The Primary Shakespeare Company

NATIONAL CURRICULUM:

Pupils should be taught to:

- recognise that they need light in order to see things and that dark is the absence of light
- notice that light is reflected from surfaces
- recognise that light from the sun can be dangerous and that there are ways to protect their eyes
- recognise that shadows are formed when the light from a light source is blocked by an opaque object
- find patterns in the way that the size of shadows change

WORKING SCIENTIFICALLY:

During years 3 and 4, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:

- asking relevant questions and using different types of scientific enquiries to answer them
- setting up simple practical enquiries, comparative and fair tests
- making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers
- gathering, recording, classifying and presenting data in a variety of ways to help in answering questions
- recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables
- reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions
- using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions
- identifying differences, similarities or changes related to simple scientific ideas and processes
- using straightforward scientific evidence to answer questions or to support their findings.

CONTEXT

On the death of Caesar, even the sun disappeared. And it did not just disappear for a passing moment, as in a normal eclipse. Befitting the demise of the larger-than-life Caesar, the sun absconded for a year. On this point the Roman sources are unusually insistent and coherent. According to Pliny the Elder, writing a century after the fact, "portentous and protracted eclipses of the sun occur, such as the one after the murder of Caesar…which caused almost a whole year's continuous gloom." Plutarch was even more vivid in describing "the obscuration of the sun's rays":

> During all that year its orb rose pale and without radiance, while the heat that came down from it was slight and ineffectual, so that the air in its circulation was dark and heavy owing to the feebleness of the warmth that penetrated it, and the fruits, imperfect and half-ripe, withered away and shriveled up on account of the coldness of the atmosphere.

It is easy enough to dismiss these observations as the superstitions of a prescientific age. We might attribute them to the human mind's infinite ability to imagine connections where there are none, or more generously, we could try to understand these reports as culturally meaningful texts, a symbolic language through which the Romans experienced the world. But thanks to unexpected insights and data gained from our own urgent need to understand the earth's climate, we have learned that there is much more to the story of the celestial signs that followed Caesar's death.

LESSON 1 WHAT IS LIGHT?

Key Vocabulary

- Light
- Sources of light
- Electricity

LO: I can recognise that there needs to be light in order to see things and that darkness is the absence of light.

Starter- Complete the pre-assessment. Chn to write down what they know about light. (Activity 1a) Once completed, watch the video and add extra information in another coloured pen.

https://www.youtube.com/watch?v=1PsHHKwtXQU

Main- chn organise the pictures. Ask the children to decide how they could sort out the pictures. (Activity 1b/1c)

Plenary- once they sort of the pictures discuss how they sorted them out. Pick up the misconception of the moon and discuss what sources of light the Romans would've had. Activity 1d

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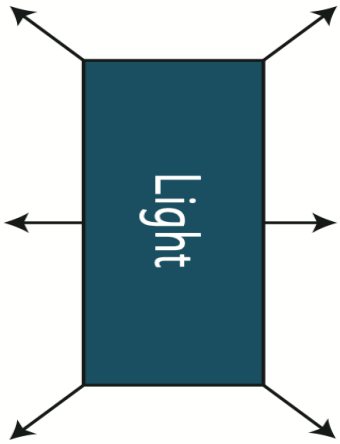
Activity 1a



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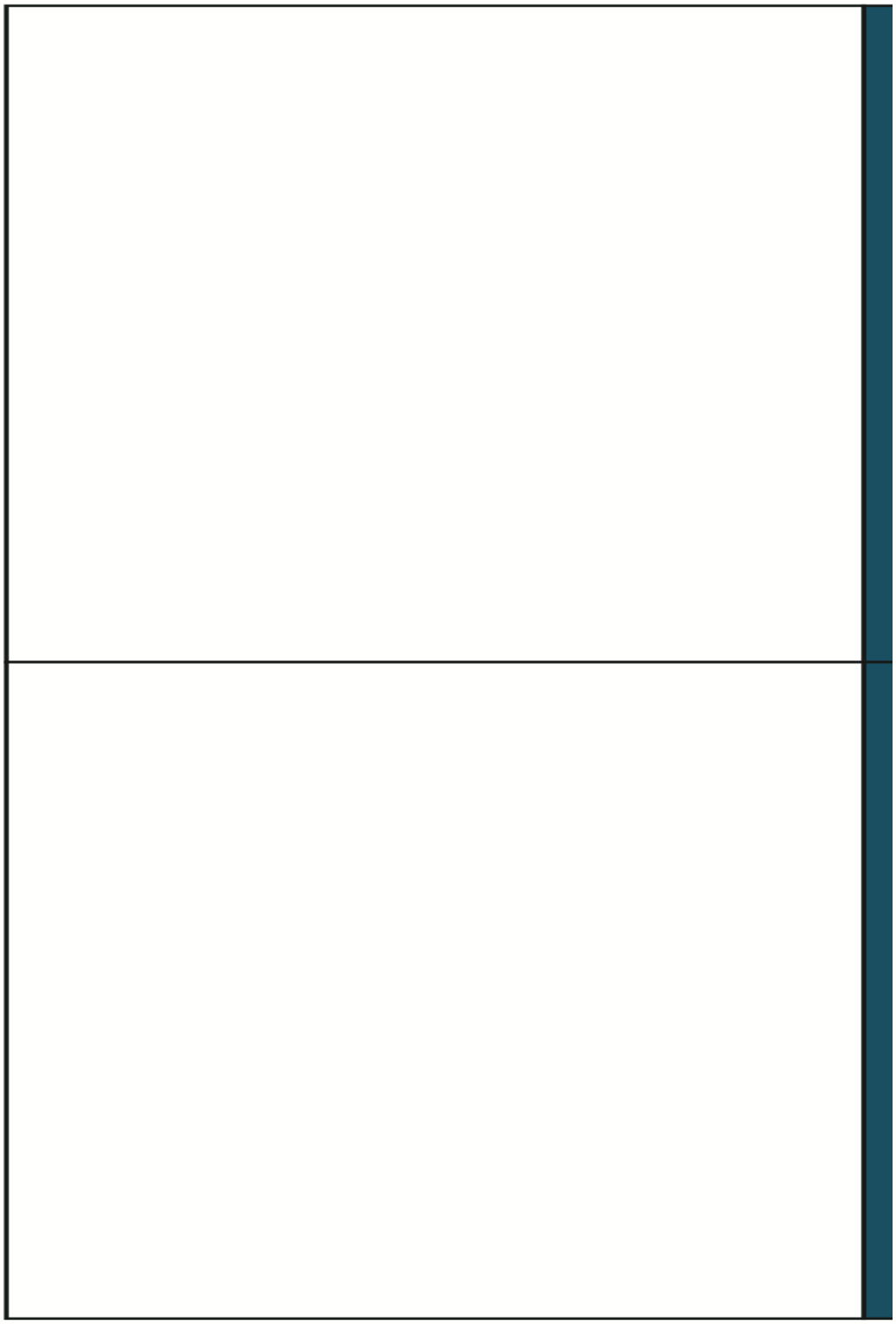
Activity 1b



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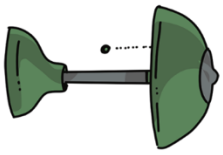
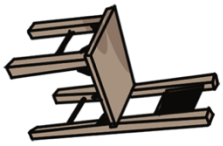
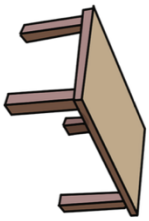
Activity 1c

fire 	pen 	stars 
mirror 	lamp 	fireworks 
Moon 	candle 	chair 
torch 	TV 	pizza 
Sun 	table 	sunglasses 

Activity 1d

Artificial light was common throughout the Roman Empire. Oil lamps offered an alternative to candlelight. The most common material used was pottery, and had only one wick. The bronze example above would have been expensive to produce and require a lot of oil.

LESSON 2 WHAT IS REFLECTED LIGHT?

Key Vocabulary

- Reflective
- Reflect
- surface
- see
- light
- travel
- straight lines

LO: I can notice that light is reflected from surfaces.

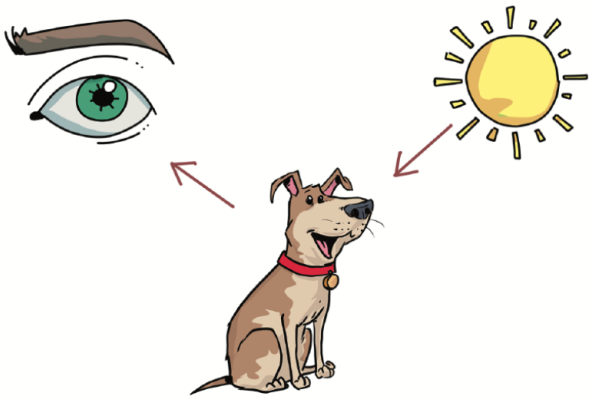
Starter: Introduce the vocabulary. Recap on what the children have learnt from the previous lesson. What is a light source? Can you name some light sources (sun, torch, candle, stars) Is the moon a light source? Why not? (it reflects light from the sun) What is the dark? What does absence mean?

Watch this video- sign up for free. How we use light to see. Take notes on whiteboards.

https://app.discoveryeducation.co.uk/learn/videos/d6ebdcc4-c5f3-4174-8890-7166c5f1e9b1/?embed=false&embed_origin=false
Then discuss the difference between sources of light and reflective material.
Give a real time example e.g. you are seeing me now, teaching you about light because sunlight and/or the light from the computer/light bulb is travelling in straight lines, hitting me or reflecting off me, changing direction and entering your eyes.
• Look at the diagram on illustrate that the light is travelling from the source, reflecting off the object, changing directions and entering the eye. (Activity 2a)
• Explain to the children that some surfaces reflect light better than others (flat, smooth, shiny surfaces). Discuss the misconception that some people mistake reflective materials for light sources. (Activity 2b) sort out the pictures.
https://www.bbc.co.uk/programmes/p0117vyw watch video.
Explain that in the Roman times there was artificial light.

Design a poster to encourage younger children to wear something reflective when they are outside. Ensure the children include information about how reflective materials work, and why they are important to wear in the dark. (Activity 2c)

Activity 2a



Explain what is happening in this picture.
Use scientific vocabulary.

Keywords	**light, reflect, reflective, surface, straight lines**

Activity 2b

Winter gloves

Camp fire

Laser lights

Decoration

Road cat's eyes

The Sun

Worker's jacket

Bulbs

Flash Light

Hat and scarf

The Moon

Cat's eyes

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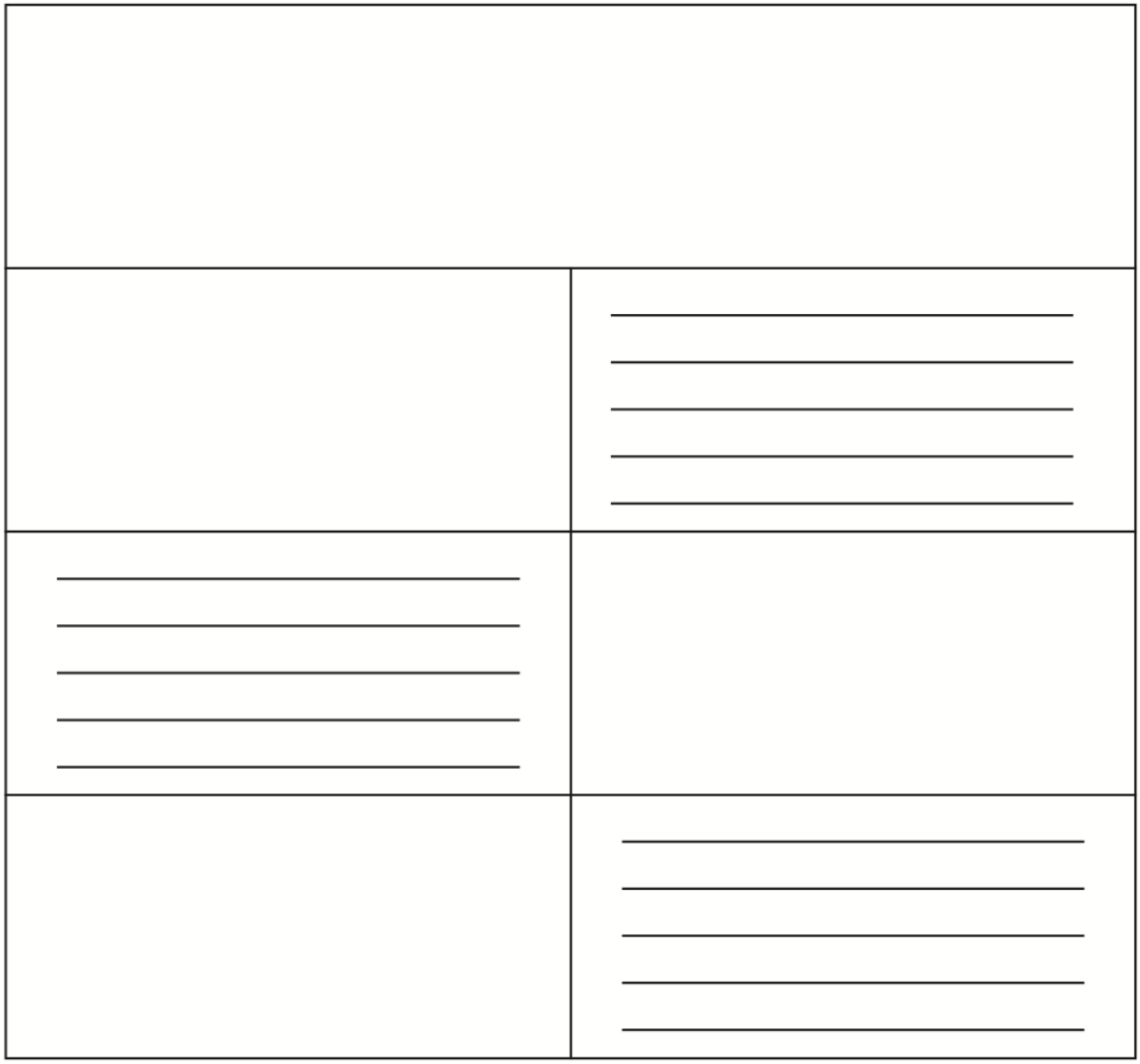
Activity 2c- poster



LESSON 3 IS THE SUN DANGEROUS?

LO: I can recognise that light from the sun can be dangerous and that there are ways to protect your eyes and skin from the sun.

Key vocabulary:
Reflective light
UV light
Light source
Straight lines
Damage
Protection
Starter: Recap- What is the light source in this picture? If it was night-time, what other light source could there be? Ask the children what they know about the sun. Take feedback and then read through the information (Activity 3a)

Main:
• Ask the children, is the sun dangerous? We know that the sun is bad for our eyes if we look directly at it as it is so bright. Are there any other ways in which the sun is dangerous? Talk about their own experiences of sun damage/ sunburn. What do they usually wear to protect themselves. (Activity 3b- go through the handout.)

Main 2: Create a poster about protecting yourself from the sun. (Activity 3b)

Plenary- share the posters. Share the information below and discuss.

The ancient Egyptians used a combination of rice, jasmine, and lupine to create a sunscreen-like paste, while **the ancient Greeks and Romans used olive oil to protect their skin**. Modern testing of olive oil confirms it has an SPF rating of about 8.

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The Sun is the biggest **light source** we use. **The Sun** is very important to us. It provides us with **heat and light.** Although it is important to us, it is just an ordinary star, one of the billions in the **Universe.**

The other **stars** are too far away for us to feel their heat, but we can see their **light** when it is dark at night. **The Sun** is a huge ball of hot gas, 1.4 million km wide. That's as wide as 12,600,000 football pitches lined up! It could swallow more than a million **Earths** and is over 300,000 times heavier.

The Sun's light is so bright that it can damage the eyes if looked at directly and can even cause **blindness.** The Sun looks **brighter** than other stars because it is **closer to the Earth.**

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Activity 3b

We can wear a hat to protect our heads and eyes from the sun's light.

We can wear at least factor 15 sun cream to protect our skin from UVA rays.

We can wear loose, light clothing, so we don't get sunburned.

We can go in the shade during the hottest times of the day (11am – 3pm).

We can wear sunglasses to protect our eyes from the sun's rays.

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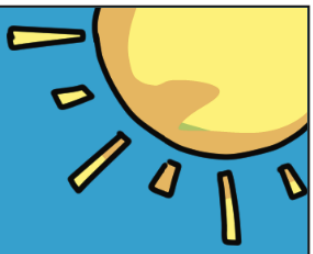
Activity 3c

Protect yourselves from the sun!



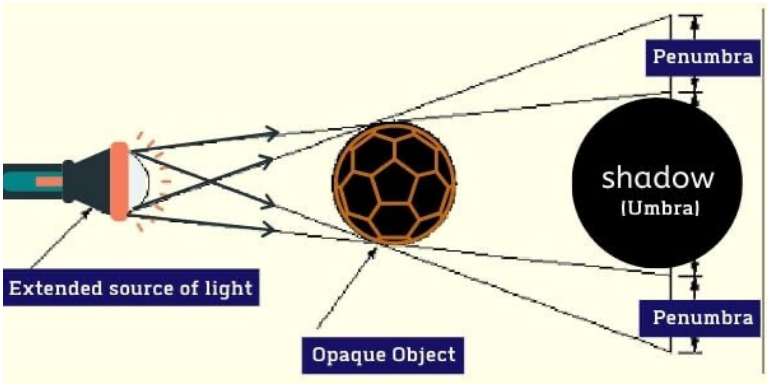
	sun hats	sunglasses
sun cream	shade	loose clothing

LESSON 4 WHAT IS SHADOW?

Watch- sign up for free.
https://app.discoveryeducation.co.uk/learn/videos/2565d973-533e-45d6-bd5e-05d3a6094d72/?embed=false&embed_origin=false

Main- Discuss the main events in Julius Caesars. Create a shadow puppet show. Show the image of Julius Caesar's death. How could you react that scene. (Activity 4a)
Show an example of puppets and shadow puppets (Activity 4b)
https://www.youtube.com/watch?v=-hL28SkHf1g
Resources: Cardboard box, tape, tissue paper, black pen, lolly sticks and black card and pencils.
Create your shadow puppets and theatre.

Plenary: Present the puppet show. Discuss how the shadow is formed.



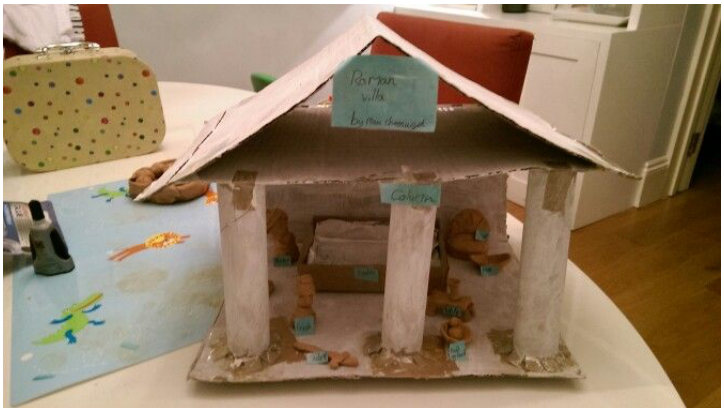
Activity 4a

Activity 4b

LESSON 5 DOES MOVING THE LIGHT SOURCE CHANGE THE SHADOW?

BEFORE THE LESSON

HOMEWORK CREATE A ROMAN BUILDING.



LO: I can find patterns in the way that the length of shadows change.

Key Vocabulary:

Height, Centimetres, Equipment, Variable, Fair test, results, conclusion.

Starter: Recap shadows and key vocabulary.
Watch the video.
https://espresso.discoveryeducation.co.uk/player/76d2c91a-5ef8-486a-90f0-aef4fd5bb670?back=bfad4550-54ef-411d-b087-6f79e9ba2dc3

Read the information below about the length of shadows at various times in the day. (Activity 5a and Activity 5b)

At a later point or when it is a sunny day, take the children outside to look at the length of their shadows in the morning, midday and in the afternoon

• Refer back to last week's lesson on shadows, did anyone discover what happens to the size, shape or length of a shadow when the position of the light source was moved?
• Introduce the investigation. Using the Roman buildings the chn made for homework we are going to see what will happen its shadow at different times of the day. (Activity 5c)

Children work in pairs or small groups to conduct the investigation.

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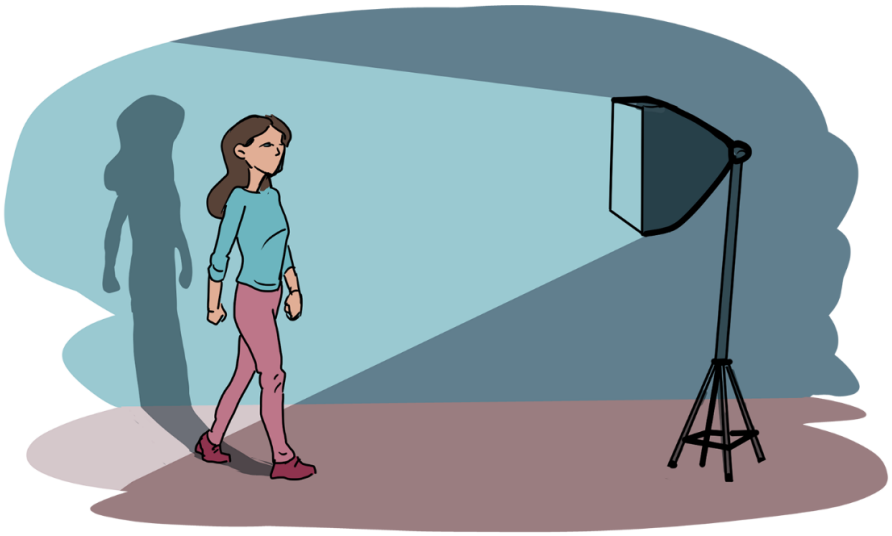
We learnt that a **shadow** is made when **an object blocks light** in the last lesson. A shadow is a dark area or shape caused by a solid object blocking the rays of light from a **light source**. Opaque objects make the **darkest shadows.**



Opaque

Opaque materials do not let any **light** pass through them. They **block the light.** Wood is an example of an **opaque material.**

Translucent

Translucent materials let some light through, but they scatter the light in all **directions** so that you cannot see clearly through them. **Tissue paper** is an example of a **translucent material.**

Transparent

Transparent materials let the light pass through them in straight lines so that you can see clearly through them. **Glass** is an example of a **transparent material.**

Year 3- Light

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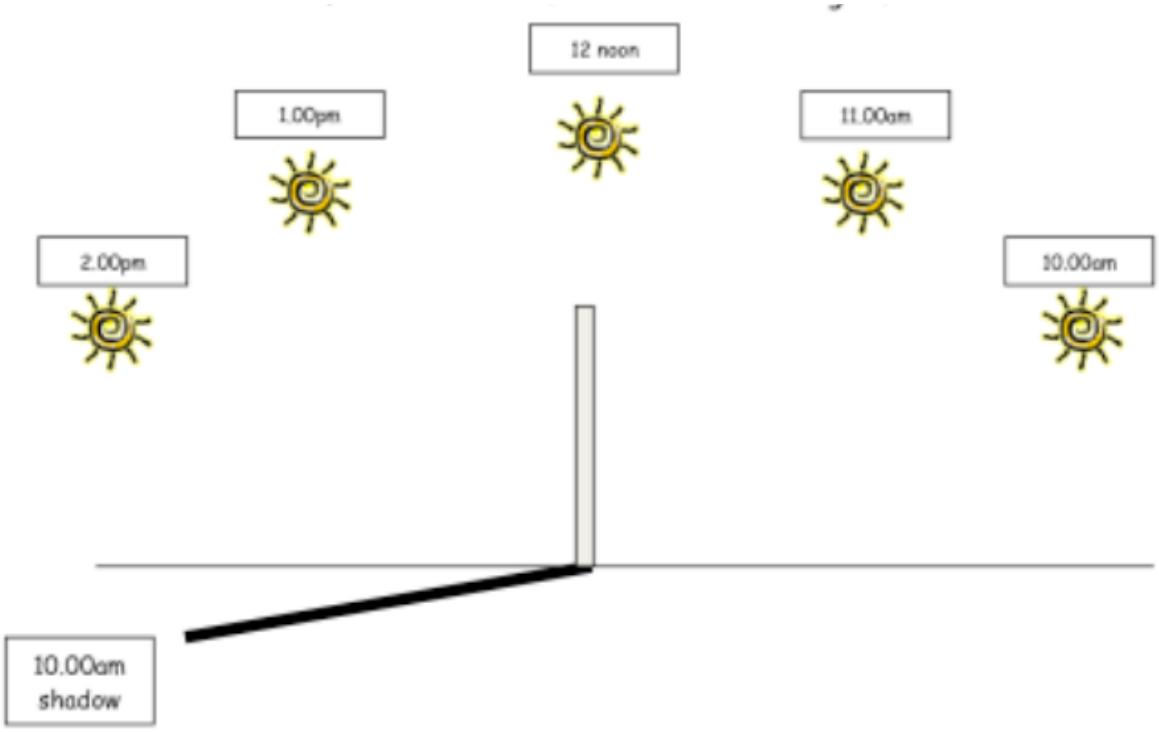
The Sun is a very bright natural light source. It seems to move across the sky during the day. In fact, it just looks like it does that because the Earth is spinning.

The Sun casts the **shortest shadows** at midday when the Sun is highest in the sky.

The Sun make the **longest shadows** at the beginning and end of the day when the Sun is lowest in the sky.



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Activity 5c

1. How will you investigate this question?
Draw a step by step to show what you will do in your investigation.

First _____	Then _____	Finally _____

Equipment:

_____

_____

_____

Results:

Time	10:00am	11:00am	12 noon	1:00pm	2:00pm
Length of shadow (cm)					

Does moving the light source above the object make the object's shadow longer? Explain your answer using your findings.

_____

_____

_____

_____

_____

_____

_____