

# Light: Changing Shadows

<b>Aim:</b> To find patterns in the way that the size of shadows change by investigating what happens when you change the distance between the object and the light source.  I can find patterns when investigating how shadows change size.	<b>Success Criteria:</b> I can explain how a shadow is formed.  I can plan and set up an investigation about the way shadows change size.  I can observe patterns in the way shadows change size.  I can explain the patterns I find.	<b>Resources:</b> <b>Lesson Pack</b>  A torch per pair A ruler or metre stick per pair Objects to make shadows
	<b>Key/New Words:</b> Shadow, light, source, observe, pattern, opaque, size, distance, change.	<b>Preparation:</b> <b>Comic Strip Planner Activity Sheet</b> - 1 per child  <b>Results and Patterns Activity Sheet</b> - 1 per child

**Prior Learning:** Children will have learnt about opaque, transparent and translucent objects in lesson 5.

## Learning Sequence

	<b>Shadows and Reflections:</b> Show the children the concept cartoon on the <b>Lesson Presentation</b> . Ask them to discuss the ideas in pairs, then feed back their thoughts to the class.	
	<b>Making Shadows:</b> Explain the ideas from the concept cartoon using the <b>Lesson Presentation</b> . Address any misconceptions or issues raised. Ask the children to think about how and when shadows change.	
	<b>Noticing Patterns:</b> Introduce the subject of the investigation. Show the image and ask the class what they notice about the shadows.	
	<b>Investigation Planning:</b> Give children the equipment they need and explain the investigation using the <b>Lesson Presentation</b> . Children use the differentiated <b>Comic Strip Planner Activity Sheet</b> to plan their investigation and make a prediction.	
  Children are given the distances to use in their investigation.          Children devise their own distances to use in the investigation.	<b>How Do Shadows Change When the Distance Between the Light Source and the Object Changes?</b> Children complete their investigation and record results on the differentiated <b>Results and Patterns Activity Sheet</b> .	
  and make their conclusions by completing the sentences.          Children use the given measurements for the distances.          give reasons for their conclusions.	<b>Is There a Pattern?</b> Encourage children to look at their results to try to find a pattern. They should notice that the shadow of the object gets bigger the closer it gets to the light source. They should also look for any results that do not fit the pattern and try to suggest a reason for them. Children complete their differentiated <b>Results and Patterns Activity Sheet</b> to explain the pattern and make a concluding statement. <b>Look for children who can use their results to form a conclusion. Some children may be able to explain their conclusion.</b>	
	<b>Why Do Shadows Change Size?</b> Ask HA children to share their explanations and ideas with the class. Explain the reason that shadows change size using the <b>Lesson Presentation</b> .	

**Taskit**  
**Makeit:** Why not make a sundial to see how shadows change throughout the day? Use a paper plate, blue tack and a pencil and place your sundial outside on a sunny day. Draw the position of the pencil's shadow every hour.

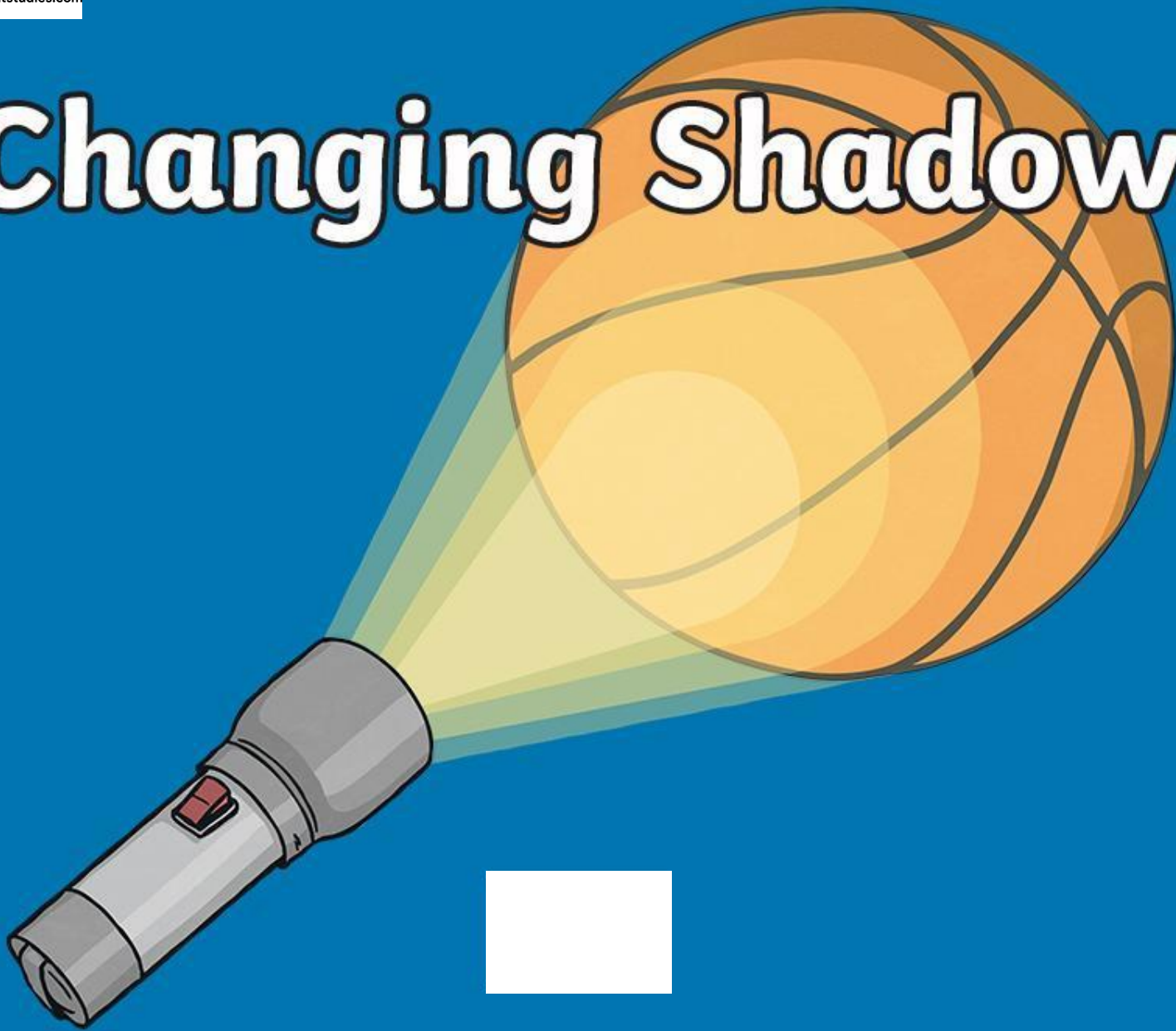


# Science

## Light



# Changing Shadows





# Aim

- I can find patterns when investigating how shadows change size.

# Success Criteria

- I can explain how a shadow is formed.
- I can plan and set up an investigation into the way shadows change size.
- I can observe patterns in the way shadows change size.
- I can explain the patterns I find.



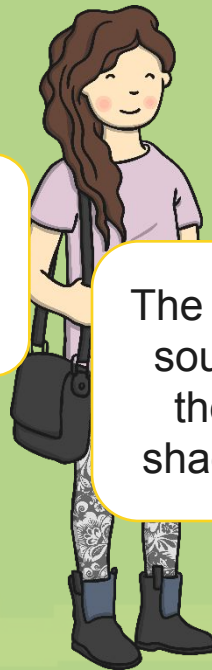
# Shadows and Reflections



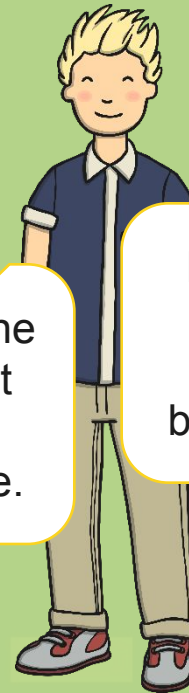
These children are talking about shadows and reflections.  
Talk to your partner about the children's ideas.  
Do you agree or disagree with any of their thoughts?



Our shadows are reflections from the sun.



The stronger the source of light the bigger a shadow will be.



I think shadows are made by something blocking the light.

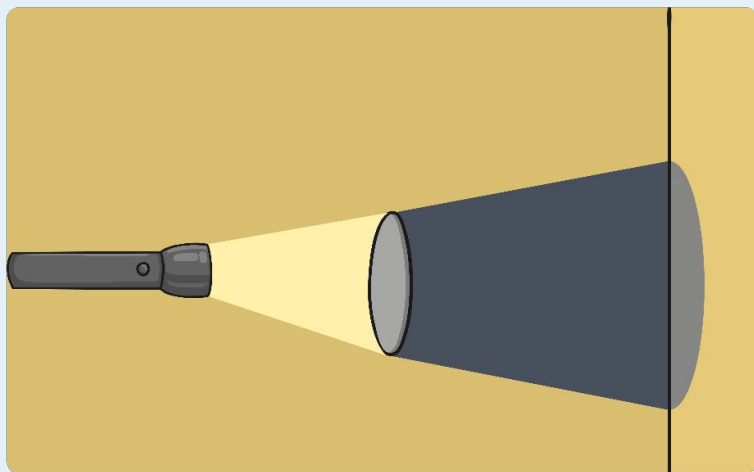


# Making Shadows

Shadows are created when an opaque object blocks light.

The light cannot go through or around the object, so a darker patch of less light is created behind the object.

**Shadows are not reflections!** Reflection is when light bounces off an object. A shadow is caused by light being blocked.



**How do shadows change?**

**Think about how and when they change size, or direction.**

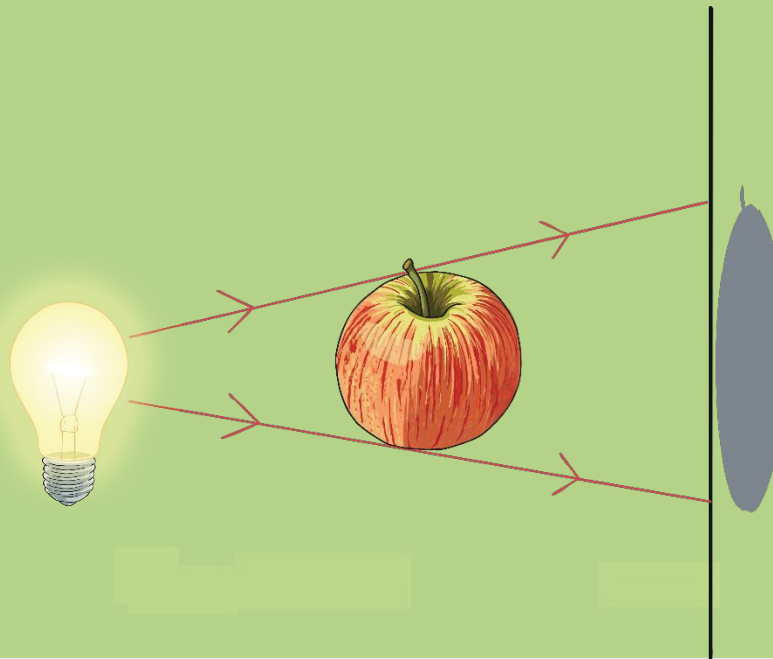


# Noticing Patterns



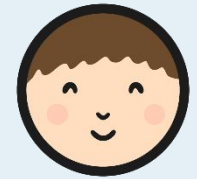
You will be investigating how shadows change when the distance between the light source and object changes.

Look at the picture below. What do you notice about the shadows?



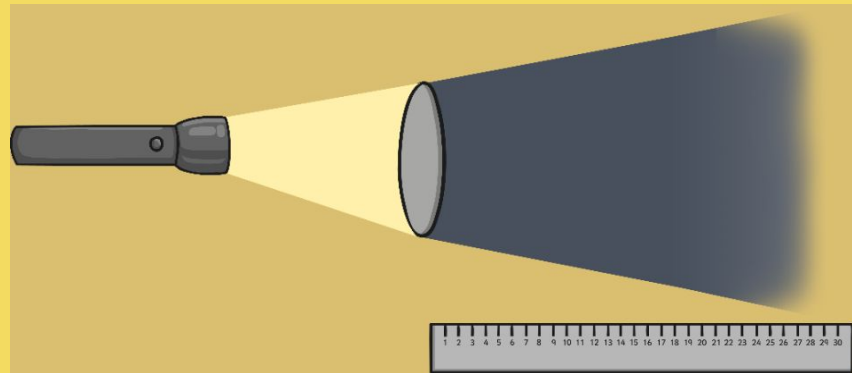


# Investigation Planning



You will set up an investigation to find an answer to this question. You will use a **torch**, a **ruler** or **metre stick**, and an **object**.

You will measure the shadow of the object at different distances from the torch (the light source).



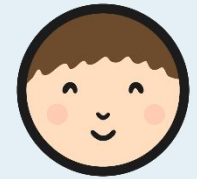
Every time you will change **the distance** the torch is placed away from the object. Are there any things you will keep **the same** every time to help make your results reliable?

Think about what you will do to answer the question, and what you think you will find out. Use the Comic Strip Planner Activity Sheet to plan your investigation and make your prediction.





# Investigation Planning



**Comic Strip Planner**

What question are you investigating?

Use the comic strip below to draw and write about what you will do to carry out your investigation.

What equipment will you use?	Step 1	Step 2
Step 3	Step 4	Prediction: What do you think will happen?

Science | Year 3 | Light | Changing Shadows | Lesson 6

**Comic Strip Planner**

What question are you investigating?

Use the comic strip below to draw and write about what you will do to carry out your investigation.

**Question: How does the distance between the light source and the object changes?**  
 What do you think will happen?

Step 1 - How will you make a shadow using your equipment?	Step 2 - How will you measure the distance of the object from the light source, and the size of the shadow?
Step 3 - How will you measure what happens to the shadow when you move the object away from the light source?	Prediction: What do you think will happen? How do you think the shadow will change?

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# Activity



## How Do Shadows Change When the Distance Between the Light Source and the Object Changes?

**★ Results and Patterns**

Complete this table with your results as you carry out your investigation.

How do shadows change when the distance between the light source and the object changes?

Distance between the light source and the object.	Size of the object's shadow.
10cm	
20cm	
30cm	
40cm	
50cm	

Look at the results you have collected. Do you notice a pattern? Does the size of the shadow change when the distance between the object and the light source changes?

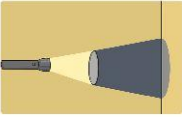
Explain what you notice:

The pattern I have noticed is \_\_\_\_\_

\_\_\_\_\_

Make a concluding statement to explain what you have found out:

I have found out that the \_\_\_\_\_ the distance between the object and the light source \_\_\_\_\_ the object's shadow is \_\_\_\_\_.



Science Year 31 Light Changing Shadows Lesson 6

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Look at the results you have collected. Do you notice a pattern? Does the size of the shadow change when the distance between the object and the light source changes?

Explain what you notice:

\_\_\_\_\_

Are there any results that do not fit your pattern? \_\_\_\_\_

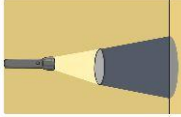
If there are, can you think why? \_\_\_\_\_

\_\_\_\_\_

Make a concluding statement to explain what you have found out:

I have found out that \_\_\_\_\_

\_\_\_\_\_



Science Year 31 Light Changing Shadows Lesson 6

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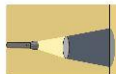
I have found out that \_\_\_\_\_

\_\_\_\_\_

Can you explain why the shadow changes in this way? Think about how light travels.

\_\_\_\_\_

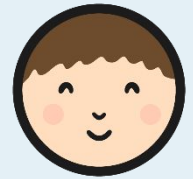
\_\_\_\_\_



Science Year 31 Light Changing Shadows Lesson 6



# Is There a Pattern?



Once you have carried out your investigation, look at the results you have gathered.

**Do you notice a pattern in your results?**

**Are there any results that do not fit the pattern? Can you think of a reason for these results?**

Complete your Results and Patterns Activity Sheet by explaining the pattern and making a concluding statement.





# Why Do Shadows Change Size?

You should have noticed that the smaller the distance between the light source and the object, the bigger the object's shadow is.

Some of you have been thinking about why this happens.

Share your explanations!

**The closer an object is to the light source, the more light it blocks.**

This means the shadow created is bigger. But if an object is far away from the light source, it does not block out much light, so the shadow is smaller.



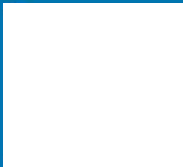
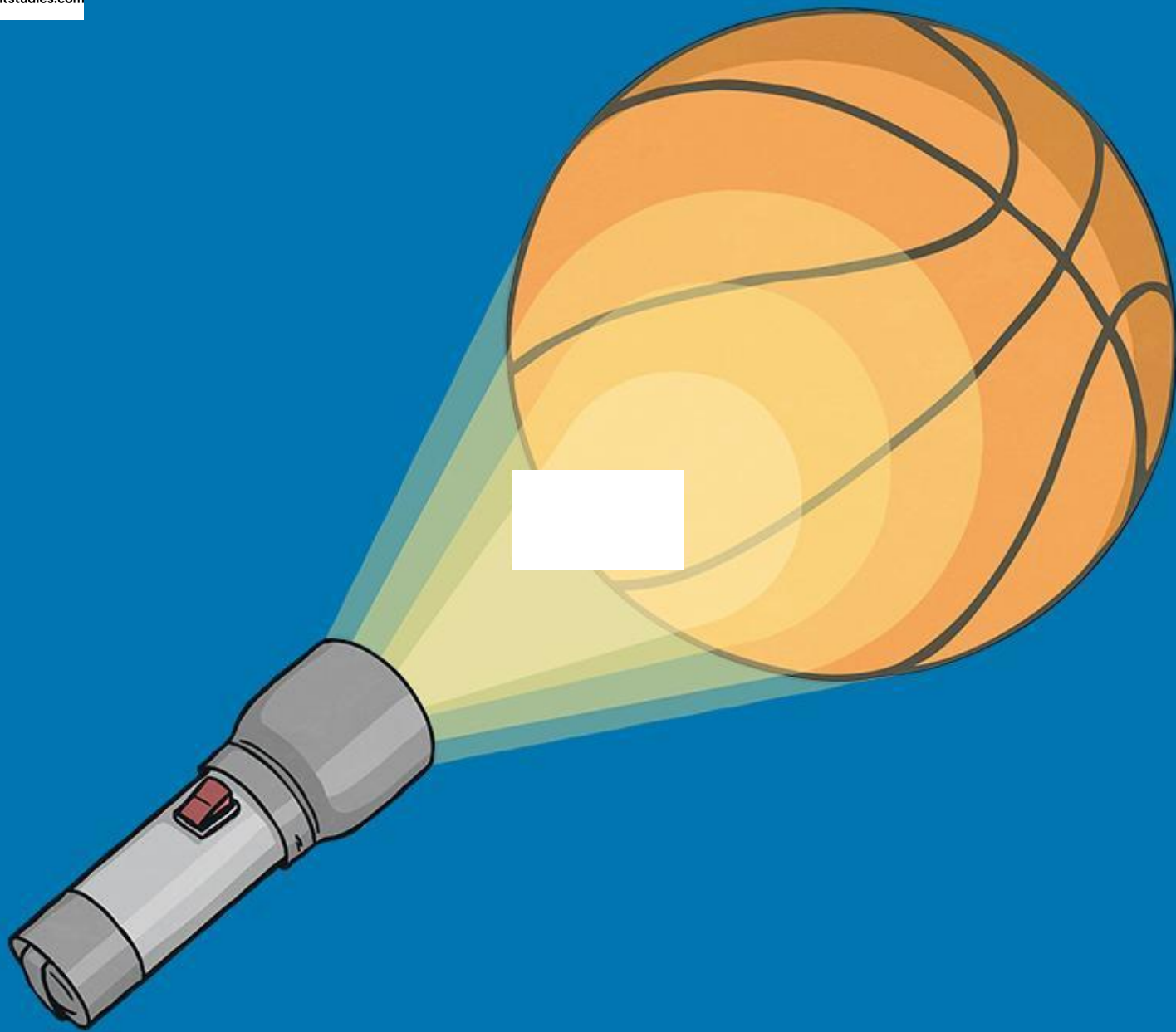
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