

Light, Materials & Shadows: Lesson & Activities

Preparatory information:

Does light travel?

Yes, light travels from luminous objects such as the sun.

How does light travel?

Light travels in straight lines.

Did you know?

Have you heard the expression 'the speed of light'? Light travels at an incredible speed. The sun is located approximately 150,000,000 km from the earth yet it takes light from the sun just 8.5 minutes to reach the earth.

Through what substances can light travel?

Light can travel in a vacuum. Otherwise light from the sun would not be able to reach the earth. Light can also travel through mediums such as air and water.

Can light travel through objects?

The answer to this question is more complex. Essentially it depends on the nature of the object. Have your students think about the many different kinds of objects: light can travel through a window but it cannot travel through a brick wall. Why?

Objects can be sorted into three different categories according to how much light they allow to pass through them:

Transparent objects allow light to pass through them without distorting it.

Example: clear glass

Translucent objects allow light to pass through them but they distort it.

Example: frosted or stained glass.

Opaque objects do not allow light to pass through them.

Example: brick walls, human beings.

Activity:

Have pupils bring in ordinary everyday objects from home. Gather all these together in central pile. Supply three containers: one labeled transparent,



another translucent and another opaque. Have pupils sort the pile. Then go through the containers together to check if objects have been correctly classified.

Sideline: Classification

Classification is extremely important in science. To classify a subject means simply to sort it into a group according to shared characteristics the most obvious example is probably the ordering of the animal kingdom into species.

Children can classify anything according to set criteria: they can sort pictures of animals into the groups to which they believe they belong or food into the sections of the food pyramid. A light hearted activity could be to sort crisps as this allows children to consider the different criteria involved in classification i.e. should crisps be sorted according to brand, or flavour, or shape etc?



Sideline: Recycling

Recyclable objects such as plastic bottles are ideal for the sorting game above. Have pupils consider why rubbish is sorted for recycling.

Recycling starts with people separating recyclable materials from their other rubbish. Cans, cardboard, glass, paper and plastic are all recyclable. These materials can be made into new products such as cardboard boxes, glass jars and bottles, newspaper, plastic detergent bottles, steel and even playground equipment!

Of course these items must all undergo a process to render them fit for use once more. Since the process involved is different for different materials it is necessary for them to be separated. For example water is added to paper to make pulp which is then deinked, passed through a screen and squeezed between rollers while aluminum is melted, cleaned and poured into moulds to form large ingots.

Shadows

Do you remember how light travels?

Light travels in straight lines.

What happens when an object is placed in the path of light?

Light travels in straight lines. It cannot bend to travel around objects; if it did we could see around corners! When light is blocked by an object a dark area or shadow is formed.

Demonstration:

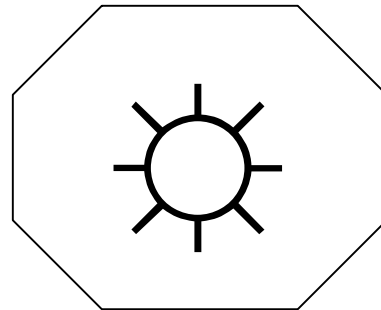
This is easy to demonstrate using a torch in a darkened classroom. Place a white sheet or page on a desk / table. Show the pupils the torch beam shining unobstructed across the page. Now place an object in its path. A shadow will form. An object with a distinctive outline will impress what is happening on pupils.

Did you know?

In the past shadows were used to tell time. As the earth rotates the position of the sun in the sky, relative to us, changes. This change in position changes the size and shape of shadows on earth.

Make & Do: Make Your Own Sundial

Materials: Piece of cardboard
Wooden stick (15 - 25 cm)
Glue
Art supplies to decorate



Method:

1. Cut the piece of cardboard into the shape you wish to use
2. Glue the wooden stick to the centre of the cardboard so that it stands upright
3. Decorate your sundial as desired but leave the edges clear
4. Place the sundial on a flat surface with good exposure to the sun
5. The wooden stick will cast a shadow across the board. Mark the point on the board where the tip of the shadow is located. Note the time of day alongside the mark.
6. Repeat step 5 at various times of day. Note the shadow changes. At what time of day are shadows longest and shortest?
7. Shadows change in appearance over the space of a day as the earth rotates. However intrepid scientists should also be aware that the appearance of shadows on shadows on their sundial will also will also vary depending on the date as at different times of year the earth will be at different points in its orbit of the sun.

Puzzling Times!

First solve the clues below & then seek out the answers in our word search



t	n	e	r	a	p	s	n	a	r	t
h	o	v	r	a	y	h	g	n	t	a
g	l	s	a	o	r	o	b	l	a	d
g	l	s	a	o	r	o	b	l	a	d
l	t	o	l	s	r	e	r	r	c	d
a	c	n	p	h	t	r	a	k	o	e
r	e	f	r	a	c	t	l	o	n	v
t	l	e	p	d	q	t	l	m	c	r
s	f	p	v	o	r	u	l	r	a	u
e	e	m	d	w	r	n	e	r	v	c
p	r	l	s	m	c	o	n	v	e	x
n	e	v	e	s	n	e	e	r	g	s

Clues

1. Light travels in lines
2. The type of lens that causes light rays to converge
3. Where you probably see your reflection most often!
4. Material that allows light to pass through it without distortion
5. Material that allows no light to pass through it
6. Object used to disperse white light
7. When light is blocked by an object a is formed
8. How many colours is white light composed of?
9. The type of lens that causes light rays to diverge
10. The bouncing of light from a surface is called.....
11. The inventor of the alphabet used by blind people to read was Louis
12. A lens is a piece of glass with a surface
13. The three primary colours of light are red, blue and
14. Richard of gave battle in vain
15. The bending of light