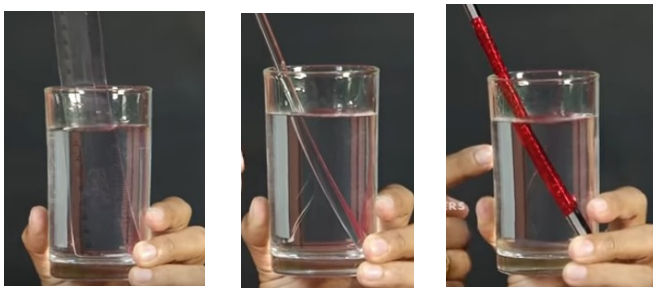
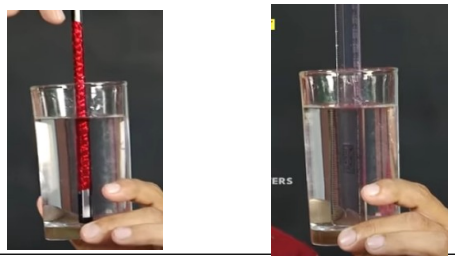
UNIT 5

Refraction of Light

18/12/2020 – Class 39

Activity 1

Fill three fourth of a glass tumbler with water and following activities are done.

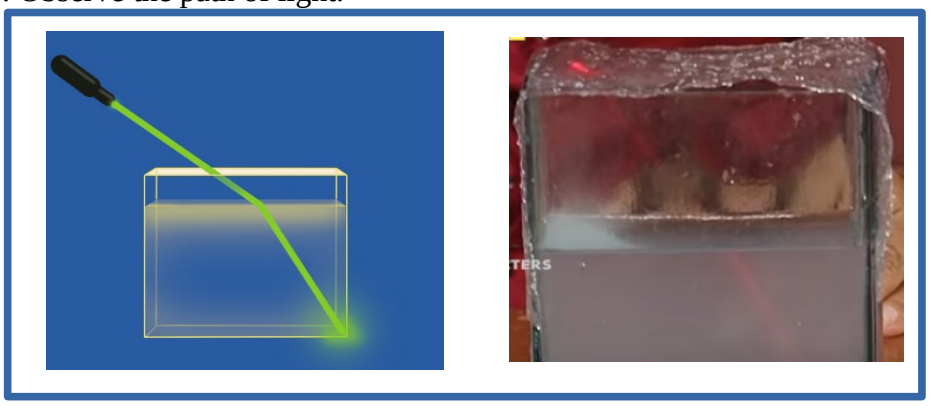
Activity	Observation
A plastic scale, glass rod and a pencil are placed obliquely into the glass tumbler. 	Scale, glass rod and pencil appeared to be broken at the surface of separation of air and water.
Pencil and scale are placed vertically into the glass tumbler. 	They doesn't appeared to be broken.

Activity 2

Why the scale, glass rod and pencil appeared to be broken, when they placed obliquely into the water?

Experiment

Fill three fourth of a transparent vessel with water. Add one or two drops of milk into it. Fill the portion of the vessel above water with smoke. Allow the light from a laser torch to pass through water obliquely. Observe the path of light.



Discussion

- Light travels through which are the media, here? **Air and water**
- When light enters from air to water, what happens? **A deviation taking place.**

- Where does the deviation of the ray take place? **At the surface of separation of water and air.**

Inference

The ray of light entering water undergoes a deviation at the point on the surface where the media get separated.

Activity 3

Why does the ray of light undergo a deviation here? Does light pass through all the media at the same speed? Analyse the table given below.

Medium	Speed of light (m/s)
Vacuum	3×10^8 m/s
Water	2.25×10^8 m/s
Glass	2×10^8 m/s (approximately)
Diamond	1.25×10^8 m/s

Discussion

- What is given in the table? **Speed of light in different media**.
- Does light travels with the same speed on all media? **No**
- Which medium, light travels with greater speed? **Vacuum (Air), 3 X 10^8 m/s**
- Which medium, light travels with least speed? **Diamond, 1.25 X 10^8 m/s**

Speed of light is different at different media.

Inference

- ➔ The characteristics of each medium influence the speed of light that passes through the respective medium.
- ➔ **Optical density** is a measure that shows how a medium influences the speed of light passing through it.
- ➔ As optical density of a medium increases, speed of light through it **decreases.**
- ➔ As optical density of a medium decreases, speed of light through it **increases.**

Activity 4

Discussion

- Which medium has lesser optical density? **Air (vacuum)**
- Which medium has greater optical density? **Diamond.**
- Can the media given in the table be arranged in the increasing order of their optical densities?

Air < Water < Glass < Diamond

- In the previous experiment light travels through which are the media? **Air and water.**
- Does the optical densities of air and water are same? **No**.
- Why a deviation occurs in the path of light, when it travels obliquely from air to water? **Their optical densities are different.**

Refraction of light.

- ➔ It is the difference in the optical densities that causes the deviation.
- ➔ When a ray of light enters obliquely from one transparent medium to another, its path undergoes a deviation at the surface of separation. This is **refraction.**

Assignment

Why the pencil, appeared to be broken, when it is placed in the water obliquely as in the figure?