

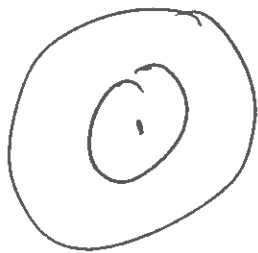
Two ways to describe how light travels.

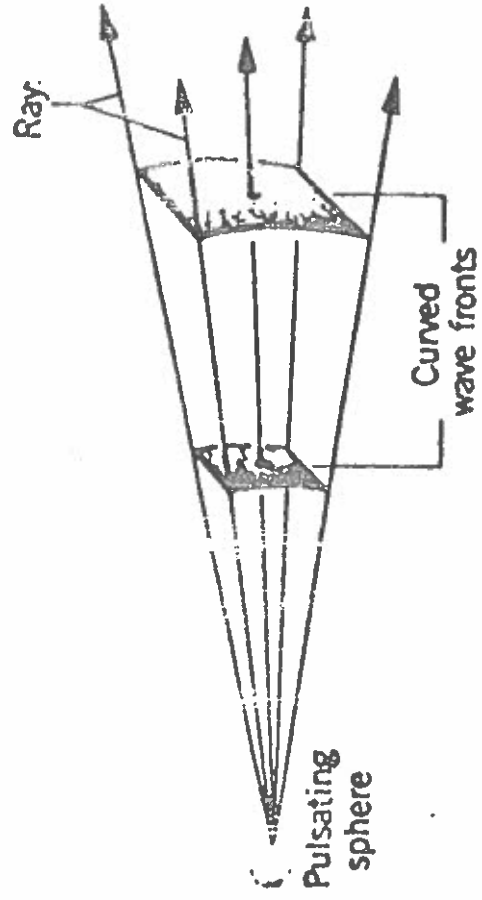
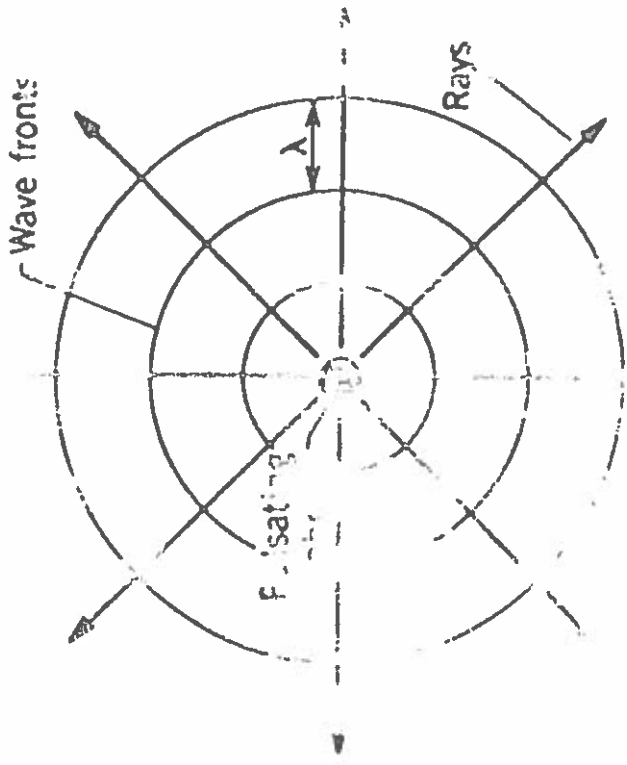
Wave fronts — where the energy of the wave is considered located



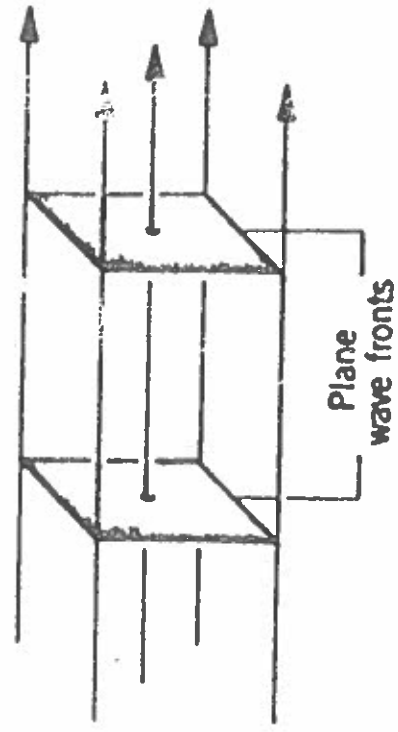
Parallel wave fronts come from objects far away (∞) infinity

Consider stone in a pond





(a)



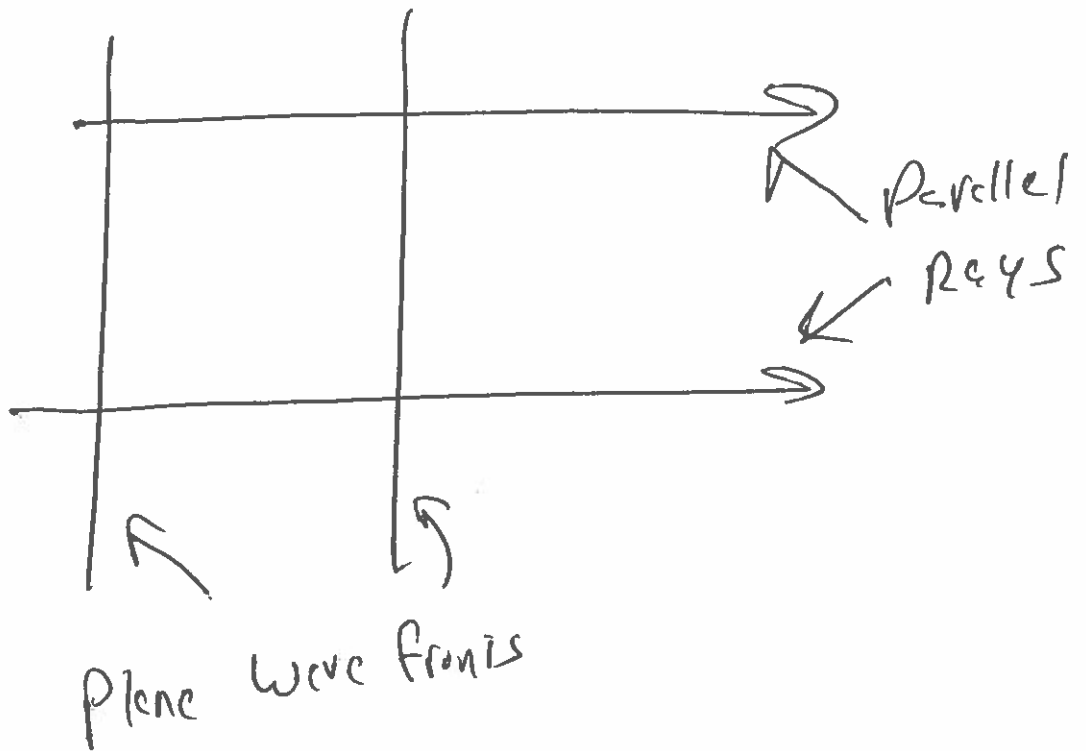
(b)

Figure 25.2 (a) Portions of the spherical wave fronts are shown. The rays are perpendicular to the wave fronts and diverge. (b) For a plane wave, the wave fronts are flat

Other way to describe light

are Light rays. Light rays
are perpendicular to wave fronts

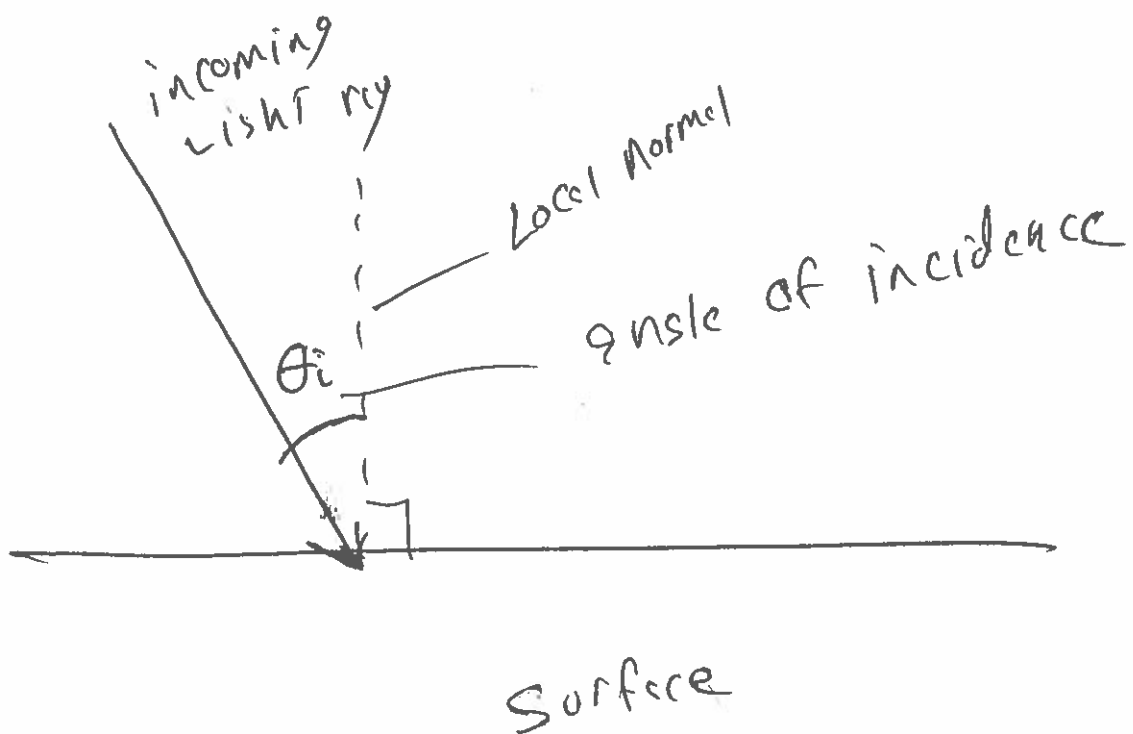
Plane wave fronts

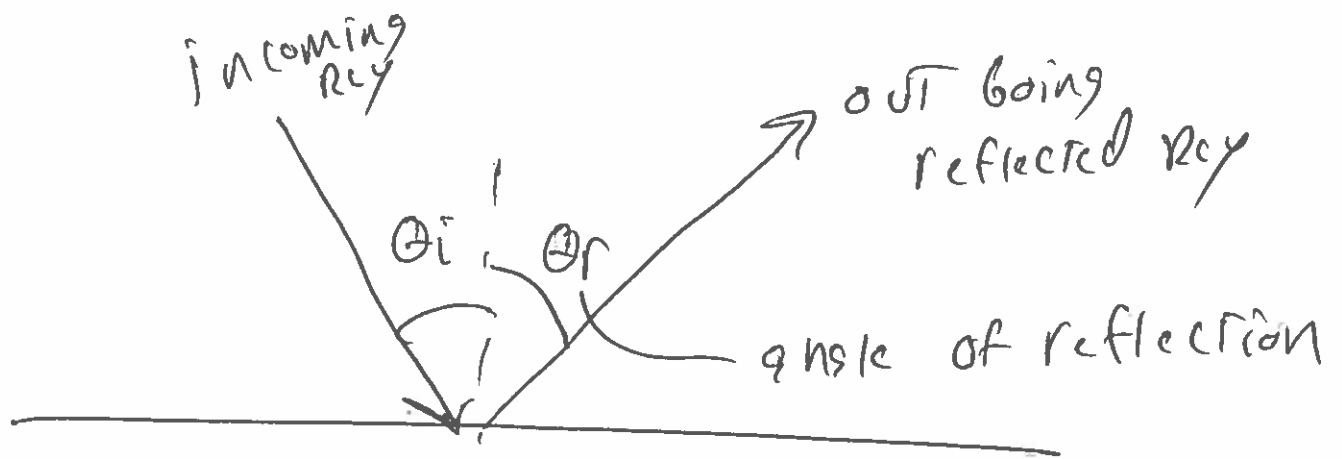


How do you see objects?

- 1) Light reflects off object
- 2) Light is emitted by the object.

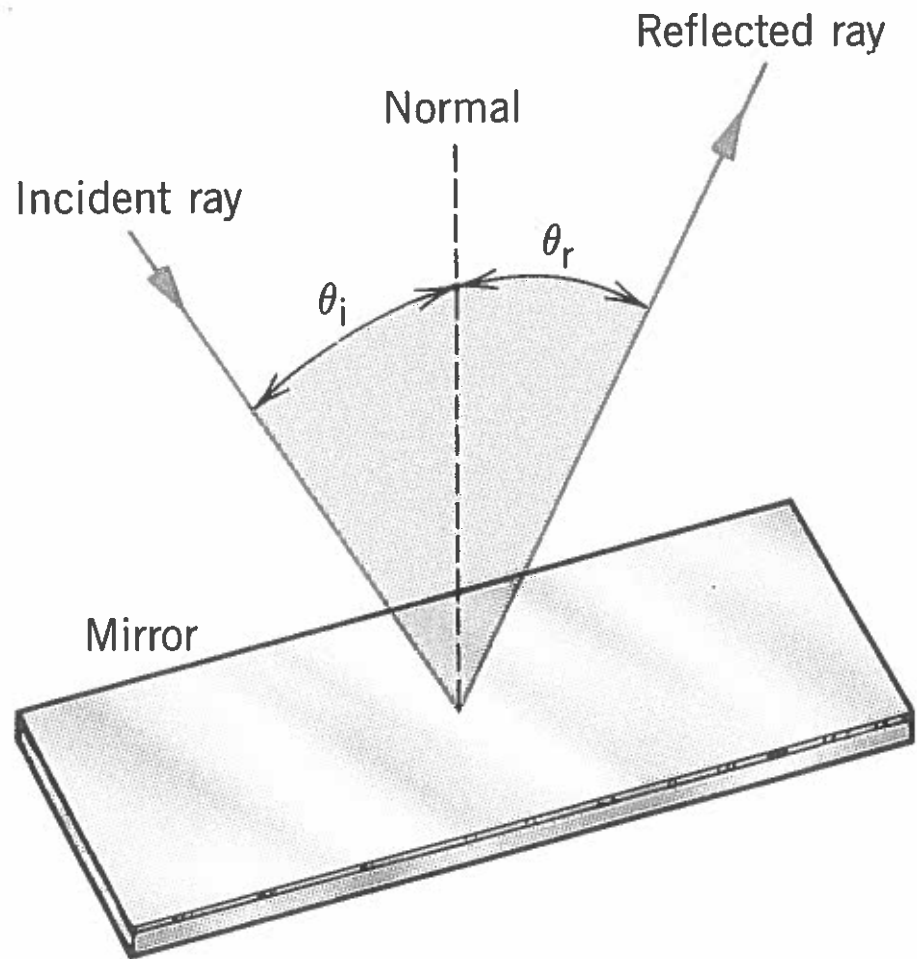
Law of reflection





Law of reflection says

$$\theta_r = \theta_i$$



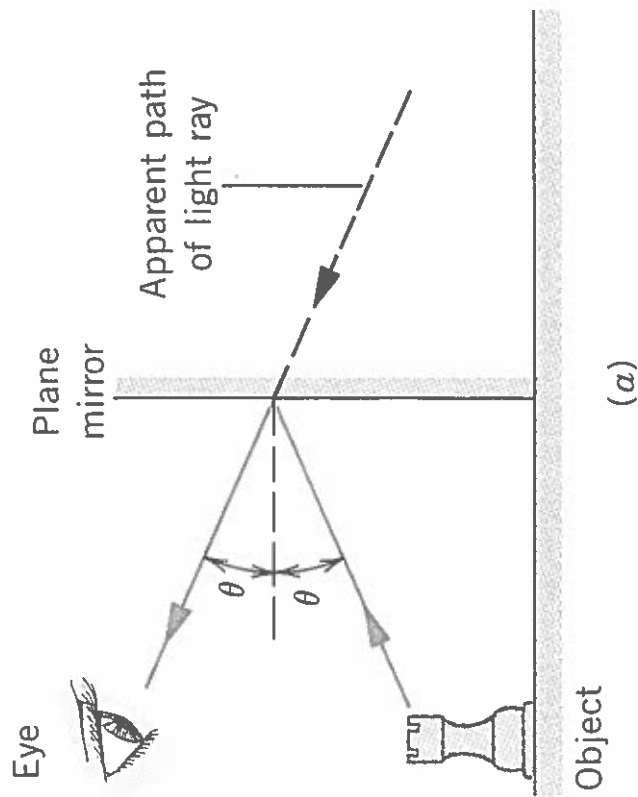
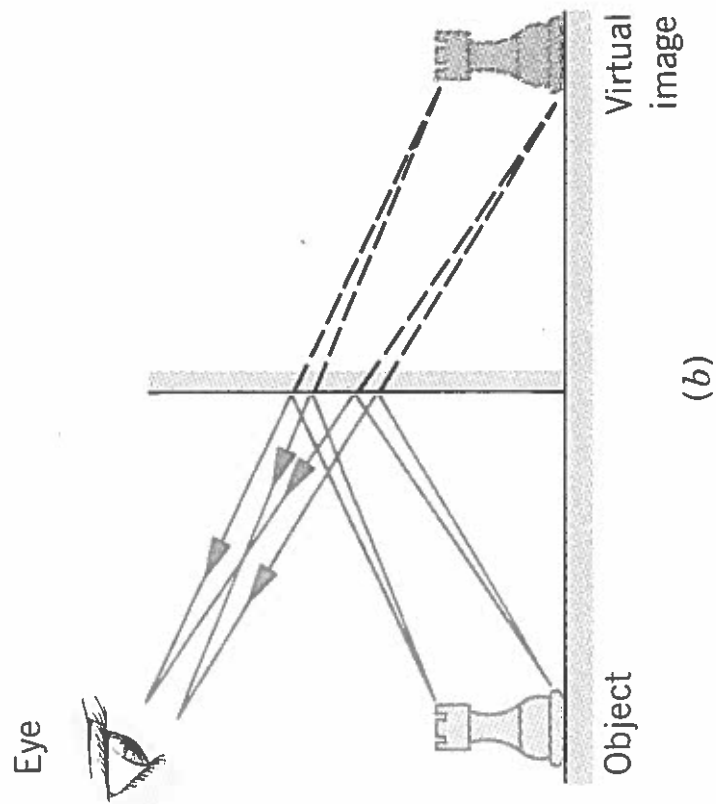
Plane mirrors (Flat)

Plane mirrors create images with the following properties

- 1) Image is upright (as opposed to inverted)
- 2) Image is same size as object
ie no magnification
- 3) Image is located as far behind the mirror as the object is in front of the mirror.
- 4) Left/Right are reversed in the mirror
recall how Ambulance is spelled on its front.

These are true because of how Brain processes light information.

We believe light travels in straight lines!



Images Real / Virtual

Real images are images where light rays actually come to a focus in space.

The image can be seen without any additional optical aid.

Virtual images are images where light rays ~~do~~ not actually meet or come together in space. They appear to focus. You require the optical element to see them.

woman is 1.68 m tall
eyes are 0.08 m below top of her head

1) How far off the ground does mirror have to be?

2) How long does mirror need to be so she sees her entire image?

How high off floor is distance \overline{BC}

How big mirror is distance \overline{AB}

Two triangles $\triangle FBM \triangle MBE$

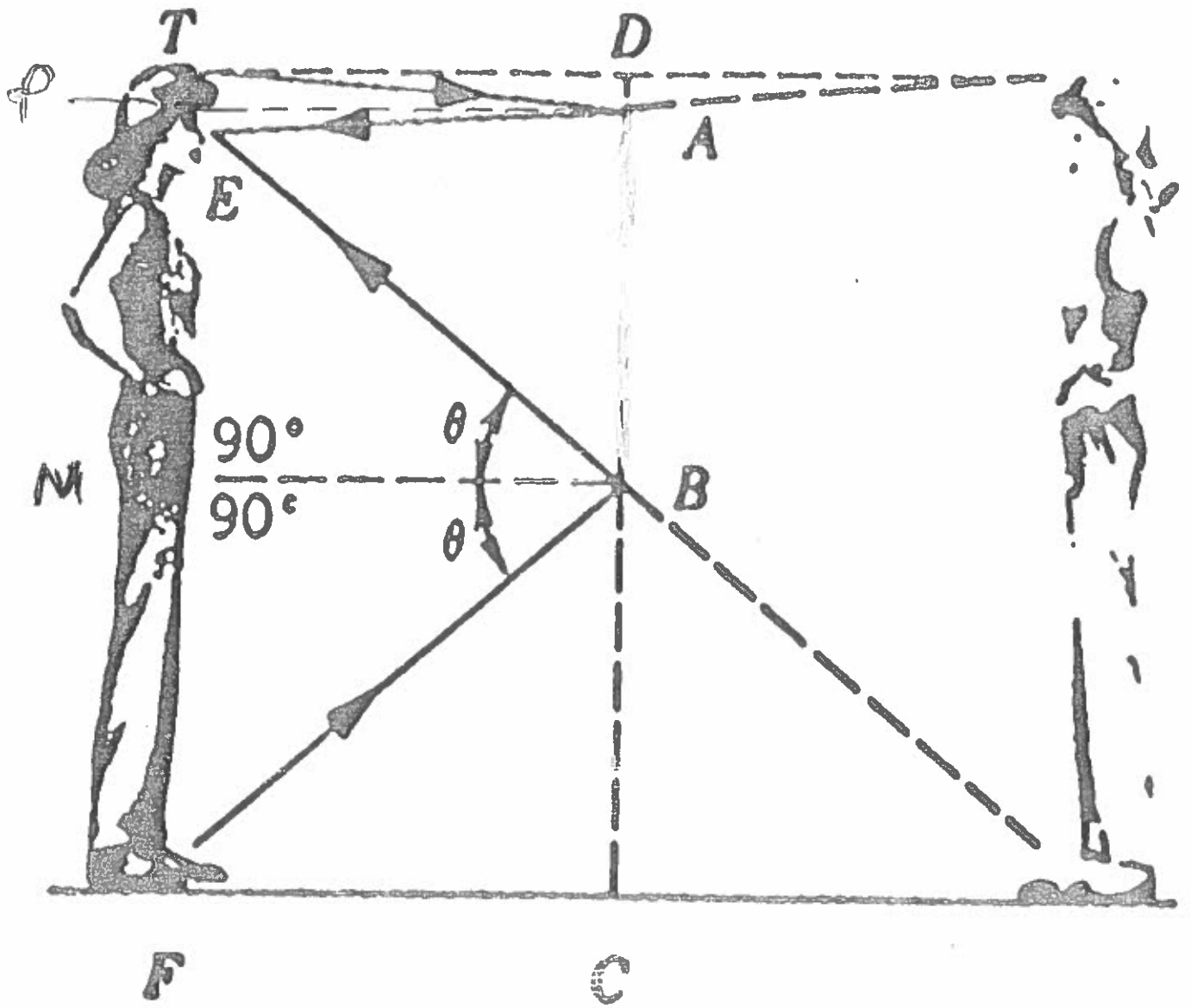
Similar \triangle

$$MF = ME \Rightarrow MF = \frac{1}{2} FE$$

$$FE = 1.68 \text{ m} - 0.08 \text{ m} = 1.60 \text{ m}$$

$$MF = \frac{1}{2} (1.60 \text{ m}) = 0.80 \text{ m}$$

$$\Rightarrow BC = 0.80 \text{ m off ground}$$



$$\triangle TPA = \triangle PEA$$

$$DA = \frac{1}{2} TE = \frac{1}{2} (0.08 \text{ m})$$

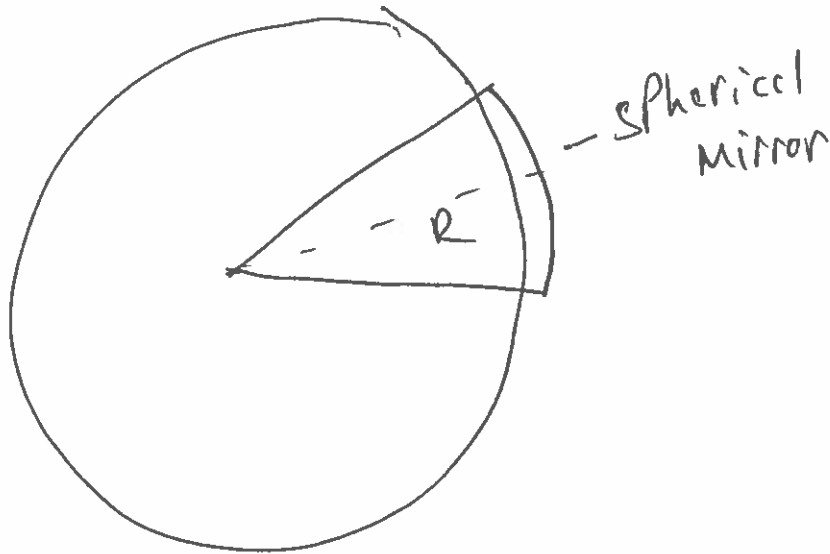
$$DA = 0.04 \text{ m}$$

$$AB = DC - DA - BC$$

$$AB = 1.68 \text{ m} - 0.04 \text{ m} - 0.80 \text{ m}$$

$$AB = 0.84 \text{ m} = \frac{1}{2} \text{ Person's Height}$$

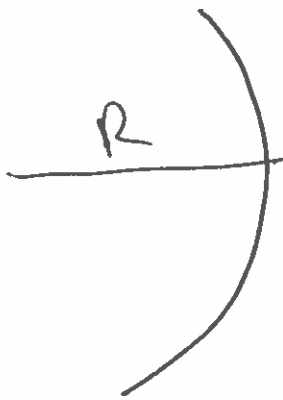
Spherical Mirrors



Spherical mirror has radius of curvature

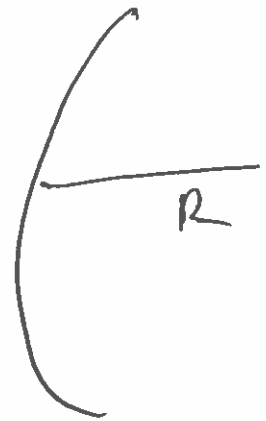
TWO TYPES

Light
→
→

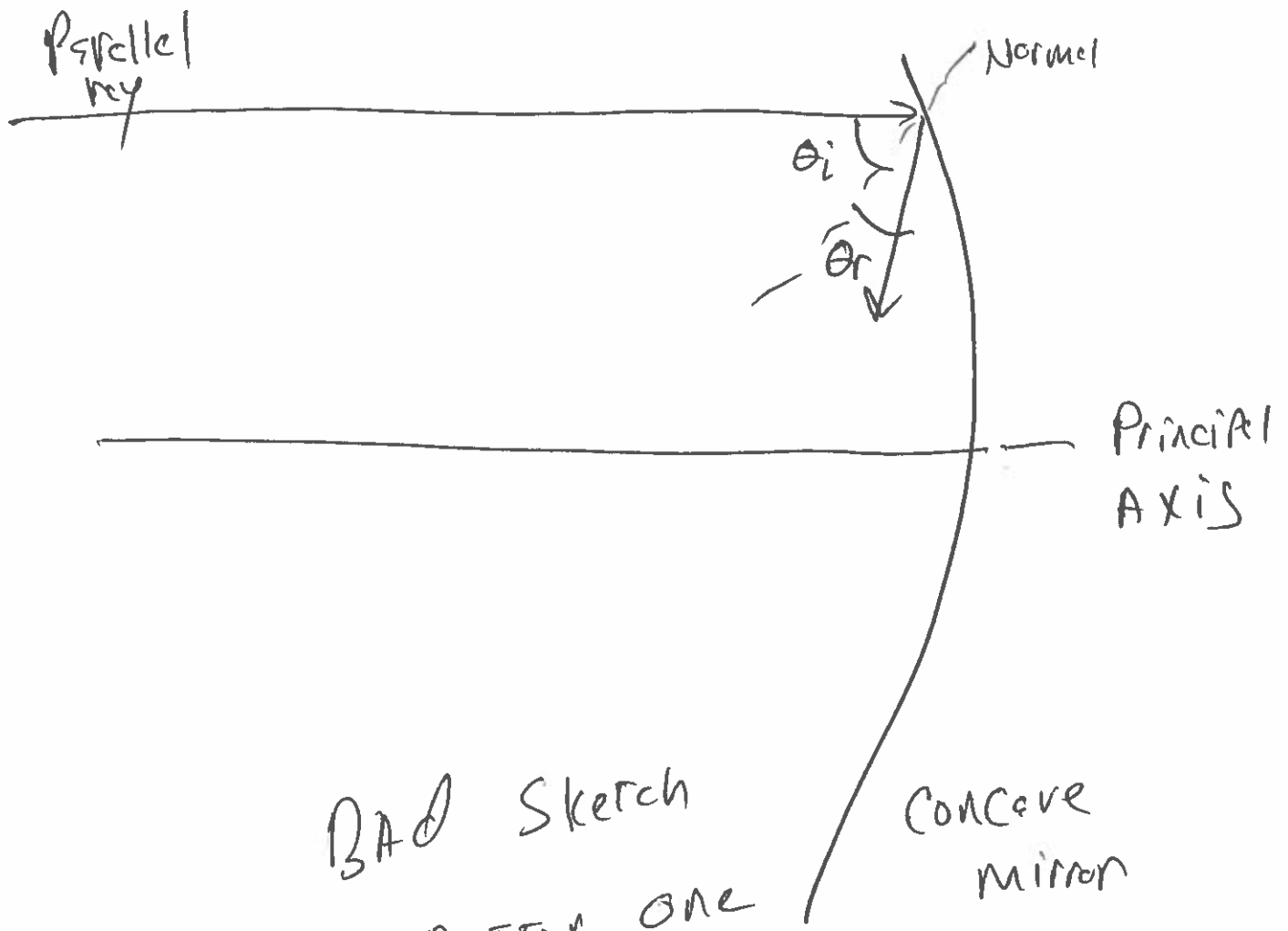


CONCAVE

→
Light
→



CONVEX



BAD SKETCH
DO BETTER ONE
TOMORROW!