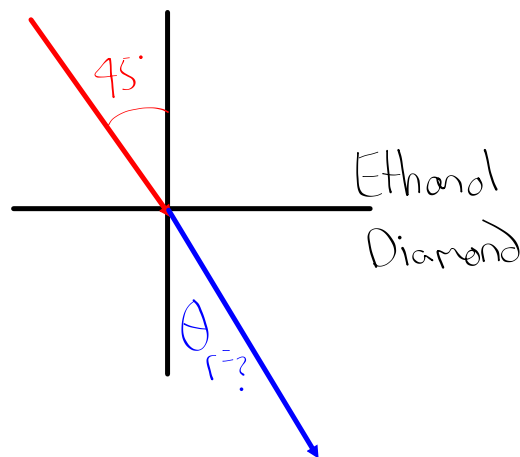


Quiz

1.)

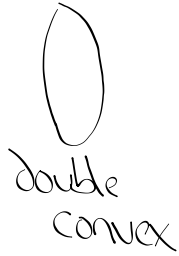


- 2) A ray of light in air hits the boundary of an unknown substance at an angle of 30 degrees. If the refracted angle is 19.2 degrees, What is the substance?
- 3) A beam of light refracts through water at an angle of 62 . If it passes through crystal ($n = 1.54$) on its way to water:
 - i) FST or SFA?
 - ii) What is the angle of incidence?
- 4) Will light be able to escape from Zircon if the angle of incidence inside Zircon is 22.3 ? (Other media is air)
- 5) Calculate the critical angle between flint ($n = 1.62$) and water.

Lenses

- combination of curved mirror + refraction

Converging

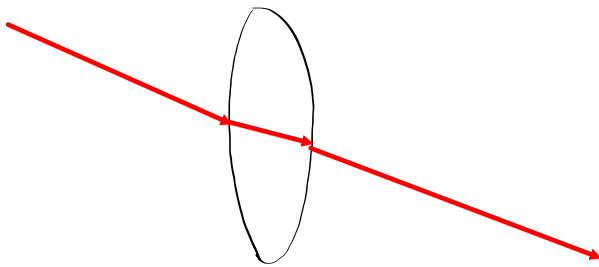


double convex

Diverging

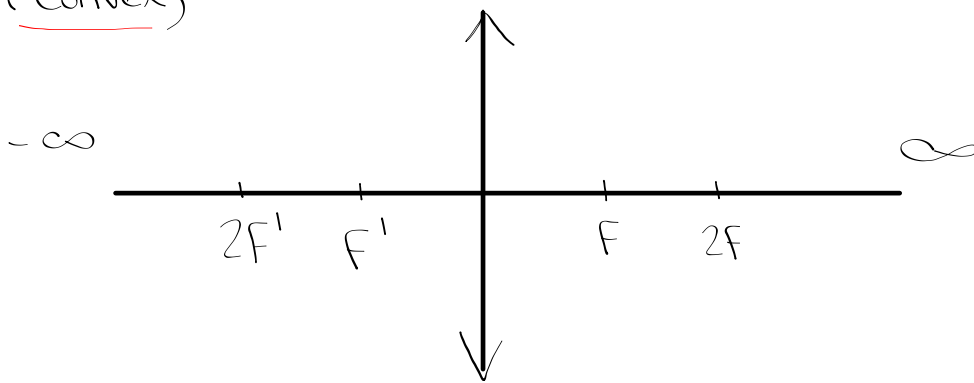


double concave



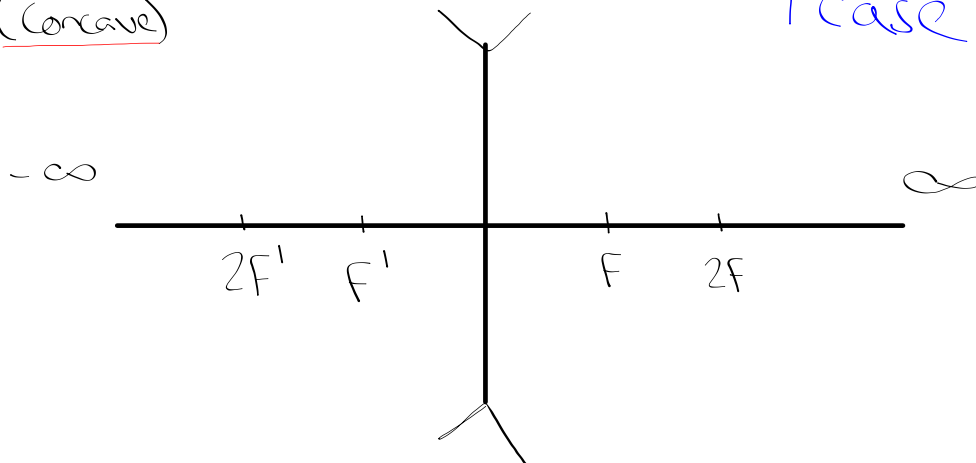
Converging
(Convex)

5 cases

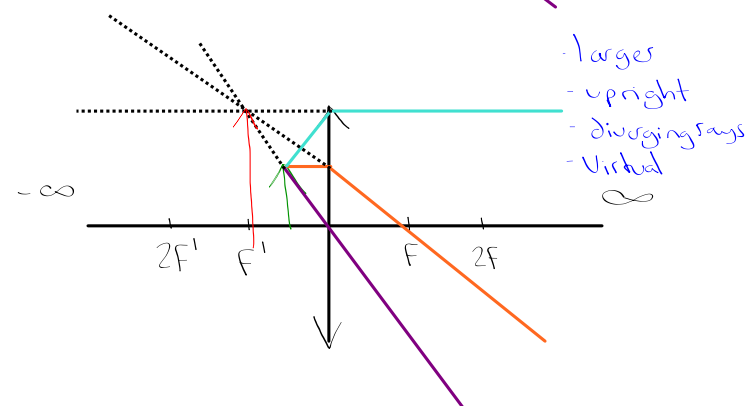
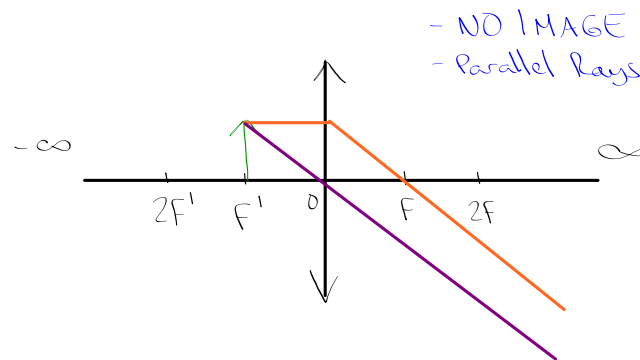
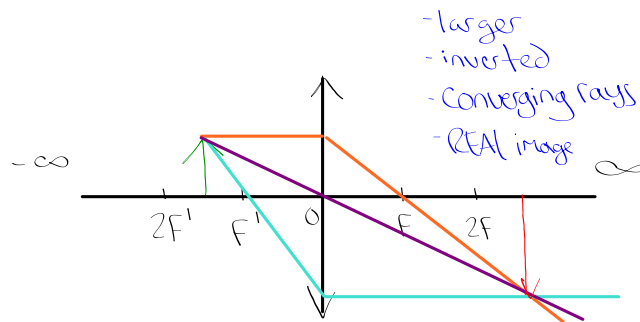
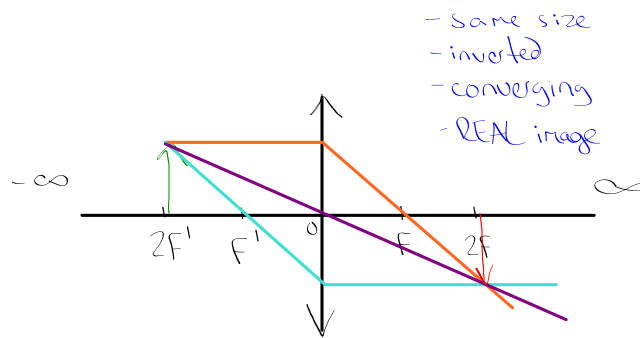
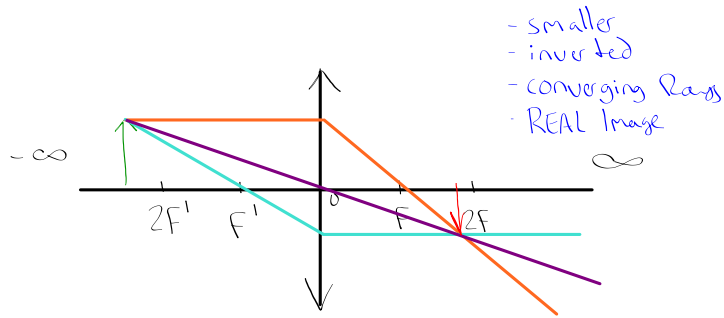


Diverging
(Concave)

1 case

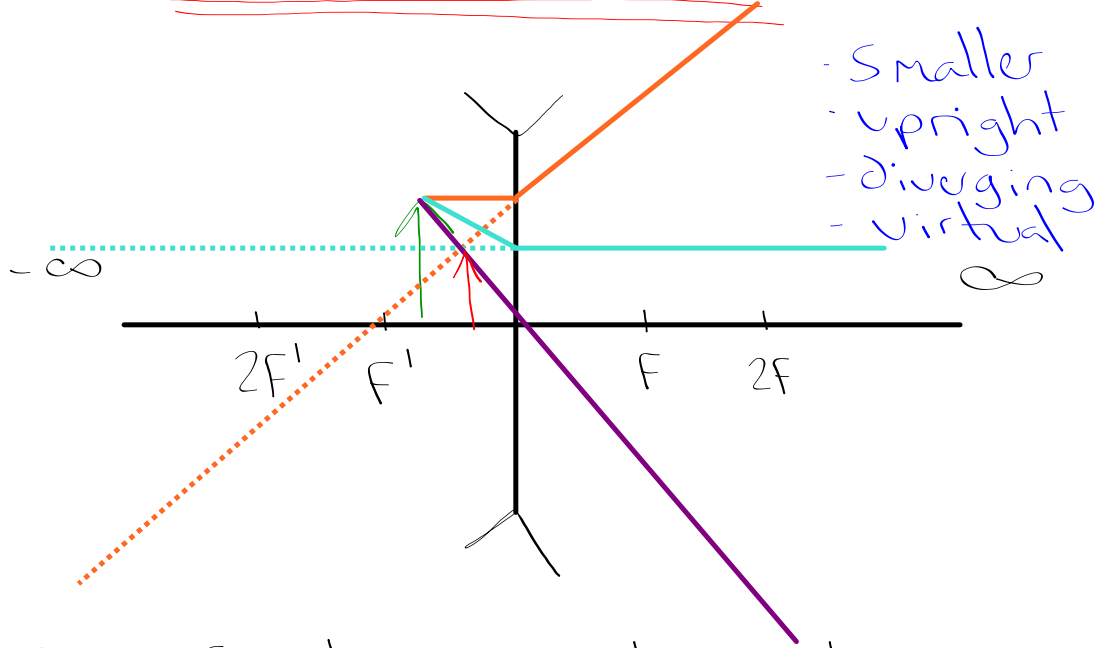


Converging (Convex) Lens



Case	Object		Image			Beam
	Position	Position	Size	Orientation	Type	Type
①	$-\infty$ to $2f'$	$2f$ to F	smaller	inverted	Real	Converging
②	on $2f'$	on $2f$	same	inverted	Real	Converging
③	$2f'$ to f'	$2f$ to ∞	larger	inverted	Real	Converging
④	on f'	—	NO	IMAGE	—	Parallel
⑤	f' to 0	$-\infty$ to 0	larger	upright	virtual	Diverging

Diverging (Concave) Lens



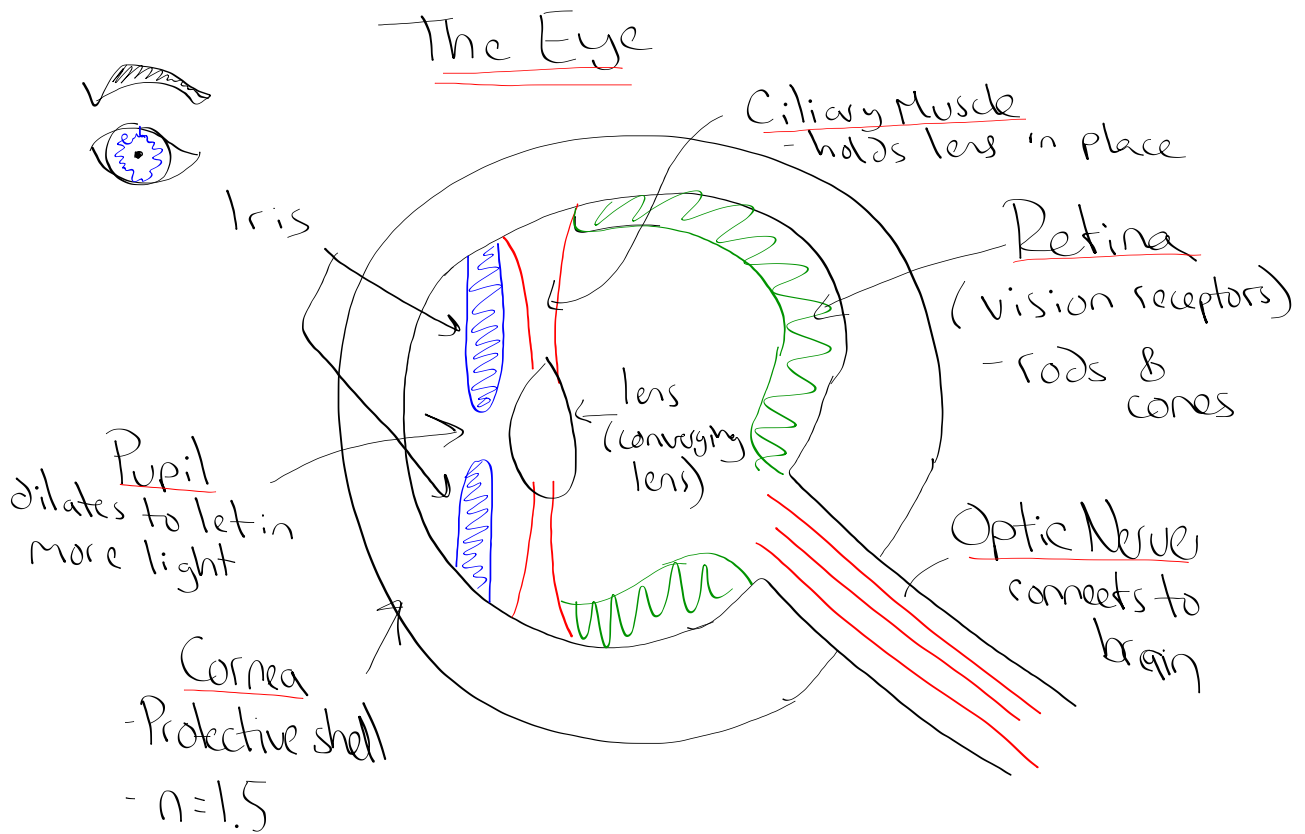
Same formulae can apply for lenses

* $\frac{1}{f} = \frac{1}{d_o} + \frac{1}{d_i}$ * $M = \frac{h_i}{h_o} = \frac{-d_i}{d_o}$ *

Sign Conventions

	(+)	(-)
d_o	/	/
h_o	/	/
d_i	Real	Virtual
h_i	Upright	Inverted
f	Convex	Concave
M	Upright	Inverted

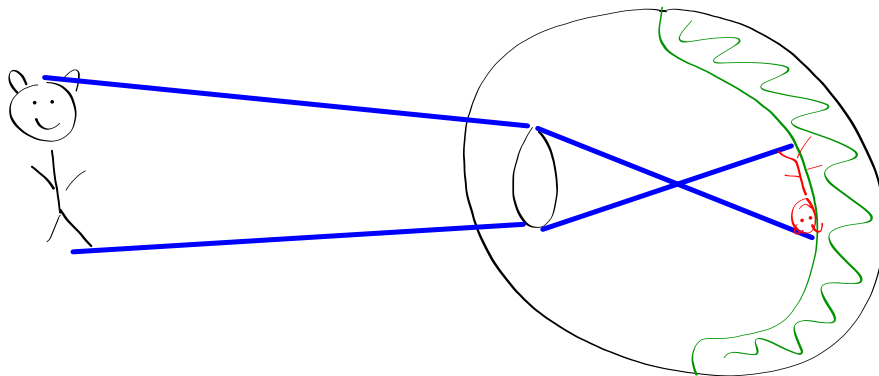
* Opposite from mirrors



Rods - 20 million → brightness & contrast

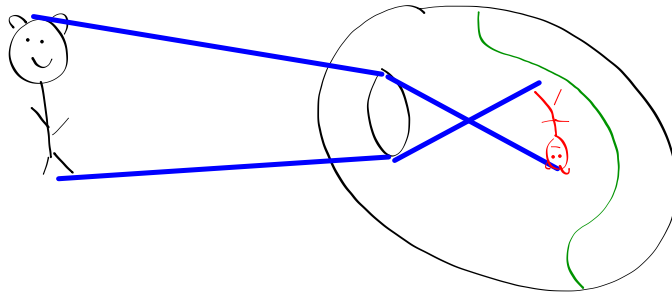
Cones - 6 million → colour

Normal Vision



Myopia - Eyeball too long

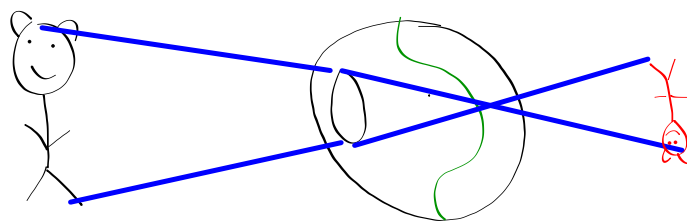
- Near sightedness - can't see far away
- Image in front of retina



Solution: Diverging lens

Hyperopia - Far sightedness - can't see close up

- Eyeball is too short
- image appearing BEHIND retina



Solution:
Converging lens