



Primary 4 Science

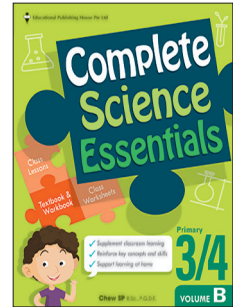


Light and shadows

Chapter Overview	Suggested duration
4.1 Sources of light 4.2 Uses of light	30 min
4.3 Properties of light 4.4 How do we see objects?	45 min
Review 1	15 min
4.5a How are shadows formed?	15 min
4.5b Factors affecting the size of shadows	30 min
4.6 How much light can pass through an object?	30 min
Review 2	15 min
4.7 Concept map	30 min
Chapter Review	45 min

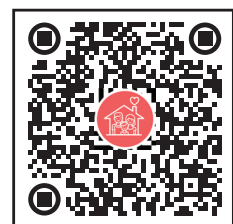
Essential but not included in science textbooks

Publisher: EPH



**COMPLETE
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ESSENTIALS**
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Scan the QR code for the Answer Sheet.

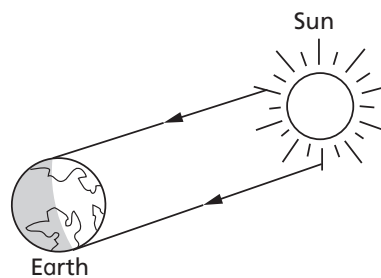




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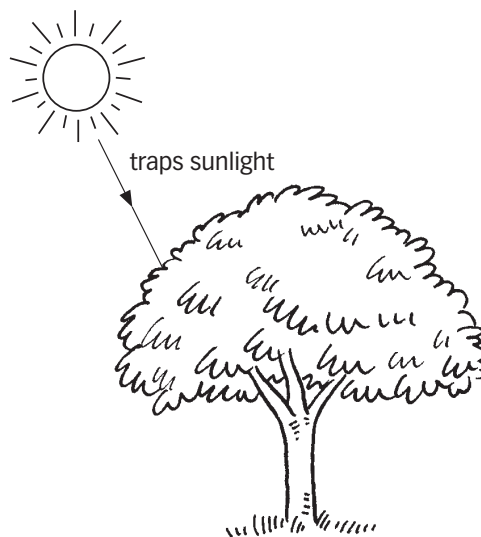
4.1 Sources of light

- Sources of light are objects that give off light.
- Examples: Sun, fire, lighted candle, fireflies, lightning
- Our main source of light is the Sun. The light from the Sun travels in straight lines to reach the Earth.



4.2 Uses of light

- For living things to see and move around
- For plants to trap sunlight and carry out photosynthesis (process of making food in plants)





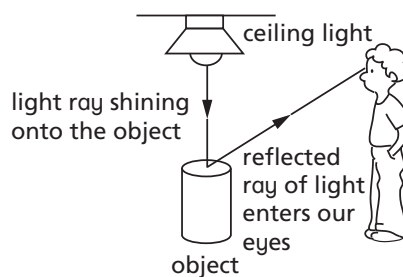
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4.3 Properties of light

Property of light	Diagram	Explanation
Light travels in a straight line.		<ul style="list-style-type: none">• When the tube is bent, light cannot pass through the bent tube as light rays cannot bend.• Hence, the light cannot be seen at the other end of the tube.
Light can be reflected. (The light ray bounces off the surface of an object.)		<ul style="list-style-type: none">• Shiny, silvery and bright-coloured surfaces reflect a lot of light. E.g.: mirror• When light is reflected into our eyes, we can see the object.

4.4 How do we see objects?

- All objects reflect light.
- Objects that are shiny and brightly-coloured reflect more light, so we see them better.
- Objects that are dark and dull-coloured reflect less light, so we do not see them as clearly.
- The reflected ray of light enters our eyes and enables us to see.



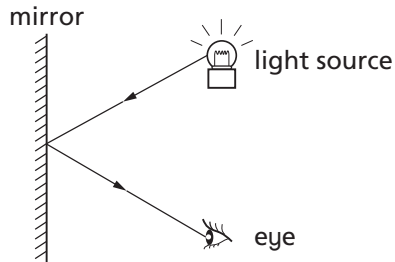
- The object reflects light from the ceiling light into our eyes.
- Without the light source, the object cannot reflect light into our eyes and we will not be able to see the object.



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Mirrors are good reflectors of light

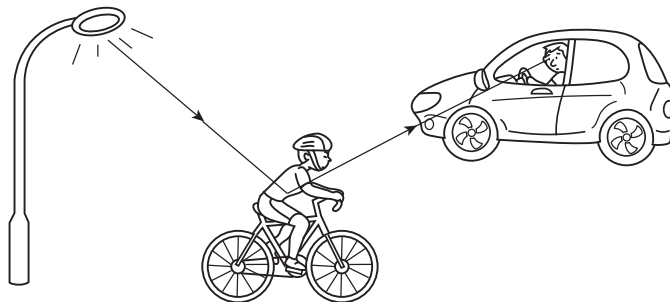
- Mirrors have a very shiny surface, so they can reflect a lot of light.



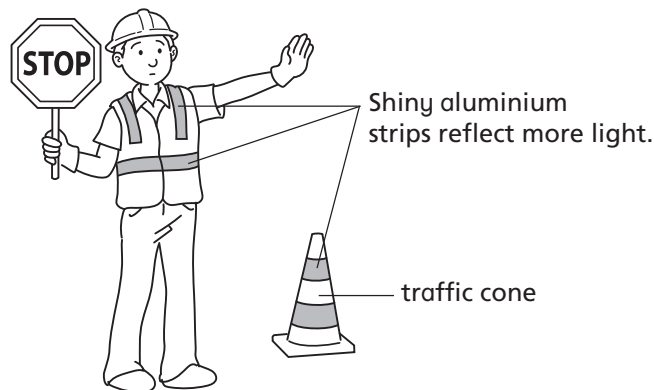
When the light source shines on the mirror, the mirror reflects the light into our eyes. Hence, we see an image of the light source in the mirror.

Applications in daily life

1. Wear bright-coloured clothes at night. The bright-coloured clothes reflect more light to the motorists, so that they can see us better, keeping us safer. E.g.: Night cyclists should wear bright-coloured clothes.



2. People who work by the roadside are often seen wearing bright-coloured vests with aluminium strips to reflect more light into the motorists' eyes.





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Review

1. Which of the following give off their own light?

- A Sun
- B Moon
- C Planets
- D Fireflies

(1) A and D only

(2) B and D only

(3) A, B and D only

(4) B, C and D only

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2. Draw light rays to show how the girl can see the objects.

(a)



(b) (i)

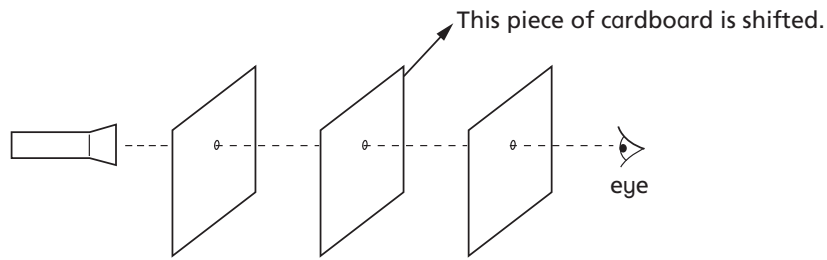


(ii) Explain how the girl is able to see the plant.



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3. Kevin conducted an experiment with a torchlight and some pieces of cardboard with holes in them.



- (a) What does this experiment show?

- (b) What happens when he shifts one piece of the cardboard?

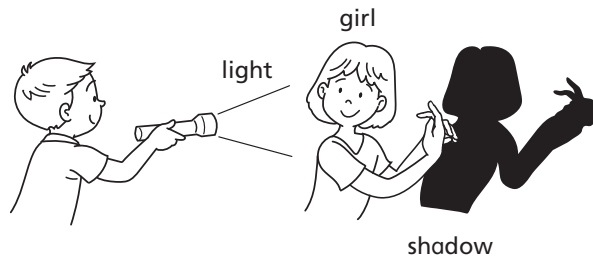


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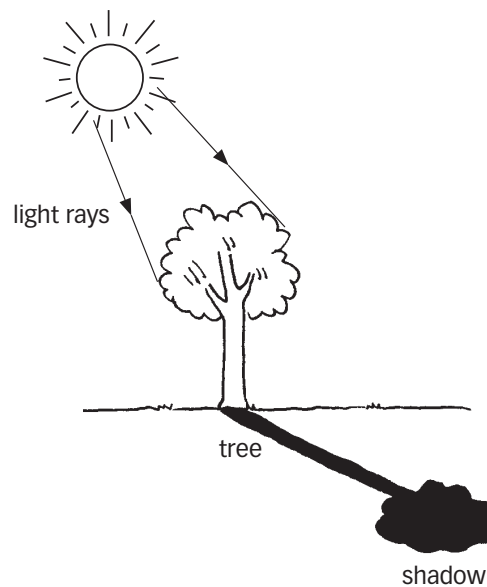
4.5a

How are shadows formed?

- Since light travels in a straight line, when the path of light is blocked by an object, a shadow is formed.
- A shadow is an area of darkness behind an object.
- In the diagram below, the girl blocks the path of light, so a shadow of her is seen.



- In the diagram below, the tree blocks the light from the Sun, so a shadow of the tree is formed.





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4.5b Factors affecting the size of shadows

- The size of a shadow can change due to changes in the following.

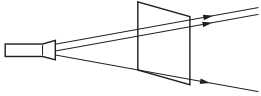
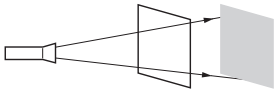
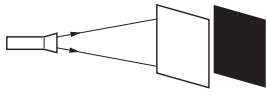
<ul style="list-style-type: none">• Position of the light source- Light source nearer to object → shadow is bigger- Light source further from object → shadow is smaller	
<ul style="list-style-type: none">• Position/Orientation of the object	
<ul style="list-style-type: none">• Position of the screen- Screen nearer to object → shadow is smaller- Screen further from object → shadow is bigger	



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4.6

How much light can pass through an object?

Transparent materials	Translucent materials	Opaque materials
Allow most light to pass through	Allow some light to pass through	No light can pass through
		
Light is not blocked by the material.	Some light is blocked by the material.	Light is totally blocked by the material.
No shadow is formed.	<ul style="list-style-type: none">• A light-coloured shadow is formed.• The shadow has a faint outline.	<ul style="list-style-type: none">• A dark-coloured shadow is formed.• The shadow has a clear outline.
Glass, clear plastic	Tracing paper, rice paper, frosted glass	Wood, metal, styrofoam

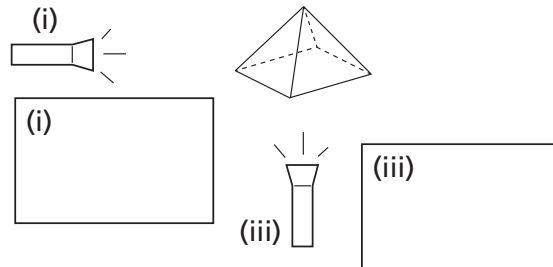
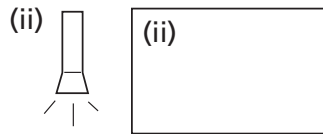


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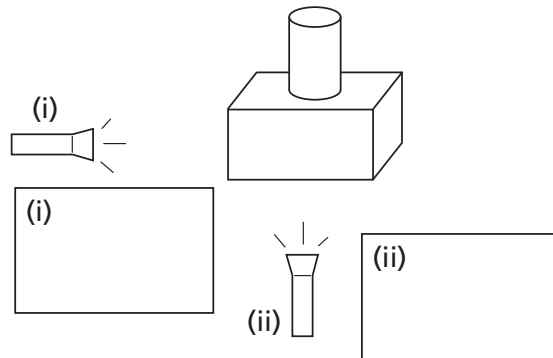
Review 2

1. Draw and shade the shadows in the boxes that are formed when the light source is shone at different positions on the same object. The objects are opaque.

(a)



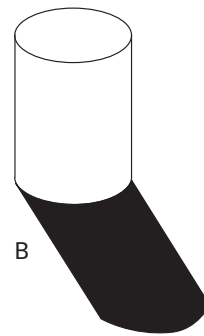
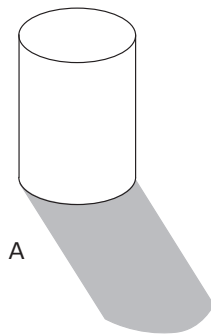
(b)





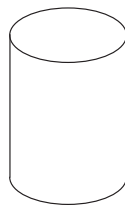
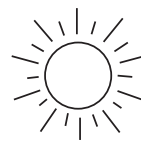
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2. Two containers made of different materials are left under the Sun. The shadows formed are shown below. Shadow A is lighter than shadow B.



- (a) What can be deduced about the materials used to make containers A and B?

- (b) Another container C is placed under the Sun. It does not form any shadow.



Give an example of a material that container C is made from.

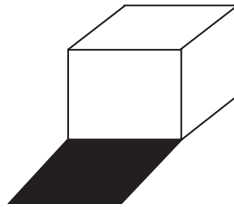


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3. A box is placed near a light source. A shadow is formed.
Draw the light source.

Legend:

Light source





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