

Module 2: Light Reflection and Colour

Lesson 3: Design and Make

Class Level: 1st and 2nd class	
Strands: 1. Energy 2. Materials 3. Design and Make	Strand Units: 1.1 Light 2.1 Properties and characteristics of materials

Safety: All material should be safe and found in your classroom or at home. Avoid selecting sharp items.

Background

In this lesson we will consider that colour is not just a matter of pigment, it can also be due to reflection of light. Too much reflection may not be good (e.g. glare on computer screens or tablets).

Students will problem-solve this issue using a design-and-make approach and rely on their knowledge gained through investigations into reflective and non-reflective material.

We will then consider how scientists are using these natural structures in technology (biomimicry).

Key Learning

- People look at properties of animals and plants and see how we can use them.
- Colour can be made by reflecting light.
- Non-reflective material like that found in the moth's eye could help make seeing our computer screens easier.

Resources

- CDs/DVDs, torches
- A variety of reflective and non-reflective material, heavy stock paper or cardboard, scissors, glue etc.
- Holographic craft paper/gift bags for demo, any man-made material that has iridescence or changes colour in the light (optional)

SunPilot Resources:

- Powerpoint
- Design-and-make template
- SunPilot video (<https://youtu.be/2UzorxppGJA>)

Key Vocabulary

- Biomimicry
- Reflective
- Non-reflective
- Nocturnal
- Diurnal
- Properties

Science	Literacy
1.1.1 investigate the relationship between light	Oral language

and materials

2.1.1 describe and compare materials, noting the differences in colour, shape and texture

2.1.2 begin to distinguish between natural and manufactured materials

3. Design and Make design and make modelled through thinking about a problem and seeing what scientists are doing

- express personal opinions, ask and ask and answer questions to get information, develop understanding and to clarify and extend thinking in relation to light and colour

-use sophisticated oral vocabulary (subject specific)

Lesson Outline

Introduction:

Slide 2

Last lesson we learned that animals that are awake at night are called **nocturnal**, Animals that sleep at night are called **diurnal**. Remember that when light is bright enough, colour is visible.

We can play with light and reflect different colours. A lot of colour in nature is due to light reflecting off special surfaces that scatter the light.

All the colours seen in the slides come from light reflection

Slide 3 - 5



Show the video illustrating change in colour based on the angle of light.

Slide 6

Ask the children – to discuss their observations from the video.

- Can you think of anywhere you may have seen rainbows or colour changing in the light?
- Show them some items such as holographic wrapping paper – or other items you might have found.
- Let's see if we can do that.



Activity 1. Groups of 2 – 4.

Slide 7

Have the students shine a torch onto a CD and look at the colours within it. What colours do they see?

Ask if they can move the CD in such a way that only one colour is visible (make sure they hold the torch still and move the CD). What colour can you see?

(they should be able to tilt the CD and see a predominant colour and they should be able to change this as they change the angle).

Whole class discussion: *Biomimicry*

Slide 8



Scientists look at nature and see if there are any **properties** in nature they could use. Properties are words we use to describe something, like being reflective. Making man-made things for us that copy nature is called **biomimicry**. Bi'o'mim'i'cry.

We use the idea of light reflection in many items like special wrapping paper or holograms on cards.

Activity 2 Design and Make - groups of 2

Slide 9 - 10



Set up the situation: teacher holds up their mobile phone, tablet or laptop and demonstrates how light reflects off of it.



Ask students 'Have you ever had trouble seeing a picture on a laptop or tablet because it was too bright? What do you think is happening? What is stopping you from seeing what is on the screen?'

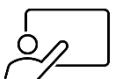
That is because, as well as the light from the screen, sunlight is also reflecting back in your eye. Sometimes things can be too reflective!

Challenge the students to make a sunscreen for a tablet or laptop so they can see the screen in bright light.

In teams of two:

- Plan the design, draw and label it. Record this in their copybooks. **Slide 11, 12**
- Once it is designed on paper – have them make it. **Slide 13**
 - Give the students time to make their design.
- Once it is made - have the students test it to see if it would keep the cat dry.
- If they are not happy with the results, give the students a chance to change the planning of their design

Activity 3 whole class. thinking about *technology* and *biomimicry*



Ask the students to think about their inventions:

Slide 14

- Can you carry your invention around easily? Is this the best approach?
- Could there be another way to solve the problem?
- Have we learned about anything in nature that can absorb light or be antireflective?

Moths' eyes are non-reflective and scientists are trying to see if they can copy that to make non-reflective screens. **Slide**

Scientists think about this too. Scientists **investigate** natural properties to see if they would work to make our lives better. Scientists have investigated the moth's eye and have made material with the same structures which allow for the non-reflective property

Show SunPilot video

Slide 16

Stop at various places within the video and ask for understanding. Some suggested questions:

- *What property were they looking at?*
- *What animal or plant had that property?*
- *What are they going to try to make?*
- *What do you think of that?*



Conclusion (whole class discussion)

Slide 17

What have you learned today?

Prompt to recap of key learnings:

- People look at properties of animals and plants and see how we can use them.
- Colour can be made by reflecting light. Blue in most insects is due to the shape of structures on the wings.
- Non-reflective material like in the moth's eye could help make seeing our computer screens easier.

Extension Activities

- 3rd and 4th class investigate the properties of light in more detail including refraction – this lesson could be extended into that area. Investigations with prisms, blending colour using light instead of pigment.
- Making art with light.
- Explore different materials with regard to light absorption.

Assessment

- Teacher observation
- Student feedback, questioning

