










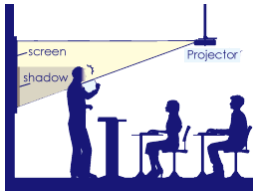


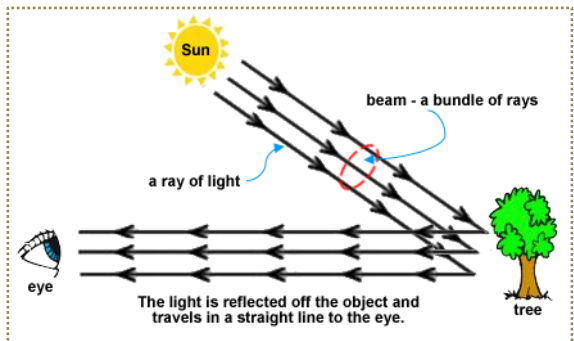
LIGHT

- Light is a **form of energy**.
- Light **travels in straight lines** and moves outward in all directions from a source until it hits something.

Sources of Light	
 the Sun	 the stars
 lightning	 fireflies
 lighted bulb	 lighted torch
 lighted candle	 fire

Phenomena Show that Light Travels in Straight Lines	
 The light beam from a torch	 The light beam from the motor vehicle
 The light beam from the lighthouse	 The light beam from the projector

- Light is needed in our daily life.
- Green plants need light to make food while human beings and animals need light to see.
- Light **cannot bend around objects**. To see things we need a light source such as the Sun. We can't see behind us because the light that reflects off the things behind us doesn't make it into our eyes.

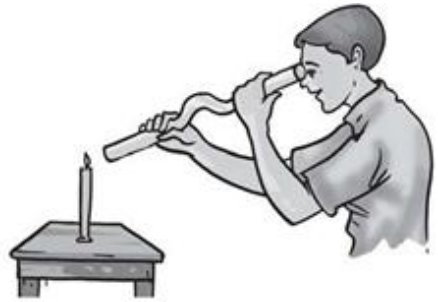


- Light **travels very fast** – around 300,000 kilometers per second. At this speed it takes about 8 minutes for light to reach Earth from the Sun.
- During thunderstorm, we see lightning before we hear thunder as light speed is faster than the sound.

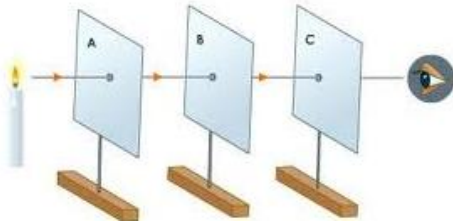
Investigations Show Light Travels in Straight Line



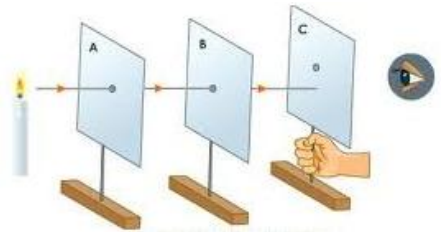
1. Light can be seen through a straight tube.



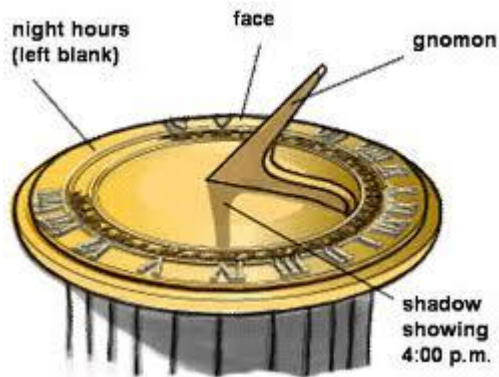
2. Light cannot be seen through a bent tube.



1. The light of the candle can be seen because all the holes are in a straight line.



2. The light of the candle cannot be seen because the holes are not in a straight line.



Sundial applies the principle that light travels in a straight line.

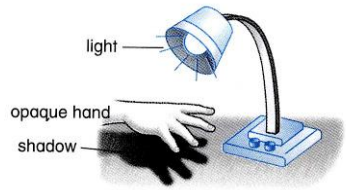
Sundials can tell us the time on sunny days.



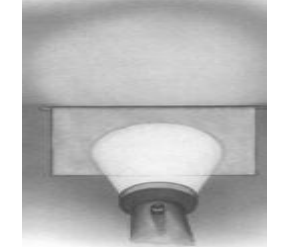
As the sun moves across the sky, a part of the sundial cast a shadow on these markings.

The position of the shadow shows what time it is.

SHADOW

- A shadow is formed when the path of light is blocked by an opaque or a translucent object.
- A shadow always falls on the side opposite to the light source.

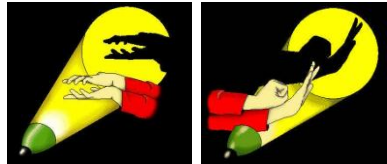


Opaque	Translucent	Transparent
 <p>A dark shadow is formed when light is completely blocked by an opaque object.</p> <p>e.g. cup, wood, book, coin</p>	 <p>A faint shadow is formed when light is partially blocked by a translucent object.</p> <p>e.g. tracing paper, handkerchief</p>	 <p>A transparent object cannot cast a shadow because a transparent object allows light to pass through it.</p> <p>e.g. a sheet of glass, transparency sheet, plastic sheet</p>

Application of Shadow

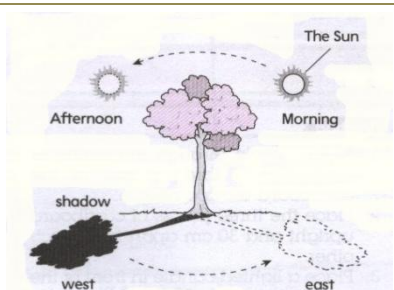


“Wayang Kulit” / shadow puppets shows are used to tell stories. Behind the puppets is a light. In front of the puppets is a screen. When someone moves the puppets, shadows move across the screen.



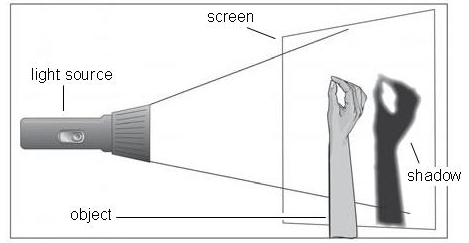
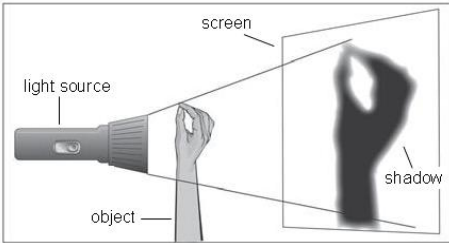
Fun with animal shadows.

- The Sun arises from the east to west, so our shadows are cast from west to east.
- The change in the position of the Sun results in changes in the length and position of the shadow.



The **size** of a shadow **can be changed** by changing:

(a) the size of the object



(b) the distance between the object and the light source

Conclusions

- | | |
|--|--|
| 1 Object near to light source, shadow become bigger. | 1 Object far from light source, shadow become smaller. |
| 2 When the distance between the object and its light source decreases, the size of the shadow increases. | 2 When the distance between the object and its light source increases, the size of the shadow decreases. |

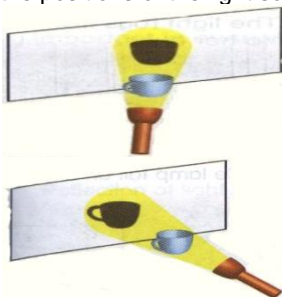
(c) the distance between the object and the screen

Conclusions

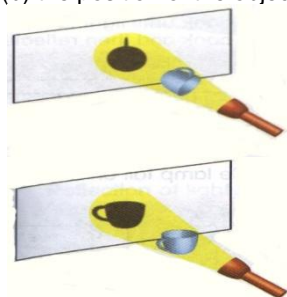
- | | |
|--|--|
| 1 Object far from the screen, shadow become bigger. | 1 Object near to the screen, shadow become smaller. |
| 2 When the distance between the object and the screen increases, the size of the shadow increases. | 2 When the distance between the object and the screen decreases, the size of the shadow decreases. |

The **shape** of a shadow **can be changed** by changing:

(a) the positions of the light source

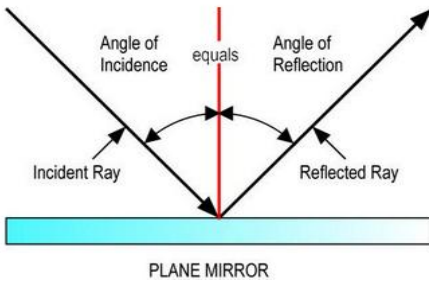


(b) the position of the object

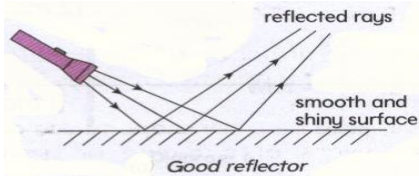


REFLECTION

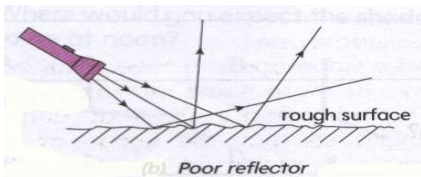
- Reflection occurs when light bounces off a surface.
- Ray Diagram can show the reflection of light. Flat mirrors reflect light at the same angle that the light strikes them.



Clear vs. Diffuse Reflection



A good reflector i.e. smooth, shiny surfaces will produce a clear reflection. E.g. mirror and aluminium foil



A poor reflector i.e. rough, dull surfaces will produce a diffuse reflection. Diffuse reflection is when light is scattered in different directions.

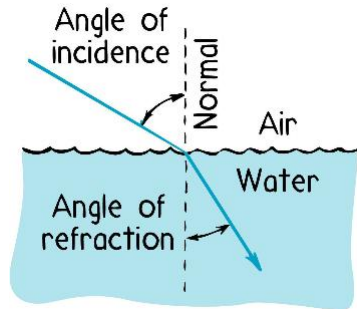
Reflection from a mirror

- When we look at a mirror, we can see our image in the mirror because this light is reflected into the mirror and the mirror reflects the image into our eyes.
- The virtual image is upright, the same size, and appears to be directly behind the mirror.

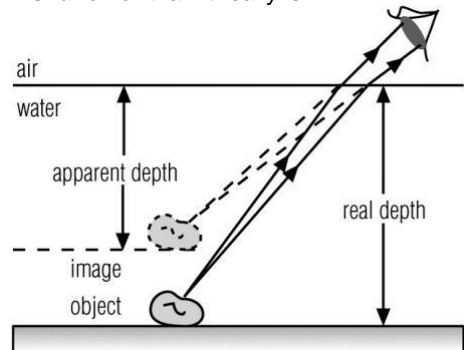


REFRACTION

- Refraction occurs when light bends while crossing a surface or moving through a material.



- Refraction can **make things look closer** than they really are.
- Refraction in water is the reason that when you stand beside a swimming pool and look down at it, it appears to be **shallower** than it really is.



- Also, if you put a spoon at an angle in a cup of water, it will appear to bend at the water-air boundary.



Reflection of Light in Our Daily Life

A **rear/side view mirror** to see the exact traffic situation behind the car.



A **dental mirror** to see the inner side of a patient's tooth.

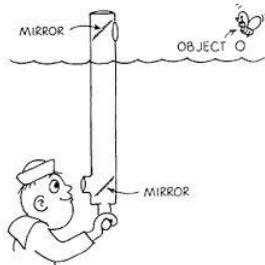


A **convex mirror** at sharp bend of a road to see incoming cars to avoid collisions.



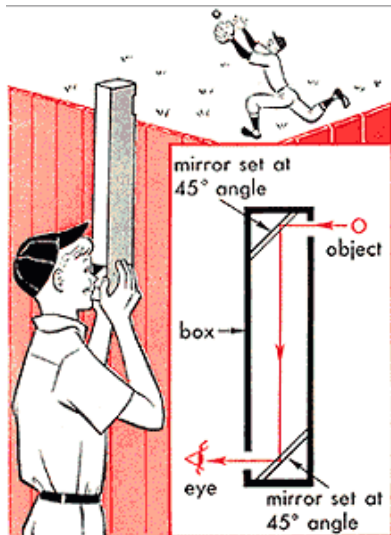
A **barber's mirror** to view haircut.

The Principle of Light Reflection to Design Devices like:



A **periscope** inside a submarine to observe objects outside the submarines.

Periscopes in tanks and submarines have magnifying lenses between the mirrors to make the reflected image bigger.



Periscope can also be used to view objects beyond obstacles.

A **kaleidoscope** to see beautiful and colourful patterns reflected by the mirrors.

