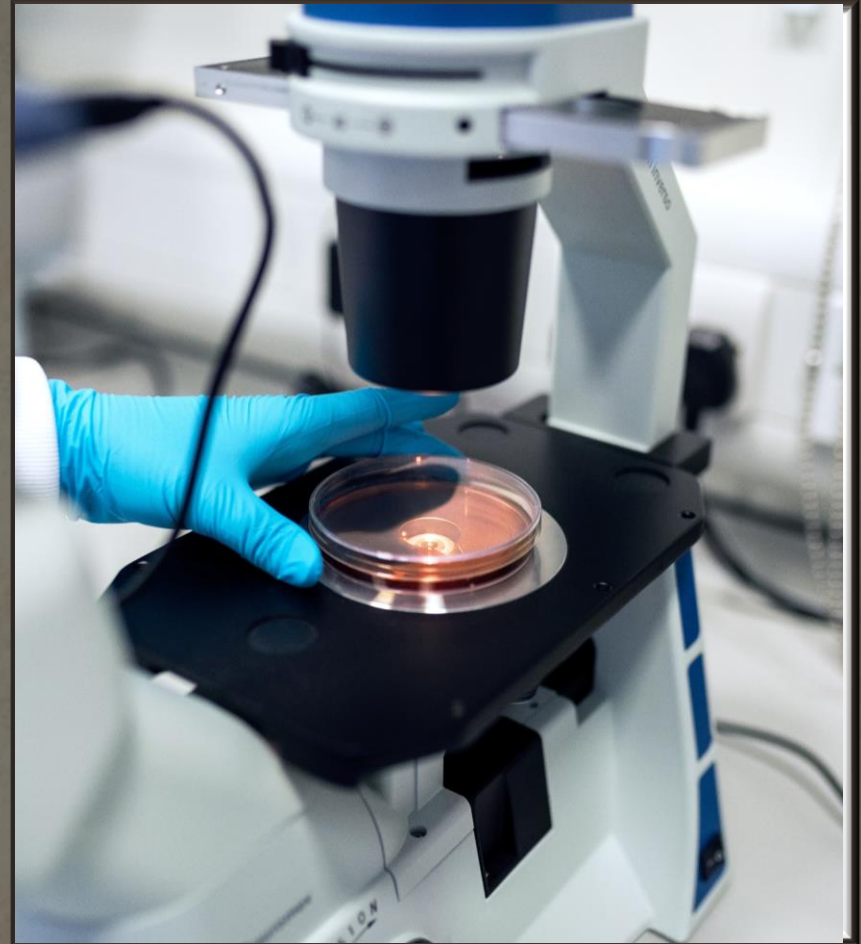


# CHAPTER#12

# GEOMETRICAL

# OPTICS

CONCEPTUAL QUESTIONS



# QUESTION#1

When you look at the front side of the polished spoon, your image is inverted and from back of the spoon, your image is erect. Explain why?

**Answer:**

The inner surface of spoon acts like *concave mirror*. When we look at front of spoon, we see an inverted image of our self. This is because the inner reflected curved surface of the metal spoon acts as converging mirror. While, the outer surface acts as *convex mirror*. When we look at the back of the spoon, we see an erect image of our self. This is because the outer reflective curved surface of the metal spoon acts as diverging mirror.



## QUESTION#2

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Which mirror is used by girls for make up and why?

**Answer:**

*Concave mirrors* magnify objects in focus. They are used for shaving or applying makeup because they reflect 'real,' almost 3-dimensional images.





## QUESTION#3

Why are large convex mirrors fixed at blind turns of mountains?

**Answer:**

Convex mirrors are generally used at blind corners, as they give a *wider field of view*. They also form erect, virtual and diminished images of objects lying away from the focal point. Therefore, convex mirrors are used at blind turns on hilly roads to help drivers for safe driving.



## QUESTION#4

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Which mirrors are used for rear view of vehicles and why?

**Answer:**

Convex mirrors are useful for rear view in vehicles, as they provide a larger field of view than the concave mirror. Convex mirrors give erect, virtual and diminished image of distant objects with a wider field of view.

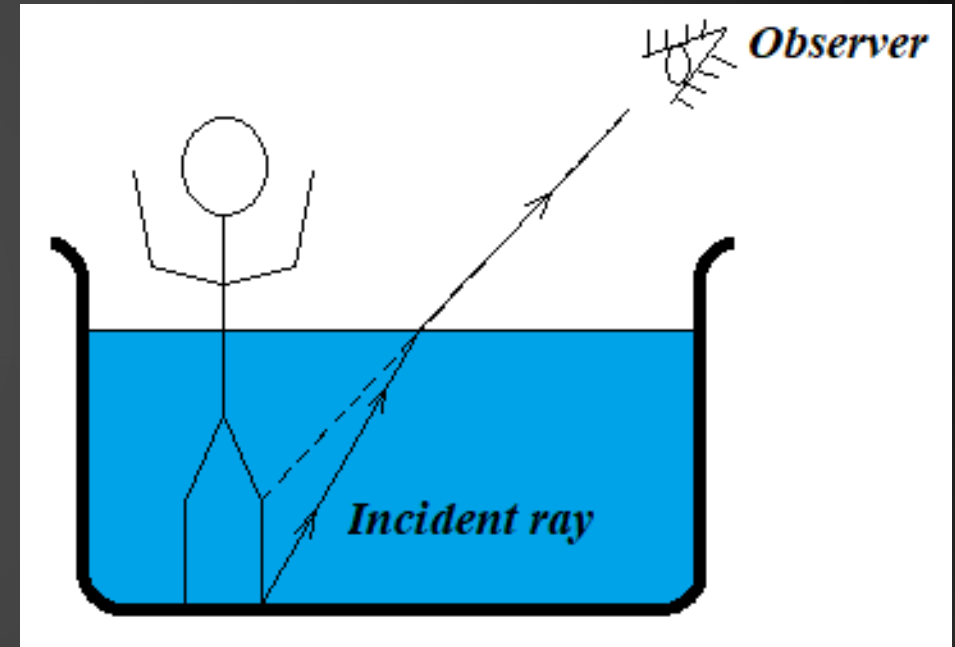


## QUESTION#5

If a person is walking in pool, why do his legs appear shorter in water? Do they really become short?

**Answer:**

A person's legs appear shorter in water due to *refraction of light*. When the rays passing through the water to air then the refracted ray bent away from the normal. We know that, the refractive index of water is greater than that of air, so a person's legs appear to be short while walking in the tank due to refraction.





## QUESTION#6

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Why do diamonds sparkle brightly?

**Answer:**

Diamond has a very high refractive index. It is because of this property that diamond sparkles. When light enters the diamond crystal, it suffers multiple total internal reflections and due to this, it sparkles. Critical angle of diamond is only  $24^\circ$ .

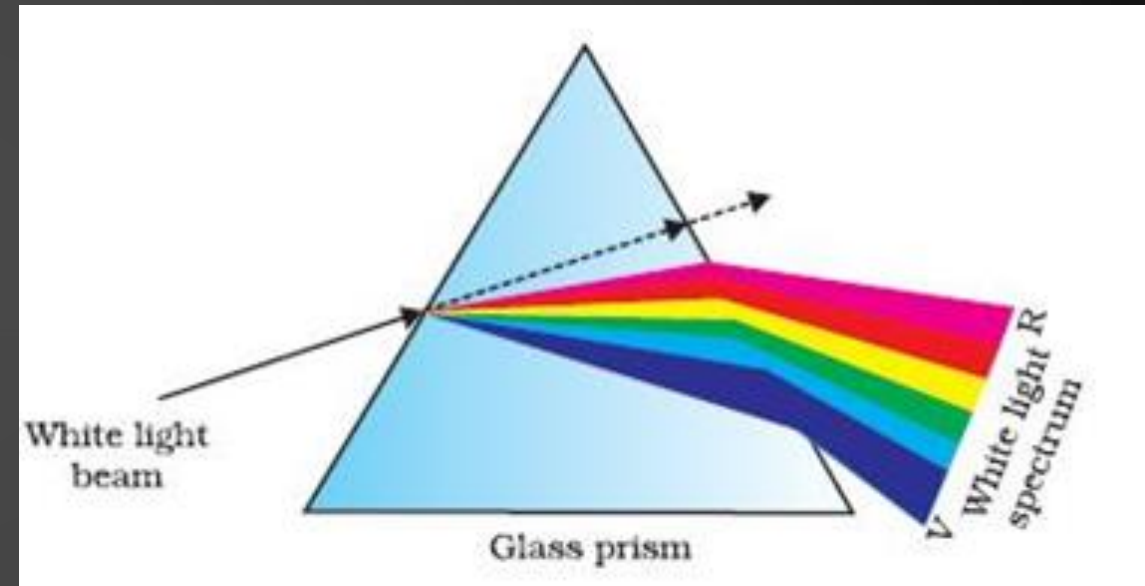


## QUESTION#7

When white light passes through a prism, it disperses into its seven colours. Why does dispersion take place in prism?

**Answer:**

The phenomenon due to which white light splits into seven colours on passing through a prism is called *dispersion*. Different colour light have different wavelength and refraction depends upon the wavelength of light, so they are refracted at a different angle and hence split into the colour spectrum.



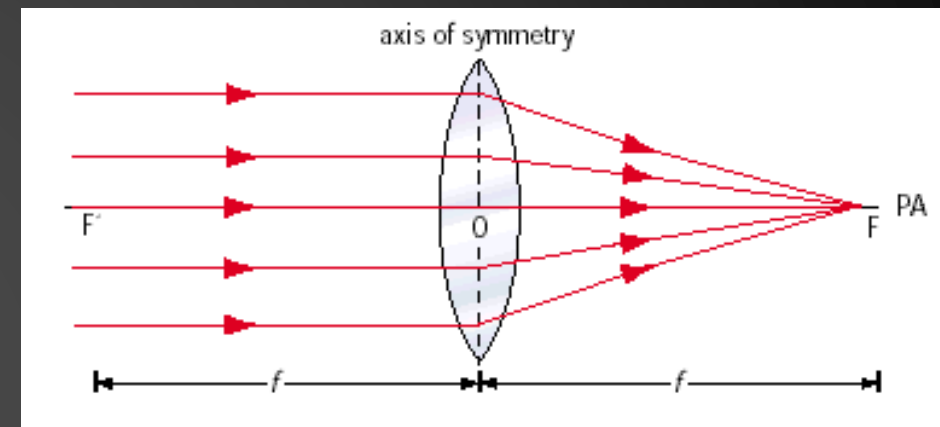


## QUESTION#8

Magnifying glass can burn the paper. How is it possible?

**Answer:**

We will use a convex lens to start fire from light of sun. A convex lens focuses or converges the parallel sun rays to a single point after refraction through the lens. The focusing point is known as principle focus "F". The paper should be placed at a distance equal to the focal length of the lens. The lens converge sunlight on the paper. After sometime the paper heat up and catches fire instantly.

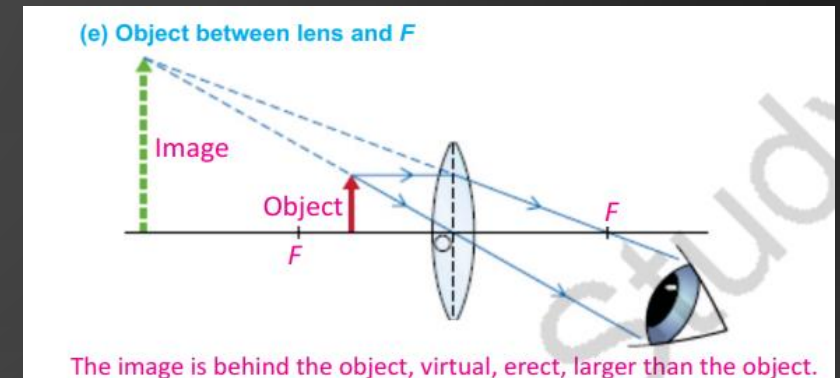
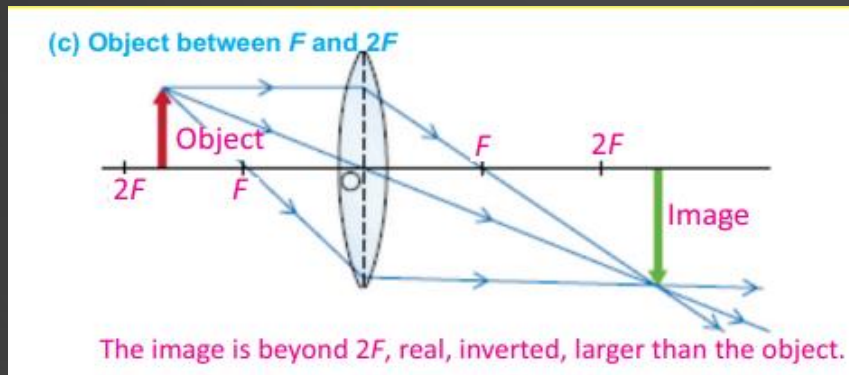


## QUESTION#9

Your grandfather uses spectacles to read newspaper. You see through the spectacles and you observe that object behind it were inverted. Why was it so observed?

**Answer:** A convex lens is used in the spectacles to read newspaper. Therefore, the image formed by it is inverted.

When my grandfather reads the newspaper, his eyes lie in the focal length of the lens, so the image of the newspaper is erect and enlarged. But when you see from his glass standing behind him, you are out of the focal length of the convex lens, so the image of the newspaper is inverted.



## QUESTION#10

Under what condition, is a convex lens nearly act as diverging lens?

**Answer:**

- A convex lens can behave as a diverging lens when it is placed in a medium whose *refractive index is greater* than the refractive index of the material of the lens.
- Convex lens acts as diverging lens when object is placed between optical centre and focal point of lens

