. This has all kinds of possibilities for links with drama and P.E. The scope of this outcome is entirely up to you.

Theatre Groups

During this block of sessions, the children will repeatedly work in “Theatre Groups” (mixed ability groups of 3). These groups will ideally remain the same throughout the sessions as the children investigate light and shadows and make the resources for their shadow puppet play. Before the first session it is wise to think about how to allocate the groups, thinking about the various personalities in your class. This will help you share out good role models as well as those who may need a bit more support, so that each group has a good chance of achieving a successful outcome.

Cardboard Boxes

You will need a large number of cardboard boxes for this session (one between three pupils) so you may need to put the word around for people to begin collecting them well in advance. The boxes need to be reasonably strong and have sufficient height for a “stage.” Ideally they should be at least 30cm high.

It is possible for groups to use the same box for the Session 1 investigation and for their shadow puppet theatre which will halve the number you need. If you are going to use the same box, warn children not to make too many holes in the box. Up to 10 in the top of the upturned box should be fine as this will not really be seen and they can be covered up. Up to 10 holes in the side will also be fine but ensure that children only make holes in one side. Choose a long side as one long side will be cut away to give the puppeteers access to the screen!
Preparing the boxes

During this session the children will be encouraged to investigate light by making pencil holes in the box. It is important that before the session, you make sure the cardboard is only one layer thick in the base of the box (which will become the top when it is upturned). You could also cut away any top flaps on the boxes so they sit neatly on the table when upturned.

Health and Safety considerations

- Warn children about the dangers of using sharp pencils
- Remind children not to share drinking straws when doing the Bubble Bowl investigation
Investigating Light

Try to describe what you can see in the centre column. It may be nothing at all or just a vague shape, colour or outline. If you can see something, but you are not sure what it is, you could lift the box a little to check on what it is before you write your observation, e.g. “a shiny edge on the pen which is right beneath my peep hole” or “the white label on the pot” or “a bit of table but no objects”. Check on its position in the box and where it is in relation to your peep hole.

| When I ... | I can see ... | I think this might be because ...
<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>Make a few holes in the top of the box and look down into each one as I go (8-10 spaced out)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Make a few holes in one side of the box and look through each one as I go (8-10 spaced out)</td>
<td></td>
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<tr>
<td>Shine the torch into a hole from the top and look down one of the other holes – try different holes for the torch and different holes to peep through. Peep through holes near the torch and holes that are far away.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shine the torch into a hole from the side and look in from one of the other holes on the side– try different holes for the torch and different holes to peep through</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shine the torch from the side and look in from the top</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shine the torch from the top and look in from side?</td>
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</table>
### My Overall Findings

<table>
<thead>
<tr>
<th>Investigation</th>
<th>I could see ...</th>
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</thead>
<tbody>
<tr>
<td><strong>When I looked in from the top</strong></td>
<td></td>
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<tr>
<td><em>What difference did the torch make?</em></td>
<td></td>
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<tr>
<td><strong>When I looked in from the side</strong></td>
<td></td>
</tr>
<tr>
<td><em>What difference did the torch make?</em></td>
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What my findings have shown me about light
Making a Whizzer Wheel

Light seems white but it is really made of 7 different colours – red, orange, yellow, green, blue, indigo and violet. If you spin a disc (Whizzer Wheel) of different colours very fast, your eyes cannot see the separate colours anymore. They blur together and are seen as “white.”

Our wheel will have 6 colours rather than 7, but the effect is very similar.

You will need

A colour copy on card of the whizzer discs, scissors, a blob of sticky tack, a sharp pencil and 1m of thin string

1. Cut out the 2 coloured discs
2. Glue the two white sides together so the coloured sides face out
3. Put the centre of the disc over a lump of sticky tack with the 2 black dots on top.
4. Using a sharp pencil, carefully make two small holes in the places shown by the dots by pushing the pencil through to the sticky tack below.
5. Thread the string up through one hole and down through the other
6. Tie the two ends together and trim the knot
7. Hook your loop of string over your two index fingers with the coloured disc in the centre.
8. Use your fingers to flip the disc until it is tightly twisted
9. Steadily pull your hands apart to make the disc spin rapidly
10. Move your hands inwards as the disc slows down (to make the string twist in the other direction) and then pull them apart once more
11. With practice you will be able to keep the disc spinning!

You have made a Whizzer wheel! Look at the disc while it is spinning fast. You will see only a creamy white colour! Your eye cannot pick out the different colours at that speed so it blurs all the colours together to form white light. Remember, white light is made of the 7 colours of the spectrum.
Design the Stage for your Shadow Puppet Theatre

Traditional theatre stages are built to look grand and exciting for audiences with bright lights and fancy decoration. Here are a couple of examples.

Curtains are also used to dress up the stage and make it look attractive.

Your task is to design the basic shape of your stage by drawing the design you want on your cardboard box. Your box will need to be upside down with all the flaps from around the edge cut away.

After the session an adult will cut away the cardboard with a sharp craft knife to the design you have drawn. This box has already been cut away with a very simple stage design.

This box has been designed with a curtain swag at the top.
Follow the instructions below to design your theatre:

1. Decide if you want a straight top or a curve

2. Then make a cardboard template for it

   For a straight top just use a long thin rectangle of card or a ruler to draw a line a few cm from the top of your upturned box. Try to make sure it’s straight!

   For a curved top, fold a long strip of card in half and draw half a curve. The thickest part of the curve should be at the fold, it should then gently slope upwards towards the edge. Cut along your curve and open it out.

3. Don’t worry if your curve is too short for your box. Draw round the curve in the centre and then move it to one side and draw an overlapping curve. Then do exactly the same on the other side.

4. Once you have drawn your top, you are ready to design the sides. These can either be straight or in the shape of curtains. Straight sides can be drawn using a rectangular strip or a ruler. For curtain sides you will need to make a curtain shape template. Draw round it on one side then flip it over and draw round it on the other.

5. Congratulations! You have designed your theatre!
I know that white light contains different colours

Compact Disc Activity

You will need: some old CDs, a torch and a magnifying lens

Turn your CD over to look at the shiny side. Can you see any colours of the spectrum? Try tilting it one way and another and notice what happens. Look at it through a magnifying lens. Try taking it into a brightly lit space and a darker space to see what effect this has. What happens when you shine the torch on it? Now try tilting it and notice the effect. What makes the colours show up most strongly? Why might this be? Can you see all 7 colours of the spectrum? How does one colour change into another?

Write down your scientific observations. What do they tell you about light?
I know that white light contains different colours

**Bubble Bowl Activity**

**You will need:** a plastic bowl containing water and a little washing up liquid, a drinking straw, a magnifying lens, sunshine or a bright torch

Blow air into the water to make bubbles. Look at them closely. Can you see any colours on the surface of the bubbles? If possible look at them in bright sunshine or if it’s not sunny, try shining a bright torch on them (be sure to keep the torch dry). Try using a magnifying lens to look at the surface of the bubbles more closely. Tilt the magnifier one way and another and notice the effect. Can you see all the colours of the spectrum? How does one colour change into another? What happens without the sunshine or the bright torch? Why is this?

Write down your scientific observations. What do they tell you about light?