Light

- Light is a type of electromagnetic wave that carries energy.

- Light is a form of radiation. This means that a source of light such as the sun or light bulb gives off light rays that travel away from the light source in all directions.

- Since light is an electromagnetic wave, it does not need a material to travel through.

- Thus, light can travel through a vacuum.

Sources of Light

- We are able to see the things around us only when light rays enter our eyes and stimulate light–sensitive cells (retinas) in our eyes.

- Anything that gives out light of their own is known as a light source and they are also known as luminous objects.
  - We are able to see them because their emitted light rays enter our eyes.
  - Light source can be natural or artificial sources.
    - Examples of natural light sources include the Sun, stars, fireflies and glow worms.
    - Examples of artificial light sources include light bulbs and fires.

- Most objects do not give off their own light and they are known as non-luminous objects.
  - We are able to see them because the light rays falling onto them are reflected into our eyes.
  - Examples include trees, humans, books.
As much as we would love to show you everything, we cannot be showing you the best. 😊

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Reflection

1. Reflection occurs when light hits a surface and changes direction.
2. The angle of incidence is equal to the angle of reflection.
3. Reflection can be total, where light is reflected at a particular angle, or partial, where some of the light is absorbed.
4. The law of reflection states that the angle of incidence is equal to the angle of reflection, and the incident ray, reflected ray, and normal all lie in the same plane.
5. Reflection is responsible for the formation of images in mirrors.

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Phases of the Moon

- The moon is a non-luminous object that reflects light from the sun.
- As the moon orbits around the earth, different parts of the moon reflect light from the sun.
- Hence, the shape of the moon changes at different periods of the month.
- Each different shape is called a **phase**.
- The shape of the moon that is observed from the earth depends on:
  - the position of the moon relative to the sun and the earth;
  - the amount of lit half of the moon facing the earth.
- Half of the moon faces the sun and is always lit while the other half of the moon faces away from the sun and is always dark.

![Figure 10: Phases of the moon](image)

Comprehensive illustrations to capture student's interest.
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Example 1

The diagram below shows a ray of light striking the mirror. Given that the total angle between the incident and reflected ray is 80°, what is the angle of incidence and angle of reflection?
Example 2

The diagram below shows an object $O$ and its image $I$ formed in a plane mirror. Draw two light rays to show how an observer at $A$ is able to see the image.
Example 3

The diagram below shows a line XY. Complete and label clearly on the ray diagram below to show the position of the image X’Y’.
Learning Objectives

☐ Describe light as a type of electromagnetic wave that carries energy
☐ Describe an object that gives out light of its own as luminous
☐ State that light travels in a straight line
☐ Describe reflection as the bouncing of light rays off the surface of a non-luminous object
☐ State the laws of reflection
☐ Describe the differences between reflections on smooth and rough surfaces
☐ State the properties of images formed by plane mirrors
☐ Describe some uses of plane mirrors
☐ Describe some uses of concave and convex mirrors

Keywords

Light | Reflection | Concave
Electromagnetic wave | Incident ray | Radiation
Reflected ray | Luminous | Laterally inverted
Shadow | Virtual | Upright
Convex

List of key words are provided in every set of notes to help students answer their examination questions accurately and precisely.
A typical exercise will start with 5 to 15 multiple-choice questions. The first few questions will be more fundamental. The level of difficulty of questions will increase towards the end of each exercise. This is to allow students to grasp the basic concepts fully before applying the concepts to solve challenging questions.
10. Which of the following is the reason that the girl in the diagram below can see the light from the torch?

(A) Light travels in a straight line.
(B) Light undergoes reflection.
(C) The cardboards are luminous.
(D) The cardboards are transparent.
1. (a) Define reflection.

(b) Name the two types of reflection.

(c) Is it easier to read from pages of a book that are rough or from pages that are smooth and glossy? Explain your choice.

2. (a) In the space provided below, draw a diagram to show

(i) a converging beam of light.  

(ii) a diverging beam of light.

(b) Look at the ray diagram below. Label the rays shown.

(i) ________________  

(ii) ________________

(c) Deduce two laws of reflection from the above diagram.

(i) ________________

(ii) ________________
5. Complete the ray diagrams below to locate the position of the image formed by the plane mirror and how it can be viewed by an observer.

(a)  

(b)  

(c)