



DONE EB

Learning Scientific Skills Outside the Classroom		
Scientific Skills		
Observing	Recording	Concluding Specific skill – explaining what they have found out
Country of Origin	Suggested Age Range	Suggested Theme
 UK	9 - 11	Light
Location outside the classroom		Benefits of using this location
Playground		The children need to use the light from the Sun to explore shadows and reflections outside
Learning Objectives - Scientific Skills		Learning Objectives - Knowledge
To make careful observations of shadows and reflections To record their observations in annotated diagrams and through photographs To conclude their findings and explain their observations		To know that shadows are formed when light from a light source is blocked by an opaque object To understand factors that affect shadows To know what reflection means To know the difference between specular and diffused reflection
Key Vocabulary		
Scientific skills vocabulary - observe, see, record, recording, conclude, explain, findings Knowledge vocabulary – straight line, natural, artificial, light, source, ray, shadow, transparent, translucent, opaque, reflection, specular, diffused		
Resources / Equipment		
<ul style="list-style-type: none"> Equipment to explore shadows – chalk Equipment to explore and record reflections – iPad/cameras, paper, pencils 		
Teaching Activities		
<p><i>Prior Learning – Children will have previously learned about how light appears to travel in a straight line.</i></p> <p>Discuss – Pose questions on light sources, shadows and reflections.</p> <ol style="list-style-type: none"> Transparent materials let light pass through them in straight lines, so that you can see clearly through them. TRUE Translucent materials let no light through them. FALSE - translucent materials let some light through but scatter the light in different directions. We cannot see clearly through translucent materials. A glow stick is a natural source of light. FALSE- glow sticks are man-made and are therefore artificial. The closer an object is to a light source, the smaller the shadow. FALSE - as an object moves closer to a light source, its shadow becomes bigger. For a shadow to be formed, the path of the light must be blocked. TRUE Reflections are only possible from a smooth surface. FALSE <p>Explain – Today they are going to be exploring some of these features of light in more detail. The first activity is going to be about artificial and man-made light, the second about shadows and the third about reflections.</p> <p>Activity 1: Light Sources</p> <p>Explain – They are going to look at a range of light sources and decide if they are natural or artificial sources of light. <i>Ensure a candle is included as an example because this can cause an interesting discussion about whether it is a natural or artificial source of light. Do not use the Moon as an example as this is not a source of light and is a common misconception amongst children. This would be a good opportunity to reinforce the idea that the Moon does not emit light.</i> If possible, do this activity outside on the playground.</p>		



Activity – Children stand on the playground in the middle, on one side of the playground is a sign saying artificial light and on the other side is a sign saying natural light. The adult will say different forms of light and the children will decide whether it is artificial or natural and move to the appropriate sign.

Activity 2: Exploring Shadows

Explain – They are going to explore shadows and observe what happens to their shadow as they move around.

Activity – On a sunny day, children go onto the playground and using the light from the Sun's rays draw around their own shadows using chalk. The children compare their shadows with that of their peers and observe the changes in their shadow as they move around.

Discuss – Ask children the following questions and discuss their responses.

- Does the height of the child affect the size of the shadow? (Yes - the larger an object, the larger the shadow.)
- Does changing direction change the direction of the shadow? (No, as long as the direction of the light is the same, the rays will travel in the same direction and therefore the shadow will still be cast in the same place.)
- What happens to your shadow when you jump? (The shadow moves as the body moves but it still stays the same size and shape.)
- Are shadows only cast by opaque objects?

Record – Children draw annotated diagrams which represent their findings.

Conclude – Children write a short paragraph explaining their understanding of shadows, how they are formed and what happens to the shadows if the object which cast them moves.

Activity 3: Reflections

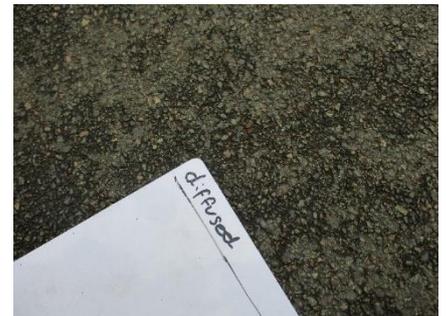


Explain – A reflection happens when light hits a surface and is reflected (bounces off). Light is always reflected at the same angle it hits the surface. Today they are going to look at two different forms of reflection. Explain that:

- Specular reflection is when light is reflected from a smooth, flat surface
- Diffused reflection is when light is reflected from a rough surface.

Activity – Children hunt around the school grounds and observe different types of reflection from smooth and rough surfaces. *(Prior preparation will aid this activity – e.g., pond reflections, mirror reflections, glass in buildings).*

Record – Children record examples of specular and diffused reflection using photographs.



Conclude – Children annotate the reflection photographs, explain the difference between the two types of reflection and explain what they found out from their observations.

Examples of children's work and teacher comments from country of origin

Children enjoyed exploring different features of light outside.

Next steps for this lesson could be to explore how shadows change throughout the day and linking this to the relative movement of the Sun and the Earth. Children could also use their knowledge of specular reflection to explore how periscopes work.