
















Light: Making Shadows

<p>Aim: To recognise that shadows are formed when the light from a light source is blocked by a solid object by investigating the best material for curtains for a baby's bedroom.</p> <p>I can investigate which materials block light to form shadows.</p>	<p>Success Criteria: I can explain how light travels. I can sort different materials according to whether they are opaque, transparent or translucent. I can use these materials in an investigation into different shadows.</p>	<p>Resources: Lesson Pack 3 equal sized pieces of card per group Hole punch A torch per pair Range of different materials to test - ideas include cotton, cling film, net curtains, voile, upholstery fabric, blackout curtain lining, muslin, tracing paper.</p>
	<p>Key/New Words: Light, energy, beam, ray, travel, straight, opaque, translucent, transparent, block, shadow.</p>	<p>Preparation: Choosing Materials Activity Sheet - 1 per child</p>

Prior Learning: Children will have learnt about light sources and reflections in lessons 1, 2 and 3.

Learning Sequence

	<p>Light: Explain how light travels using the Lesson Presentation. Address any misconceptions. Ask the children to work in groups to set up a model demonstrating that light travels in a straight line. Using three pieces of card with a hole punched in each one, they can shine a torch through the holes when they are in a straight line. Ask what happens when the holes in the card do not line up.</p>	
	<p>Blocking Light: Explain and discuss opaque, translucent and transparent objects, focusing on the fact that opaque objects block light. Ask children to look around the classroom to name objects that are opaque, transparent or translucent.</p>	
	<p>What's the Use? Looking at the statements on the Lesson Presentation, ask the children to decide if each item would be best made out of an opaque, translucent or transparent material.</p>	
	<p>Making Shadows: Use the Lesson Presentation to explain how opaque objects block light, creating shadows.</p>	
	<p>Choosing Materials: Introduce the context of the investigation. Explain that a boy wants to choose a material to make some new curtains for his baby sister's bedroom. The curtains need to block light so that the baby doesn't wake up too early. Ask the children to test the different materials on their table by shining a torch onto each material and observing the shadow it creates. They should decide if each material is opaque, translucent or transparent, and record their ideas on their differentiated Choosing Materials Activity Sheet.</p>	
	<p>Which Material Is Best? The children should decide which material would be best for the curtains. They should draw and label curtains on the blank window on their differentiated Choosing Materials Activity Sheet, and should write an explanation of why they chose this material, referring to their investigation. <i>Look for children who are able to communicate their understanding of how opaque materials block light in their explanation.</i></p> <div style="display: flex; justify-content: space-around;"> <div>  <p>Children use the prompts for the different types of material and complete the sentence starters to explain their choices.</p> </div> <div>  <p>Children use the prompts for the different types of material and use headings to help structure their explanation.</p> </div> <div>  <p>Children refer to their findings in their explanation.</p> </div> </div>	

Taskit

Drawit: Sit in front of a light to create a shadow of your face in profile. Ask a friend to draw around your silhouette. Swap over and draw their silhouette!

Sortit: Sort the _____ cards according to whether the objects are opaque or transparent.

Createit: Cut pictures out of magazines or catalogues to create a collage of opaque, translucent or transparent materials.



Science

Light

Making Shadows



Aim

- I can investigate which materials block light to form shadows.

Success Criteria

- I can explain how light travels.
- I can sort different materials according to whether they are opaque, transparent or translucent.
- I can use these materials in an investigation into different shadows.

Light



Light is a beam of energy that travels in a wave from a source.

A wave of light can only travel in a straight line. Waves of light are called light rays.

Try this activity to demonstrate how light travels:

- Punch holes in the centre of three equal-sized pieces of card.
- Hold the pieces of card so that the holes line up.
- Shine a torch so that the beam of light can travel straight through the holes.

What happens if you move one of the pieces of card so the holes don't line up?



Blocking Light

When you moved one of your pieces of card so the holes did not line up, the card blocked the ray of light. This is because light can only travel in a straight line, so it can not travel around the card.

Some objects, like the card, block light well and don't let any get through. These objects are called opaque.

Other things let some light through, but scatter the light so we can't see through them properly. These things are called translucent. Transparent objects let light travel through them easily.

Can you think of some items that are opaque, translucent and transparent?

Look around your classroom for ideas!

What's the Use?



Opaque, translucent and transparent materials are all useful for different things. Look at the items below and decide which type of material would be best for each one:

bathroom window

living room curtains

car windscreen

sun hat

window with a
lovely view

shower curtain

Making Shadows

Opaque objects do not let any light through.

They completely block the light and stop it travelling any further.

These objects create shadows.

Shadows are areas of darkness where light has been blocked.



Choosing Materials

This is Isaac.

He has a new baby sister.

She is a very good baby, but she keeps crying early in the morning because too much light is getting into her bedroom and waking her up.

Isaac wants to choose the best material to make some new curtains for her bedroom.

He wants to make sure that her new curtains block as much light as possible.

Can you help him?



Choosing Materials



Look at the different materials on your table.

You will test how well each one blocks light by shining a torch onto it and seeing if it makes a dark shadow. If it does, it is opaque and may be a good choice for the new curtains.



Decide whether each material you test is opaque, translucent or transparent.

Record this on your Choosing Materials Activity Sheet.

Choosing Materials

Write your name in the box below.

Write the name of the material you are testing. (Do not write the name of the material you are testing.)

When you shine a torch on the material, does it make a dark shadow? (Yes/No)

Material	Does it make a dark shadow?	Is it opaque, translucent or transparent?

Write a message to thank your class for the materials they have given you. (You can use the words in the box below.)

Thank you for the materials you have given us. We will use them to make our new curtains.

Thank you for the materials you have given us. We will use them to make our new curtains.

Thank you for the materials you have given us. We will use them to make our new curtains.

Which Material Is Best?



Now you have tested all the materials, you need to choose which material is best for Isaac to make the curtains out of.

Choosing Materials

The quality team choose the best material for the new window to be built. How can you help?

What materials did you test? How did they behave?

Which material was the best for the window? How do you know?

Material	How it behaved	Why it was good/bad

Write a message to Isaac to explain why you chose this material.

I chose _____ for the new curtains.

The material is good because _____.

I like it and it is good for the new window because _____.

Draw curtains on the window on your Activity Sheet, and label them to show which material they are made out of. Write a message to Isaac to explain to him why you chose this material.

Think about how you could tell it blocked light and why this would be useful.



Aim



- I can investigate which materials block light to form shadows.

Success Criteria

- I can explain how light travels.
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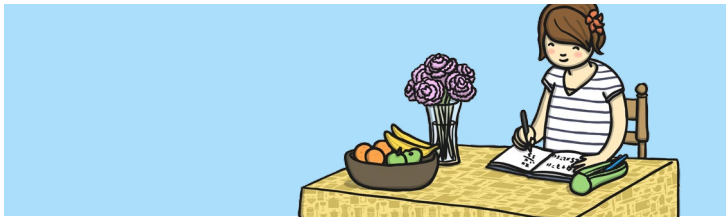
Introduction

This 'Light' unit will teach your class about light, reflections and shadows. They will learn about different sources of light, and that we need light to see. The children will work scientifically and collaboratively to investigate reflective materials, in the context of designing a new book bag. They will work in a hands on way to play a range of mirror games, finding out more about reflective surfaces. Furthermore, they will learn that the sun's light can be dangerous, and will create an advert for a pair of sunglasses or a sun hat that they have designed. The children will have chance to test which objects are opaque in an exciting investigation to design the most effective curtains, and will find out how shadows change when the distance between the object and light source changes. They will develop their scientific enquiry skills, making observations, predictions and conclusions.



Health & Safety (including food allergies)

Ensure that children are aware that they should never look directly at the sun or any bright lights. Remind children not to shine lights towards others' eyes. Suitable torches should be used in the investigations, never laser pointers. Make sure that the mirrors used are child safe, not glass. When carrying out investigations ensure children are aware of how to use the equipment safely.



Home Learning

Create Your Own Light Quiz: In this activity children design their own quiz for a friend or family member, using their knowledge of light and dark, reflection and shadows.

Light, Reflection and Shadows Crossword : In this differentiated activity children have the opportunity to use their understanding of light, reflection and shadows to solve a fun crossword puzzle.



Wider Learning

The [Light](#) web page has lots of video clips and ideas on light, reflection and shadows.

This [Light and Shadows](#) contains useful animations of how shadows change, and includes a statistics activity involving noticing patterns.

Arrange a visit from an optician, photographer or a stage lighting technician to explain how they work with light in their job.

Assessment Statements

By the end of this unit...

...all children should be able to:

- Identify light sources.
- Understand that we need light to see.
- Know that light travels in a straight line.
- Identify reflective surfaces.
- Know that the Sun can damage their eyes.
- Know how to protect their eyes from the Sun.
- Understand that a shadow is formed when a solid object blocks light.

...most children will be able to:

- Understand that dark is the absence of light.
- Set up an investigation and make predictions.
- Understand how surfaces reflect light.
- Recognise that a mirror appears to reverse an image.
- Identify some parts of the eye.
- Understand how the Sun can damage parts of the eye.
- Identify opaque, translucent and transparent objects.
- Know how shadows change size.

...some children will be able to:

- Explain the properties of materials that reflect light well.
- Understand why shadows change size.
- Set up reliable and accurate investigations.
- Make and explain predictions.
- Make and record accurate observations.
- Use scientific language to explain their findings.
- Be able to ask and answer questions based on their learning using scientific language.

Choosing Materials

Insert text here.



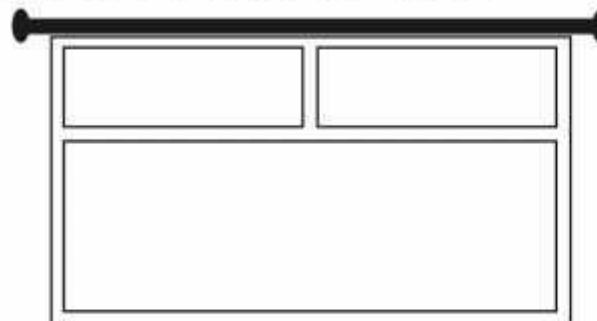
Can you help Isaac choose the best material for the new curtains in his baby sister's bedroom?

What materials are you testing? Draw or list them below.

Shine the torch on each material to see what sort of shadow it makes. Put each material in the correct column below.

Opaque Blocks all light and makes a dark shadow.	Translucent Lets some light through and makes a faint shadow.	Transparent Lets all the light through and does not make a shadow

Which material have you chosen for the new curtains? Draw the curtains on the window and label the material.



Write a message to Isaac to explain why you think he should use this material.

I chose _____ for the new curtains.

When I tested it, this material _____

The shadow it made was _____

I think it will be good for the new curtains because _____

Choosing Materials

Insert text here.



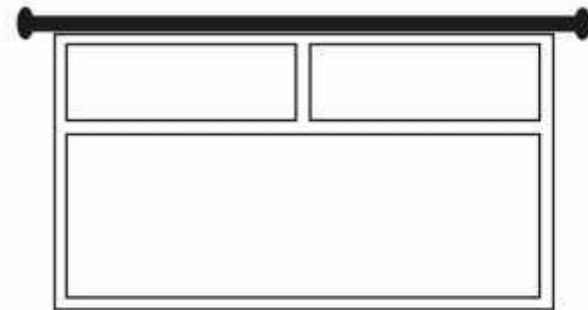
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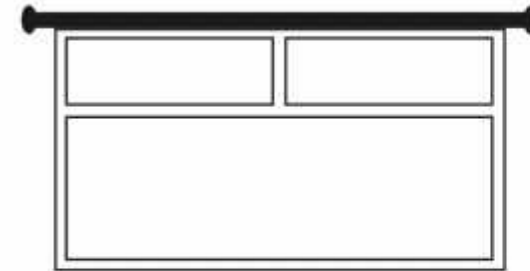
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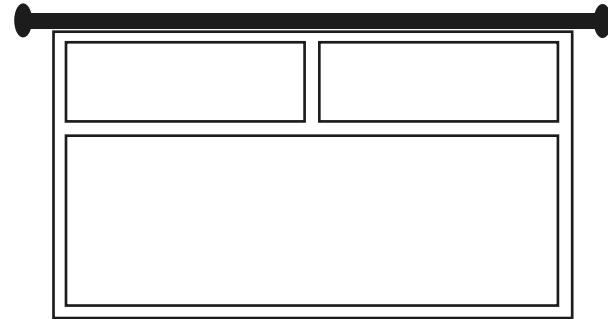
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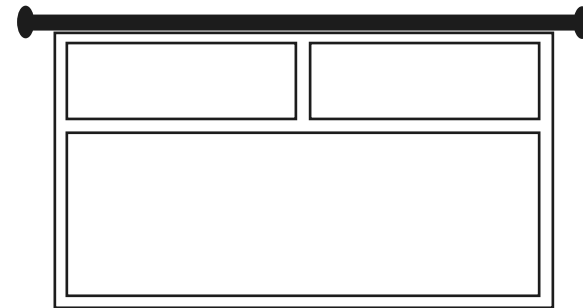
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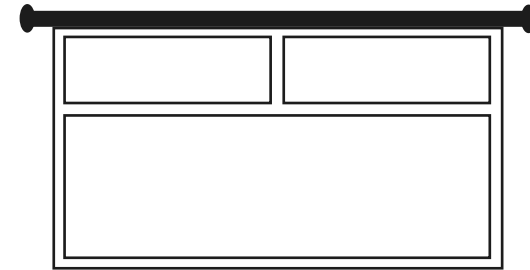
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