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King Saud University
College of Science
Physics & Astronomy Dept.

Phys 145 (General Physics)

Chapter 7: Mirrors, Lenses and Imaging Systems (part 1)

Week n° 9

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Chapter 7: Mirrors, Lenses and Imaging Systems

- **We will learn in this chapter 7:**

- Mirrors
- Lenses
- Image Formation
- Power of a Lens; Aberrations

Chapter 7: Mirrors, Lenses and Imaging Systems (First part)

- **We will learn in this first part of chapter 7:**

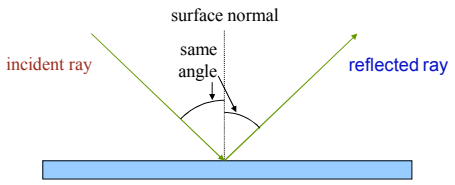
- Mirrors
- Lenses

Mirrors

- Standing away from a plane mirror shows a virtual (not real) image with opposite direction.

- The angle of incident ray is equal to the angle of reflected ray.

$$i = r$$

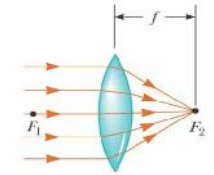


Lenses

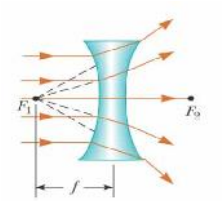
Lenses are usually used to converge or diverge the light rays.

- A converging lens bends the light rays toward its axis.
- A diverging lens bends the light rays outward from its axis.

Converging lens



Diverging lens



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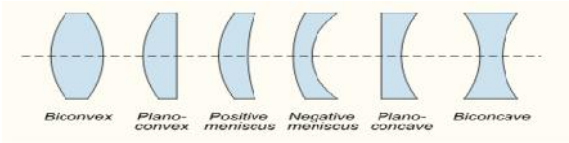
Lens classification

Lenses are either:

1- A **convex** surface (converge light), has a positive radius of curvature.
Convex lenses bring rays to a focus. The more curved the lens, the quicker the rays are focussed.

2- A **concave** surface (diverge light), has a negative radius of curvature.
Concave lenses make rays spread out. The more curved the lens, the more the rays spread out.

3- A **plane** surface, has an infinite radius of curvature.



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Lensmaker's Equation

f is the focal length of the lens. Which is the distance for the center of the lens to the focal point.

The focal length is positive (+) for the converging lenses, and negative (-) for the diverging lenses .

The focal length depends on the refraction index n of the lens and its shape (i.e. on the radii of curvature R_1 and R_2).

$$\frac{1}{f} = (n-1)\left[\frac{1}{R_1} - \frac{1}{R_2}\right]$$

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Video 01 of week 9: Converging Lenses

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Summary of week 09

- Light travel in straight lines.
- For a mirror, the incident angle is equal to the reflected angle.
- There are real and virtual images.
- Any lens is defined by its refraction index and radius of curvature.
- Lensmaker's equation:

$$\frac{1}{f} = (n-1)\left[\frac{1}{R_1} - \frac{1}{R_2}\right]$$

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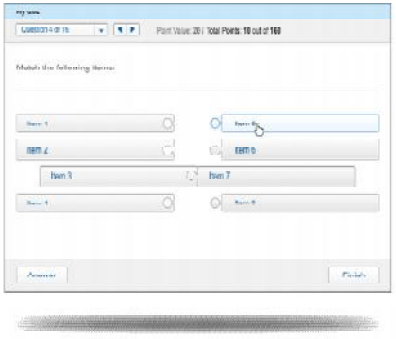
Quiz for week 09



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