

SHADOW PLAY (LEVEL 1)

Ages 4 to 7 (Level 1)

Description:	Learners will explore the qualities and characteristics of light and shadows. They will create their own shadow theatre by illustrating part of their story, illustrating and cutting their own puppets, and setting up the stage
Leading question:	What stories can shadows tell us?
Age group:	4 – 7 years
Subjects:	Science, Literacy, Art and Design
Total time required:	5 hours over 5 days
Self-guided / Supervised activity:	Medium Supervision
Resources required:	White Sheet Straws / Skewers / Toothpicks Light source: Lamp, Torch, Sun etc. Tape, Paper, Black Marker / Crayon, Scissors Paint and Paintbrush Paper and Pen

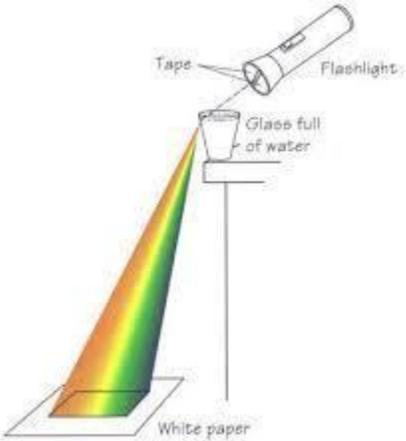
Learning outcomes:	<ul style="list-style-type: none"> - Identify sources of light as natural and artificial - Classify and name some everyday examples of opaque, translucent, and transparent objects. - Understand how opaque objects cast a shadow, and how the shadow appears. - Understand how shadows change when the distance of a light source is altered - Use puppets to narrate a single event or several loosely linked events, tell about the events in the order in which they occurred, and provide a reaction to what happened. - Speak audibly and express thoughts, feelings, and ideas clearly.
Topics/Concepts covered and skills developed	<ul style="list-style-type: none"> - Natural and artificial - Light - Transparent, translucent, and opaque - White light (the rainbow) - Colors - Ability to mix colours - Shadow - Drawing and painting skills - Storytelling - Puppets - Following instructions

	<ul style="list-style-type: none"> - Critical Thinking (making observations) - Creativity and communication skills - Acting
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Day	Time	Activity and Description
1	15 minutes	<p>Learners will explore the properties and qualities of light through this project. In Day 1 they will explore questions related to the nature of light and the role it plays in our life.</p> <ol style="list-style-type: none"> 1. To explore the importance of light in our lives, learners will draw a scene in the daylight and night (they can choose to draw a scene of their house, a landscape, of themselves, etc.). Prompts: What does the sky look like in the day and night? What are people or animals doing in each case? What are things that we only see at night? What are things that we only see during the day?
	15 minutes	<ol style="list-style-type: none"> 2. After drawing, learners will think about the different things we do when it is light or dark. If the project is conducted in a classroom setting or with a group of learners, have the students look at what the others drew to scaffold this reflection. Guide the learners attention to the fact that most of their working time is in the day with the sunlight and most people sleep in the night in the darkness. Additional prompts: Why do you think most people work in the day? Why would some people have to work at night?
	15 minutes	<ol style="list-style-type: none"> 3. What is light? Learners will brainstorm at least 3 ideas or things that they associate with light. They will think of how they can draw and show light and draw this. Reflection Prompts: is it difficult to draw light? Why or why not? Learners will illustrate and label these answers. Here are some examples of ideas that they can come up with:



	<p>15 minutes</p>	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  Sparkly Stars Bright </div> <div style="text-align: center;">  Sun - Hot </div> </div> <div style="display: flex; justify-content: space-around; align-items: center; margin-top: 20px;"> <div style="text-align: center;">  Candle </div> <div style="text-align: center;">  Light </div> <div style="text-align: center;">  Rainbow </div> </div> <p style="margin-top: 20px;">4. Where does light come from? Learners will identify sources of light and make a list illustrating their examples. Prompts: What, if anything, do these sources have in common? (for instance, learners can say that they burn, or they can say that they are used by people for different purposes, etc.). What are some differences between them? (for example, the difference between natural and artificial can come up in the conversation). To support learners on this reflection, or this, you can design a worksheet where learners will draw the different sources within each of the rows:</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th colspan="2" style="text-align: left;">Sources of Light</th> </tr> </thead> <tbody> <tr> <td style="width: 50px; text-align: center;">1.</td> <td>Sun</td> </tr> <tr> <td></td> <td style="text-align: center;"></td> </tr> <tr> <td style="text-align: center;">1.</td> <td>Fire</td> </tr> <tr> <td></td> <td style="text-align: center;"></td> </tr> <tr> <td style="text-align: center;">2.</td> <td>Bulb</td> </tr> <tr> <td></td> <td style="text-align: center;"></td> </tr> </tbody> </table> <p style="margin-top: 20px;">5. How do we experience light or its absence? Learners will explore what happens without lights and how the different senses work together. Learners can play a “dark room game.” In this game, learners will turn off all the lights of the room (if they play it</p>	Sources of Light		1.	Sun			1.	Fire			2.	Bulb		
Sources of Light																
1.	Sun															
																
1.	Fire															
																
2.	Bulb															
																

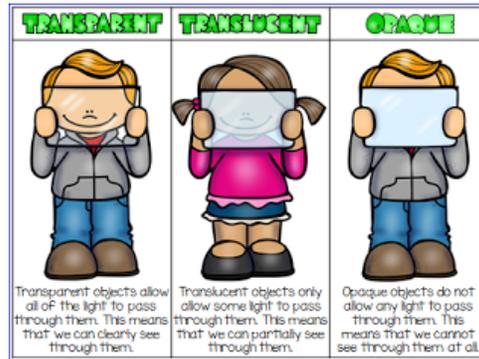
		during the night) or make it dark (if they are playing during the day). The family members will call out and learners will try and find them based on their voice. Learners will think about how their different senses of sound and sight work together.
2	20 minutes	<p>Learners will continue to explore the properties of light and its relation to color. Learners will test the assumption made on Day 1 about light usually being yellow or white.</p> <p>Part 1.</p> <ol style="list-style-type: none"> Learners will conduct an experiment on how rainbows are formed. Learners will place a white paper or sheet on the ground or a table. They will fill a glass with water and hold this against the sun – as the light goes through the glass of water, it will reflect a rainbow on the white sheet of paper.
	20 minutes	 <ol style="list-style-type: none"> Learners will paint over the reflected rainbow that is on the paper with colors and paints Ask the learners: Where did the colors come from? What does this tell us about light? After they've had time to explore some answers to these questions, learners will understand that sunlight has all the colors.
	20 minutes	<ol style="list-style-type: none"> Learners will explore how colors mix to create new colors. Learners will experiment with mixing different colors of paint to see what happens. Learners will start mixing combinations of the primary colors (red, blue and yellow) following this order: <ol style="list-style-type: none"> What happens if we mix red and yellow? What happens if we mix red and blue? What happens when we mix yellow and blue? What other combinations can you think of? Can you make your favorite color? How would you name your favorite color? Learners will then write the “math – equations” on the result as a list, for example:

- Red + Yellow = Orange
- Red + Blue = Purple
- Yellow + Blue = Green
- Favorite color= [quantity] _____ + [quantity] _____ + [quantity] _____

Part 2.

Learners will explore how some things are transparent, translucent or opaque by holding up items against a source of light.

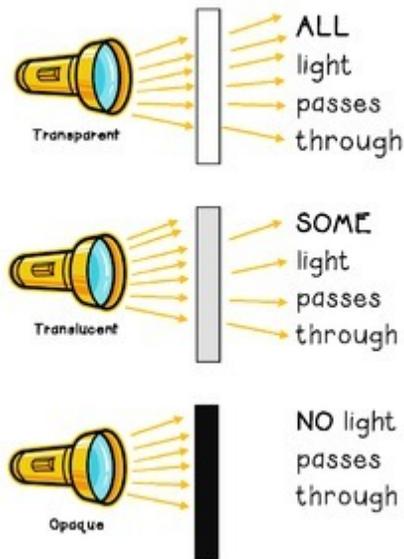
1. Introduce the learners to new terminology and explain:
 - *Transparent* materials include glass, windows, clear plastic etc. that you can clearly see through since all light passes through
 - *Translucent* materials include sunglasses, white shirt, paper towel, white sheet etc. that you can partially see through since some light passes through
 - *Opaque* materials include a chair, a cardboard box, a book etc. that no light passes through and you cannot see anything through.



2. Invite learners to explore (hold against direct sunlight, a lantern, or a lightbulb) different materials or objects and sort them out as transparent, translucent or opaque. Brainstorm with the students a list of at least five objects or materials that they would like to explore. To record their observations, learners will write or draw the items across three columns in a chart like the following:

Transparent	Translucent	Opaque

Translucent, Transparent & Opaque



- Learners share the list or drawings of transparent, translucent and opaque items .Family members give feedback indicating what they have got right, what the need to explore again, and ideas of other things that they could explore.

3

30 minutes

Learners will explore the sun’s patterns and the impact of shadows.

- Learners will track their sun’s movements through the day and see where it is from their window. They will illustrate this in the following schedule answering the following questions.

	sunrise	mid-day	sunset
Where do you see the sun from their window?			
How bright is the sun?			
How big is the sun?			

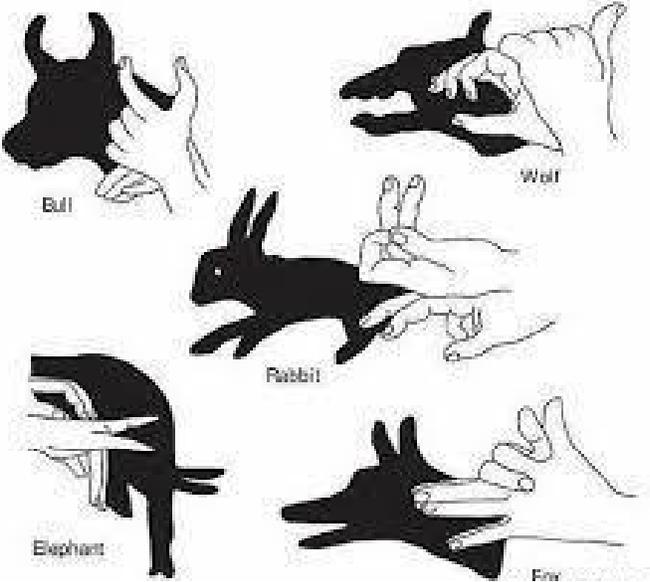
		<table border="1" data-bbox="500 254 1430 390"> <tr> <td data-bbox="500 254 732 390">What is the color of the sky around it?</td> <td data-bbox="732 254 964 390"></td> <td data-bbox="964 254 1196 390"></td> <td data-bbox="1196 254 1430 390"></td> </tr> </table> <p data-bbox="451 470 1403 533">2. Learners will draw and label images of sunrise, mid-day and sunset based on the above.</p> <div data-bbox="418 583 906 743">  </div> <div data-bbox="406 844 652 1213">  </div> <p data-bbox="451 1226 1430 1360">3. Numeracy extension: Learners will read the time and write that down for the different times of the day that they are illustrating e.g. sunrise (6 am), mid-day (12 pm) and sunset (6 pm). Learners will conduct subtraction to see how many hours it takes the sun from sunrise to mid-day.</p> <p data-bbox="451 1402 1403 1575">4. Learners will share their drawings and paintings with the family members for feedback. Feedback from family members will include:</p> <ul data-bbox="548 1478 1328 1575" style="list-style-type: none"> • What details they see in the drawings • What is the most original or creative thing that they see in the drawings <p data-bbox="451 1617 1403 1717">5. Learners will now explore the concept of shadows – a shadow is made when an object blocks the light – this is for opaque objects. A shadow can show an object's shape, but it cannot show colors or details (like a smile or a frown).</p> <p data-bbox="451 1726 1333 1789">6. Learners will place small toys or objects in the sun and place a paper underneath it. The learners will try and trace the shadows of their toys</p>	What is the color of the sky around it?			
What is the color of the sky around it?						
5 minutes						
30 minutes						

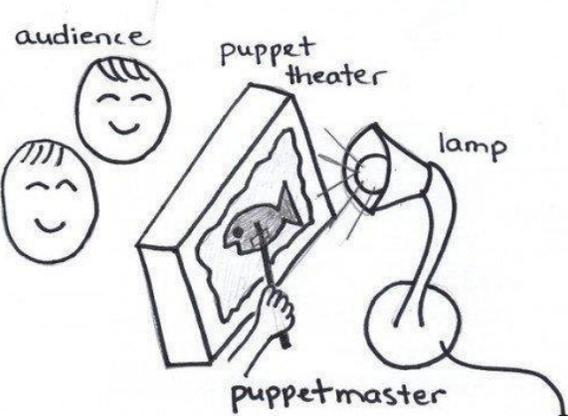


7. Learners will try and form shadows of their own body and move around to see how their shadows move – they will form a sundial to mark their own shadows at different times of the day standing at the same place.
8. Guide the learners' attention to I notice where their shadows move on the ground and the length of their shadows. Prompts: Is your shadow always the same? How does it change? What are some reasons that can explain why it changes?



4	10 minutes	<p>Learners will begin to plan for their shadow puppet theatre!</p> <ol style="list-style-type: none"> 1. Learners will use a torch or the sun to form shadows with their hands. They can form different animals and characters, while their family may guess what these different shadows are.
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	<p>20 minutes</p>	 <p>2. Learners will think of a basic story that they will tell the viewers through the shadow theatre – to make it easier they can adapt a section of a story that they already know. Learners should pick a story with not more than 2 or 3 characters: a wolf, a princess, a rabbit and props including the sun, a house, a cloud etc. Example of a story: Hare and the Tortoise – The hare and the tortoise decided to have a race. The hare started running really fast and saw how much ahead he was and stopped for a snack and a nap. The tortoise kept moving slowly ahead and he won the race.</p> <p>3. Learners can illustrate or write out the story. You may scaffold the writing or drawing process with some graphic organizers like this (you may adapt the number of steps based on the learners’ age or skills):</p> <div style="text-align: center;">  <p>Beginni ng or set up Middle part End or closure</p> </div> <p>4. Learners will now design the main “characters and props” of shadow theatre as puppets. Learners will draw the main outline on paper or cardboard and color this inside with black crayon, paint or marker</p> <p>5. Learners will now cut out these characters or props and stick them using tape on toothpicks / chopsticks</p>
	<p>30 minutes</p>	

5	20 minutes	<p>1. Learners will design the “stage” –</p> <ul style="list-style-type: none"> - They will need to find a place to hang a large white bedsheet or shadow screen – it can be hung on a door frame (it is better if the screen is straight) - There needs to be space behind the screen for the learners to stand and hold the puppets - The bottom half of the screen can have a desk or table so learners can hide behind it when they operate the puppets - They will need to find a good source of light e.g. sunlight or a lamp / torch behind the screen - There needs to be space in front of the screen for audience to sit <p>Learners can use a doorframe – to make the screen, learners have to pin a large sheet of paper on the frame or hang a sheet from the rod</p> 
	10 minutes	<p>2. Learners will play with light and experiment with it, based on what they learned about in the project, until they discover its effects on the shadows their puppets make. Learners will quickly discover that the shadows grow larger when the puppets are close to the light source, and smaller when they are further away.</p>
	10 minutes	<p>3. Learners will “act” out the story using these puppets and props and try and simultaneously narrate or tell the story.</p> <p>4. Learners can also enhance their play adding music, translucent materials, or sound effects for e.g. a plastic bottle with little stones as a shaker for rain etc.</p>
	10 minutes	<p>5. Learners will now act the play for their family</p> <p>6. Learners will ask their family their opinion about the play: Did they understand the characters based on the shadows? Did the family members like the story? Did the family members enjoy any additional effects of sound or the narration of the story? What would they change in order to make it more entertaining?</p>
	10 minutes	
		- Clarity of drawings, illustrations, and labelling

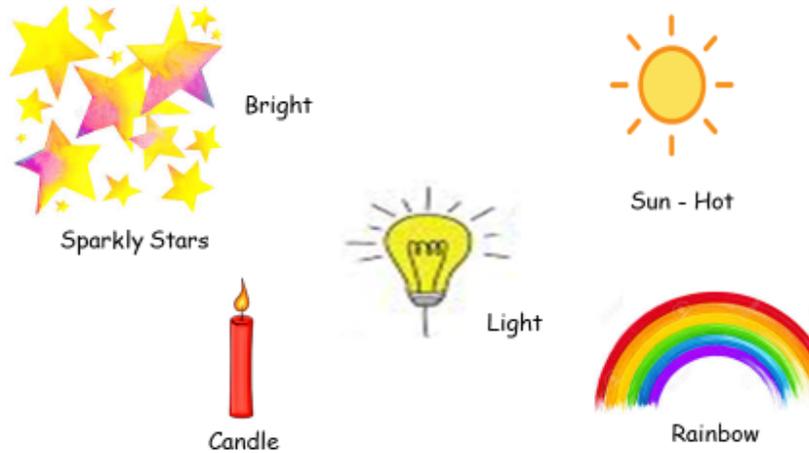
Assessment Criteria:	<ul style="list-style-type: none"> - Creativity and simplicity of the story and character puppets - Narration and retelling of the story - Ability to distinguish between objects as opaque, translucent or transparent - Speak audibly and express thoughts, feelings, and ideas clearly.
Additional enrichment activities:	<ul style="list-style-type: none"> - Learners can design more complex shadow puppet theatre
Modifications to simplify the project tasks if need be	<ul style="list-style-type: none"> - Learners can work on days 3 – 4 and 5 of the project to explore shadows and create their own shadow theatre

Ages 8 to 10 (Level 2)

Description:	Learners will explore the qualities and characteristics of light and shadows. They will create their own shadow theatre by writing their own story, illustrating and cutting their own puppets and setting up the stage
Leading question:	What stories can shadows tell us? ?
Age group:	8 – 10 years
Subjects:	Science, Literacy, Art and Design
Total time required:	5 hours over 5 days
Self-guided / Supervised activity:	Medium Supervision
Resources required:	White Sheet Straws / Skewers / Toothpicks Light source: Lamp, Torch, Sun etc. Tape, Paper, Black Marker / Crayon, Scissors Paint and Paintbrush Paper and Pen

Learning outcomes:	<ul style="list-style-type: none"> - Understand the difference between natural and artificial - Understand the differences between opaque, translucent and transparent objects. Understand how opaque objects cast a shadow, and how the shadow appears. - Investigate how shadows change when the distance of a light source is altered - Describe people, places, things, and events with relevant details, expressing ideas and feelings clearly. -Add puppets to descriptions when appropriate to clarify ideas, thoughts, and feelings.
Topics/concepts covered and skills developed	<ul style="list-style-type: none"> ● Natural and artificial ● Light ● Color ● Transparent, translucent and opaque ● White light (the rainbow) ● Shadow ● Storytelling ● Puppets ● Ability to follow instructions and make observations in experiments ● Creativity and communication skills ● Acting

15
minutes



3. Learners will identify sources of light and make a list of five different sources of light. They will also characterize these as natural or artificial (man-made):

Input: Parents may support the learners with input on this including:

- Natural: Sun, Stars, Moon, Fire, Lightning, etc.
- Artificial: Light bulb, Torch, etc.

15
minutes

Learners will draw the different sources within each of the columns:

Sources of Light	
Natural	Artificial
2. Sun 	3. Bulb 
4. Fire 	

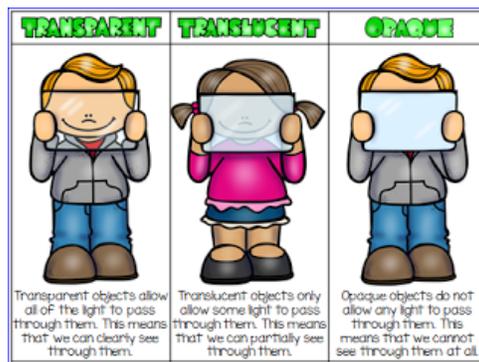
5. Learners will share their table of natural and artificial sources of light with family members for feedback. Family feedback will include:
- Other possible sources of light
 - What does this list make you wonder about the difference between natural and artificial?
6. Learners will use the feedback to include additional sources of light in their table and write down their own definition of “natural” and “artificial.”

20
minutes

- e. Can you make a maroon, a pink?
f. Can you make your favorite color? How would you name your favorite color?
4. Learners will then write the “math – equations” on the result as a list, for example:
- Red + Yellow = Orange
 - Red + Blue = Purple
 - Yellow + Blue = Green
 - Favorite color[name it however you would like]= [quantity] _____ + [quantity] _____ + [quantity] _____
5. Learners will share their formulas with family members for feedback. Family feedback will include:
- What was your favourite part of the process?
 - What did you learn during the process?
- The family members can also challenge the learners on what colours to mix to get certain secondary colours

Part 2. Learners will explore how some things are transparent, translucent or opaque by holding up items against a source of light.

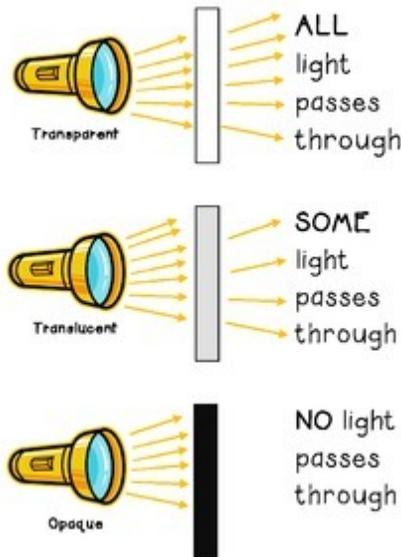
1. Introduce the learners need to learn new terminology and explain:
- Transparent materials include glass, windows, clear plastic etc. that you can clearly see through since all light passes through
 - Translucent materials include sunglasses, white shirt, paper towel, white sheet etc. that you can partially see through since some light passes through
 - Opaque materials include a chair, a cardboard box, a book etc. that no light passes through and you cannot see anything through.



2. Invite learners to explore (hold against direct sunlight, a lantern, or a lightbulb) different materials or objects and sort them out as transparent, translucent or opaque. Brainstorm with the students a list of at least five objects or materials that they would like to explore. To record their observations, learners will write or draw the items across three columns in a chart like the following:

Transparent	Translucent	Opaque

Translucent, Transparent & Opaque



Learners will make a list writing or drawing the items within the three columns of transparent, translucent and opaque

- Learners share the list or drawings of transparent, translucent and opaque items .Family members give feedback indicating ideas of other things that they could explore.

3

30 minutes

Learners will explore the sun's patterns and the impact of shadows

- Learners will track their sun's movements through the day and see where it is from their window. They will illustrate this in the following schedule answering the following questions.

	sunrise	mid-day	sunset
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	Where do you see the sun from their window?			
	How bright is the sun?			
	How big is the sun?			
	What is the color of the sky around it?			

2. Learners will draw and label images of sunrise, mid-day and sunset based on the above.



5
minutes

3. Numeracy extension: Learners will read the time and write that down for the different times of the day that they are illustrating e.g. sunrise (6 am), mid-day (12 pm) and sunset (6 pm). Learners will conduct subtraction to see how many hours it takes the sun from sunrise to mid-day.

30
minutes

4. Learners will share their drawings and paintings with the family members for feedback. Feedback from family members will include:
- What details they see in the drawings

- What is the most original or creative thing that they see in the drawings?

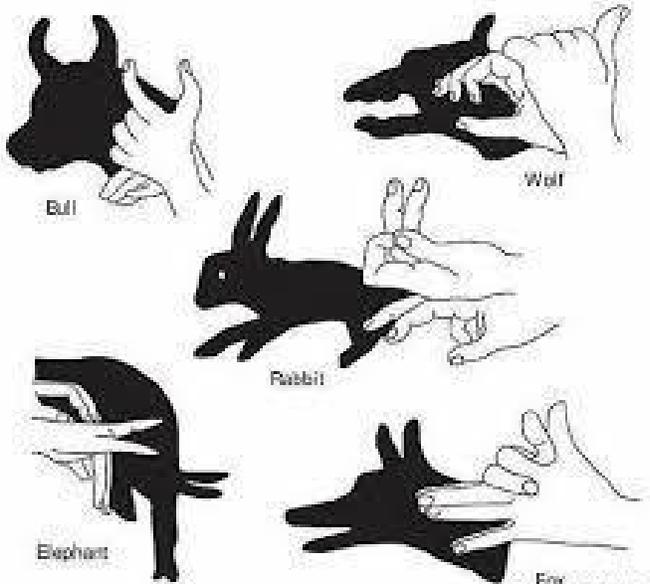
5. Learners will now explore the concept of shadows – a shadow is made when an object blocks the light – this is for opaque objects. A shadow can show an object's shape, but it cannot show colors or details (like a smile or a frown).
6. Learners will place small toys or objects in the sun and place a paper underneath it. The learners will try and trace the shadows of their toys

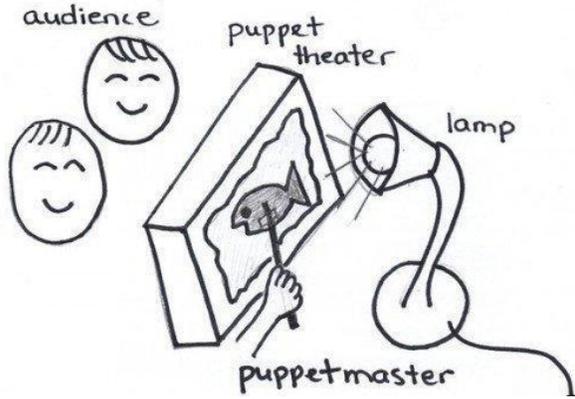


7. Learners will try to form shadows of their own body and move around to see how their shadows move – they will form a sundial to mark their own shadows at different times of the day standing at the same place.



8. Guide the learners' attention to notice where their shadows move on the ground and the length of their shadows. Prompts: Is your shadow always the same? How does it change? What are some reasons that can explain why it changes?

	<p>10 minutes</p>	<p>1. Learners will use a torch or the sun to form shadows with their hands and form different animals and characters and to have their family guess what these different shadows are.</p>  <p>The image shows five hand shadow puppets. Each puppet is a black silhouette of an animal, with a hand visible behind it showing the finger positions used to create the shadow. The animals are labeled: Bull (top left), Wolf (top right), Rabbit (middle), Elephant (bottom left), and Fox (bottom right).</p>
	<p>20 minutes</p>	<p>2. Learners will think of a basic story that they will represent through a shadow theatre. They will make puppets whose shadows will represent the characters of the story.</p>
	<p>30 minutes</p>	<p>3. Learners can illustrate or write out the story. To make the writing process easier, they can adapt a section of a story that they already know. Learners can think of a fairytale like the Hare and the Tortoise Race or Jack and the Beanstalk. Ideally, learners will pick a story with not more than 2 or 3 characters: a wolf, a princess, a rabbit and props including the sun, a house, a cloud etc.</p> <p>4. Learners will now design the main “characters and props” of shadow theatre as puppets. Learners will draw the main outline on paper or cardboard and color this inside with black crayon, paint or marker</p> <p>5. Learners will now cut out these characters or props and stick them using tape on toothpicks / chopsticks</p>
<p>5</p>	<p>20 minutes</p>	<p>1. Learners will design the “stage” –</p> <ul style="list-style-type: none"> - They will need to find a place to hang a large white bedsheet or shadow screen – it can be hung on a door frame (it is better if the screen is straight) - There needs to be space behind the screen for the learners to stand and hold the puppets or the musical instruments

	<p>10 minutes</p> <p>10 minutes</p> <p>10 minutes</p> <p>10 minutes</p>	<ul style="list-style-type: none"> - The bottom half of the screen can have a desk or table so learners can hide behind it when they operate the puppets - They will need to find a good source of light e.g. sunlight or a lamp / torch behind the screen - There needs to be space in front of the screen for audience to sit <p>Learners can use a doorframe to make the screen: pin a large sheet of paper on the frame or hang a sheet from the rod.</p>  <ol style="list-style-type: none"> 2. Learners will play with light and experiment with it guided by their insights on the first part of the project until they discover its effects on the shadows your puppets make. Learners will quickly discover that the shadows grow larger when the puppets are close to the light source, and smaller when they are further away 3. Learners will “act” out the story using these puppets and props and try and simultaneously narrate or tell the story. Learners can also add music or sound effects for e.g. a plastic bottle with little stones as a shaker for rain etc. 4. Learners will now act the play for their family 5. Learners will ask family about their opinion about the play: Did they understand the characters based on the shadows? Did the family members like the story? Did the family members enjoy any additional effects of sound or the narration of the story?
<p>Assessment Criteria:</p>	<ul style="list-style-type: none"> - Clarity of drawings, illustrations and labelling including the understanding demonstrated -Produce complete sentences when appropriate to task and situation -Creativity and simplicity of the story and character puppets - Narration and retelling of the story - Ability to distinguish between objects as opaque, translucent or transparent 	

<p>Additional enrichment activities:</p>	<p>Learners can design more complex shadow puppet theatre</p>
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Modifications to simplify the project tasks if need be	Learners can work on days 3 – 4 and 5 of the project to explore shadows and create their own shadow theatre
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Ages 11 to 14 (Level 3)

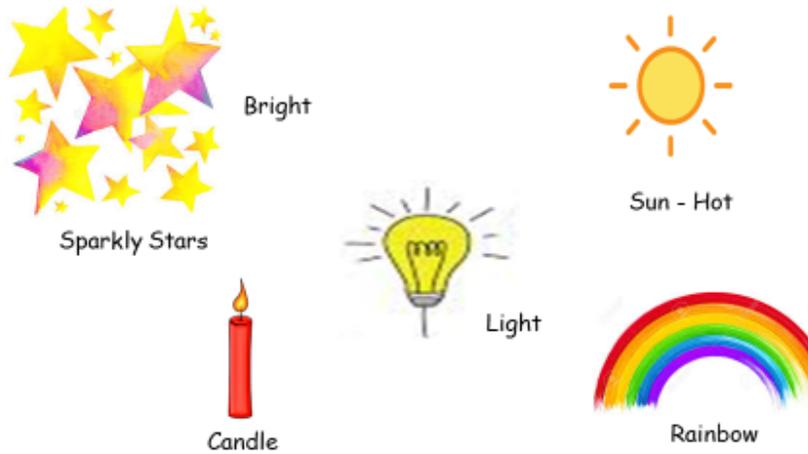
Description:	Learners will explore the qualities and characteristics of light and shadows. They will create their own shadow theatre by writing their own story, illustrating and cutting their own puppets and setting up the stage
Leading question:	What stories can shadows tell us? ?
Age group:	11 – 14 years
Subjects:	Science, Literacy, Art and Design
Total time required:	5 hours over 5 days
Self-guided / Supervised activity:	Low Supervision
Resources required:	White Sheet Straws / Skewers / Toothpicks Light source: Lamp, Torch, Sun etc. Tape, Paper, Black Marker / Crayon, Scissors Paint and Paintbrush Paper and Pen

Learning outcomes:	<ul style="list-style-type: none"> - Understand how light moves and how it creates shadows - Understand the differences between natural and artificial - Understand the differences between opaque, translucent and transparent objects. - Investigate how opaque objects cast a shadow, and how the shadow appears. - Tell a story or recount an experience with appropriate facts and relevant, descriptive details, speaking audibly in coherent sentences.
Topics/concepts covered and skills developed	<ul style="list-style-type: none"> ● Natural and artificial ● Light ● Shadows ● Nocturnal and diurnal animals ● Sun's patterns ● Transparent, translucent and opaque ● Prism effect ● Experiment ● Storytelling ● Acting

Day	Time	Activity and Description
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1	20 minutes	<p>Learners will explore the properties and qualities of light through this project</p> <ol style="list-style-type: none"> To explore the importance of light in our lives, learners will draw a scene in the daylight and night (they can choose to draw a scene of their house, a landscape, of themselves, etc.). Prompts: What does the sky look like in the day and night? What are people or animals doing in each case? What are things that we only see at night? What are things that we only see during the day? Are the same animals active during the day and at night?
	10 minutes	<div data-bbox="609 548 1123 835" data-label="Image"> </div> <p>After drawing, learners will think about the different things we do when it is light or dark. If the project is conducted in a classroom setting or with a group of learners, have the students look at what the others drew to scaffold this reflection. Guide the learners attention to the fact that most of their working time is in the day with the sunlight and most people sleep in the night in the darkness. Additional prompts: Why do you think most people work in the day? Why would some people have to work at night? Those that work in the day. Hints: Doctors, Security Guards, Firefighters etc</p> <ol style="list-style-type: none"> Learners will draw an image of “light”. They will think of how they can draw and show light and draw this. In order to do this, learners will think of all the words they associate with light with the following questions: <ul style="list-style-type: none"> What color do you associate with light? How would you describe light? What are the main sources of light? Do you think of hot or cold when you think of light? <p>Learners will illustrate and label each of their answers with 5 adjectives they associate with light for example: bright, sun, yellow etc.</p>

15
minutes



15
minutes

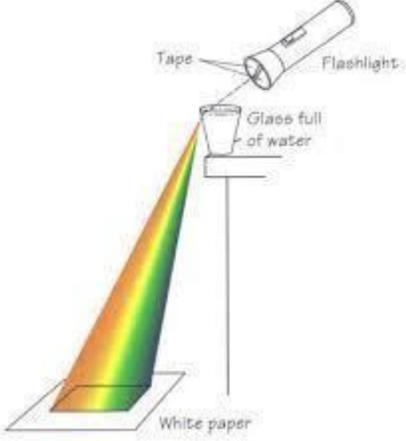
3. Learners will identify sources of light and make a list of five different ones. They will also characterize these as natural or artificial (man-made):

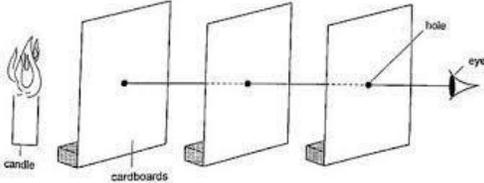
Input: Parents may support the learners with input on this including:

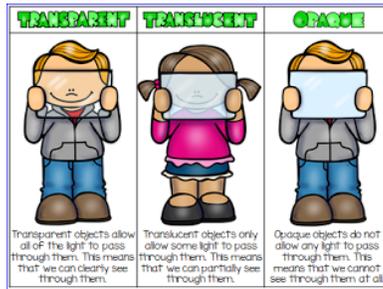
- Natural: Sun, Stars, Moon, Flame (Candles, Stove), Lightening etc.
- Artificial: Light bulb, Torch etc.

Learners will draw the different sources within each of the columns:

Sources of Light	
Natural	Artificial
1. Sun 	2. Bulb 
3. Fire 	

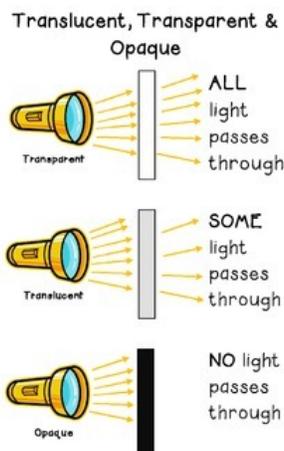
		<p>5. Learners will share their table of natural and artificial sources of light with family members for feedback (if in a classroom setting, this activity can be done in partners or small groups). Family feedback will include:</p> <ul style="list-style-type: none"> • Other possible sources of light • What does this list make you wonder about the difference between natural and artificial? Is a bonfire natural or artificial? <p>and write down their own definition of “natural” and “artificial.”</p> <p>7. Learners will explore the concept of sight.</p> <p>Input: Our eyes have light receptors which receive light and form an image on our retina. So, if there is no light reflected from an object, we cannot see the object.</p> <p>Prompt for learners: What happens without lights? Why do we need light to see? Learners can play a game in a dark room. In this game, learners will turn off all the lights of the room and make it dark. The family members will call out and learners will try to find them based on their voice. Learners will think about how their different senses of sound and sight work together, there are animals like bats that are blind but follow sounds and echoes.</p>
2	20 minutes	<p>Learners will continue to explore the properties of light and color and how light travels. If it was the case, learners will test their assumption they made the day before of light usually being yellow or white</p> <ol style="list-style-type: none"> 1. Learners will conduct an experiment on how rainbows are formed. Learners will place a white paper or sheet on the ground or a table. They will fill a glass with water and hold this against the sun – as the light goes through the glass of water it reflects a rainbow on the white sheet of paper. They will paint over the reflected rainbow that is on the paper with colors and paints to understand how lights have spectrums of colors.  <p>Input for educators: This is called the “prism effect.” When different colors of light hit a prism, or an object with 2 sides that are not parallel, they leave at different</p>

	<p>20 minutes</p>	<p>angles (refraction) so they separate. Different colors of light have different wavelengths and therefore bend differently. For example red turns slower and therefore appears on the top and violet turns faster and appears on the bottom.</p> <p>2. Learners will explore how light travels (they will use this when designing their stage and puppets).</p> <ol style="list-style-type: none"> They will cut out a small hole in three pieces of cardboard or thick paper. Learners will place a torch/candle in front of this and see if the light travels through and is visible from the "back." The pieces of cardboard with the holes will be put in a line one behind another. First, the holes will be in a straight line. Learners will discuss what they notice. Then, the holes, and thus, the pieces of cardboard will not be aligned. Learners will discuss what they notice. Ask the learners: what did you notice? What was the difference between the two experiments? (Guide students to conclude that light can only travel through all three holes when the holes are in a straight line.  <p>The diagram illustrates an experiment to demonstrate the straight-line travel of light. On the left, a candle is lit. In the center, three rectangular cardboard sheets are placed one behind the other, each with a small hole in its center. A horizontal line with dots at the holes and the candle's flame represents the path of light. On the right, an eye is positioned to see through the holes. The labels 'candle', 'cardboards', 'hole', and 'eye' are included.</p>
	<p>20 minutes</p>	<p>3. Learners will explore how some things are transparent, translucent or opaque by holding up items against a source of light. Introduce the learners need to learn new terminology and explain:</p> <ul style="list-style-type: none"> - Transparent materials include glass, windows, clear plastic etc. that you can clearly see through since all light passes through - Translucent materials include sunglasses, white shirt, paper towel, white sheet etc. that you can partially see through since some light passes through - Opaque materials include a chair, a cardboard box, a book etc. that no light passes through and you cannot see anything through



4. Invite learners to explore (hold against direct sunlight, a lantern, or a lightbulb) different materials or objects and sort them out as transparent, translucent or opaque. Brainstorm with the students a list of at least five objects or materials that they would like to explore. To record their observations, learners will write the items across three columns in a chart like the following:

Transparent	Translucent	Opaque



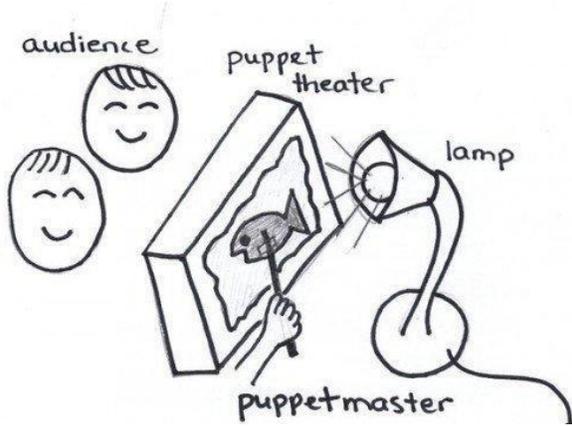
5. Learners share the list or drawings of transparent, translucent and opaque items. Family members give feedback indicating ideas of other things that they could explore.

3	30 minutes	<p>Learners will explore the sun's patterns and the impact of shadows</p> <p>1. Learners will track their sun's movements through the day and see where it is from their window. They will illustrate this in a schedule answering the following questions:</p> <table border="1" data-bbox="496 468 1398 1043"> <thead> <tr> <th></th> <th>sunrise</th> <th>mid-day</th> <th>sunset</th> </tr> </thead> <tbody> <tr> <td>Where do you see the sun from their window?</td> <td></td> <td></td> <td></td> </tr> <tr> <td>How bright is the sun?</td> <td></td> <td></td> <td></td> </tr> <tr> <td>How big is the sun?</td> <td></td> <td></td> <td></td> </tr> <tr> <td>What is the color of the sky around it?</td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p>2. Learners will draw and label images of sunrise, mid-day and sunset based on the above</p> <div data-bbox="656 1234 1143 1409" data-label="Image"> </div> <div data-bbox="776 1495 1024 1864" data-label="Image"> </div>		sunrise	mid-day	sunset	Where do you see the sun from their window?				How bright is the sun?				How big is the sun?				What is the color of the sky around it?			
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What is the color of the sky around it?																						
30 minutes																						

3. Learners will share their drawings with family members for feedback. Family feedback may include:
 - What details they see in the drawings
 - What is the most original or creative thing that they see in the drawings?
4. Learners will use the feedback to revise their drawing
5. Learners will now explore the concept of **shadows** – a shadow is made when an object blocks the light – this is for opaque objects. A shadow can show an object's shape, but it cannot show colors or details (like a smile or a frown).
6. Learners will place small toys or objects in the sun and place a paper underneath it. The learners will try and trace the shadows of their toys



7. Learners will try to form shadows of their own body and move around to see how their shadows move – they will form a sundial to mark their own shadows at different times of the day standing at the same place. Learners will notice where their shadows move on the ground and the length of their shadows
8. Learners will explain why the position of shadows changes across different times of day. Assuming that students do not have a clock, they will try to identify what time of the day it was based on the shadows – this is how people in the past to tell the time.

		design puppets that will represent the main “characters and props” of shadow theatre. Learners will draw the main outline on paper or cardboard and color this inside with black crayon, paint or marker. Learners will cut out these characters or props and stick them using tape on toothpicks / chopsticks
5	20 minutes	<ol style="list-style-type: none"> Learners will design the “stage” – <ul style="list-style-type: none"> They will need to find a place to hang a large white bedsheet or shadow screen – it can be hung on a door frame (it is better if the screen is straight) There needs to be space behind the screen for the learners to stand and hold the puppets or the musical instruments The bottom half of the screen can have a desk or table so learners can hide behind it when they operate the puppets They will need to find a good source of light e.g. sunlight or a lamp / torch behind the screen There needs to be space in front of the screen for audience to sit
	10 minutes	<p>Learners can use a doorframe to make the screen is pin a large sheet of paper on the frame or hang a sheet from the rod</p> 
	10 minutes	<ol style="list-style-type: none"> Learners will play with light and experiment with it guided by their insights on the first part of the project until learners discover its effects on the shadows your puppets make. Learners will quickly discover that the shadows grow larger when the puppets are close to the light source, and smaller when they are further away
	10 minutes	<ol style="list-style-type: none"> ects for e.g. a plastic bottle with little stones as a shaker for rain etc. Learners will now act the play for their family
	10 minutes	<ol style="list-style-type: none"> Learners will ask family about their opinion about the play: Did they understand the characters based on the shadows? Did the family members like the story? Did the family members enjoy any additional effects of sound or the narration of the story?

<p>Assessment Criteria:</p>	<ul style="list-style-type: none"> - Clarity of drawings, illustrations and labelling including the understanding demonstrated - Creativity and simplicity of the story and character puppets - Speak in complete sentences when appropriate to task and situation in order to provide requested detail or clarification. - Ability to distinguish between objects as opaque, translucent or transparent
<p>Additional enrichment activities:</p>	<p>Learners can design more complex shadow puppet theatre</p>
<p>Modifications to simplify the project tasks if need be</p>	<p>Learners can work on days 3 – 4 and 5 of the project to explore shadows and create their own shadow theatre</p>