





Learning Scientific Skills Outside the Classroom

Scientific Skills

Predicting	Measuring	Concluding
Country of Origin	Suggested Age Range	Suggested Theme
 Spain	9 - 10	Light
Location outside the classroom		Benefits of using this location
Outside on the playground		There are areas of sunlight and shade
Learning Objectives – Scientific Skills		Learning Objectives – Knowledge
To use prior knowledge to make a prediction To accurately measure time using a stopwatch To orally report their findings from investigations		To know that absorbed light may transform into heat energy To know that different colours absorb heat differently To know how and why a rainbow is formed
Key Vocabulary		
Scientific skills vocabulary – predict, measure, measurement, accurate, conclude, conclusion Knowledge vocabulary – ray, energy, absorb, absorption, reflect, reflection, refract, refraction, heat, spectrum		
Resources / Equipment		
<ul style="list-style-type: none"> Equipment for absorption of light – different coloured balloons (white, black and coloured), black marker pens, magnifying glass, stopwatches Equipment for rainbows – bubble mixture, straws, CDs, white paper or a white surface 		
Teaching Activities		
<p>Discuss – Through discussion retrieve pupil’s prior knowledge on light.</p> <ul style="list-style-type: none"> What is our biggest, brightest and hottest source of light on Earth? (Sun) How do we see? (Light enters eye which can convert light into electrical signals in the retina). What is visible light made of? (Seven colours in spectrum, the rainbow: red, orange, yellow, green, blue, indigo and violet). Why do objects look different colours? (The whole spectrum of visible colours from the Sun can hit an object which can then absorb or reflect the different colours according to its colour. The reflected light enters our eyes. Black objects absorb all colours and white objects reflect all colours). What happens when you wear clothes which are different colours? (Different colours absorb light and can make you feel hotter or cooler – light has energy). <p>Activity: Absorption of light</p> <p>Demonstrate – Show children how to concentrate the light rays from the Sun onto a balloon using a magnifying glass by standing with their back to the Sun so the light rays are coming from behind them. Using a black balloon, show what happens as the energy of the light from the Sun is absorbed by the black rubber material and heats up the air inside the balloon.</p>		
 <p>Activity – Children hold a magnifying glass and a balloon and try to concentrate the light rays onto the balloon. It will be beneficial for the children to practise this with a balloon before they begin to make accurate measurements of time using a stopwatch.</p> <p>Explain - The balloons are different colours to show how the colour of the balloon affects how long it takes to heat up the air inside the balloon. When the air is warm it will make the balloon burst. They are going to time how long it takes to burst a balloon.</p>		
<p><i>N.B. It is extremely important to remind the pupils of health and safety - they should not stare directly at the sun and should not direct the rays of light from the sun onto anything other than their balloon.</i></p>		



Predict - Before starting the activity, children individually make a prediction and justify their answer, “ _____ balloon will pop faster, because _____”.

Measure – Pupils will use a stopwatch to accurately measure the time it takes in seconds for the black and white balloon to explode once the light ray has been concentrated on its surface.

Conclude – What did you find out? Was your prediction correct? Did all the balloons explode? Why does a balloon explode? Which colour balloons explode faster and why?



Explain – Different colours absorb heat differently because they absorb and reflect the light from the Sun differently. The energy from the light which is absorbed is transformed into heat energy. This heats up the air inside the balloon which means it then moves around much more, eventually the increasing force of the faster moving air hitting the inside surface of the balloon makes the balloon burst. The increasing force leads to an increase in pressure.

Activity: Creating a rainbow

Activity - Children use a bubble solution (concentrated washing up liquid and water) and straws to blow bubbles. They observe the changes in colour on the bubbles before they pop.

Activity - Children use CDs to try and reflect the sunlight from the surface of the CD and create a rainbow on a white surface/poster.



Predict - The children predict how the shape and colours will change when they alter the angle of the CD and how the shape and colours will change when the distance between the surface/poster is changed.



Conclude – What colours did you see? What colour is the sunlight? What happened when the sunlight passes through the bubble or hits the surface of the CD? What happened when the distance was changed? Where did you see a rainbow? Can we all see exactly the same effect (the same rainbow) from the same angle? Why?

Explain – When sunlight hits the bubble or the surface of the CD, the white light from the Sun is refracted. Refraction changes the direction of the light waves in white light so the different colours of the spectrum are now visible to the human eye, this is seen in a rainbow.

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

Consider how absorption of light is applicable to day-to-day activities and explore other ways of making rainbows.

