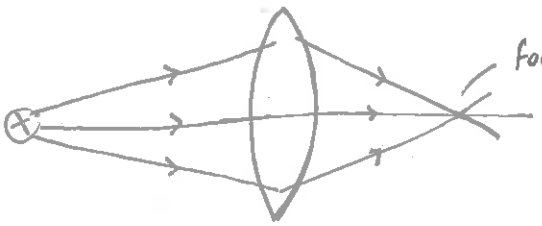
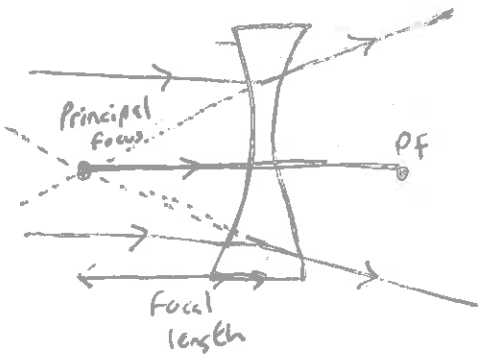
Lenses

Works by changing direction of light.

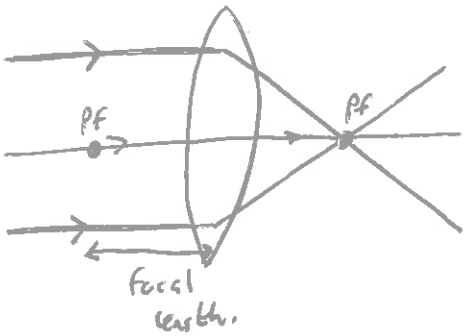
Converging lens (convex) - makes parallel rays converge to a focus - the point where they are focused is the principal focus (focal point).
example magnifying glass - camera.



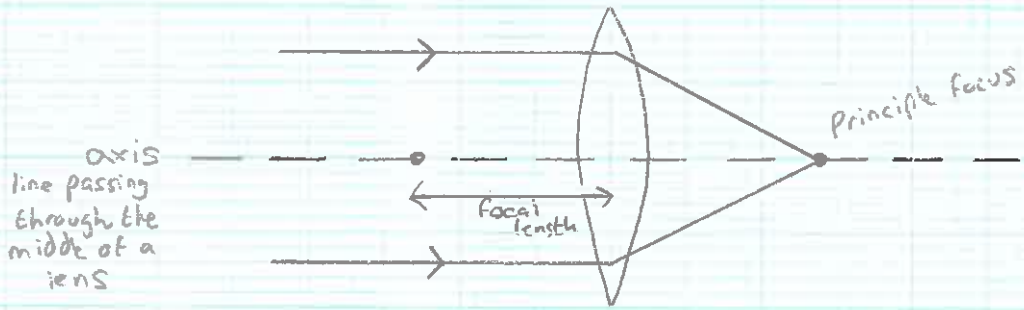
diverging lens (concave) - makes parallel rays diverge. The point where the rays appear to come from is the principal focus

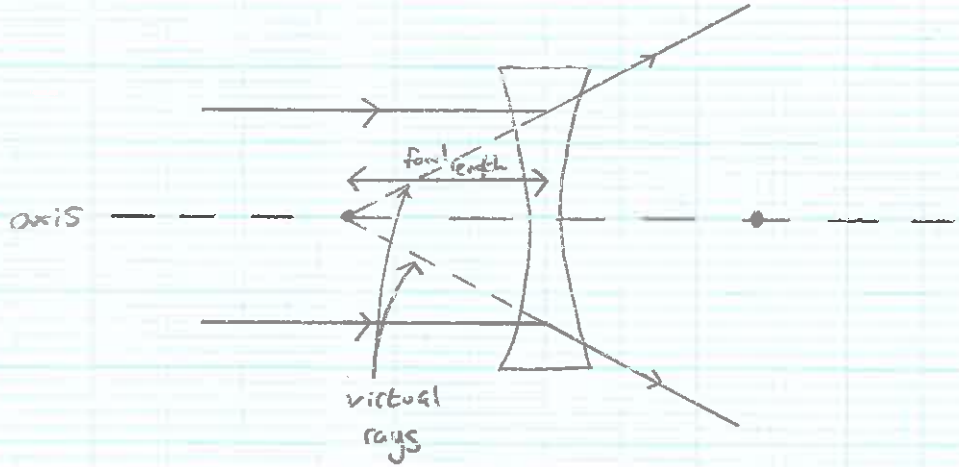


Principal focus usually shown on both sides of ray diagram...



Converging lens (convex)

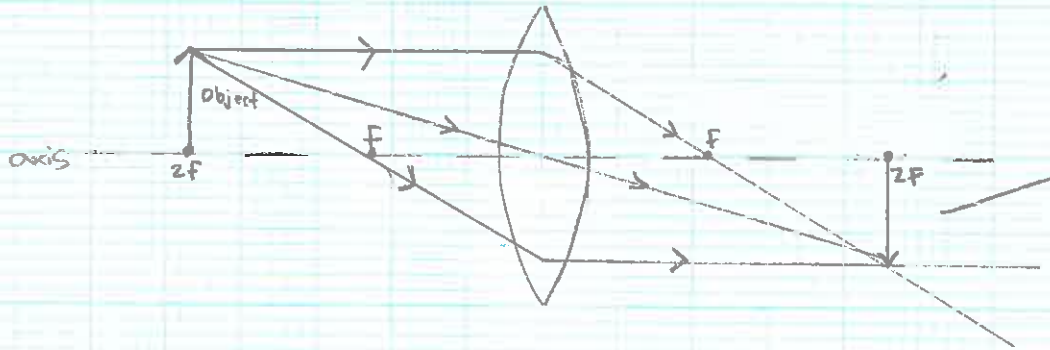




Rules

- Rays parallel to axis refract through the lens and pass through principle focus.
- An incident ray passing through the principal focus refracts through the lens and travels parallel to the axis. (think in reverse).
- An incident ray passing through the centre of the lens carries on in same direction.
- An incident ray parallel to the axis refracts through the lens, and travels in line with the principal focus. (Looks like it has come from the principal focus)
- An incident ray that passes through the lens towards the principal focus refracts through the lens and travels parallel to the axis (think in reverse!)
- An incident ray passing through the centre of the lens carries on in the same direction

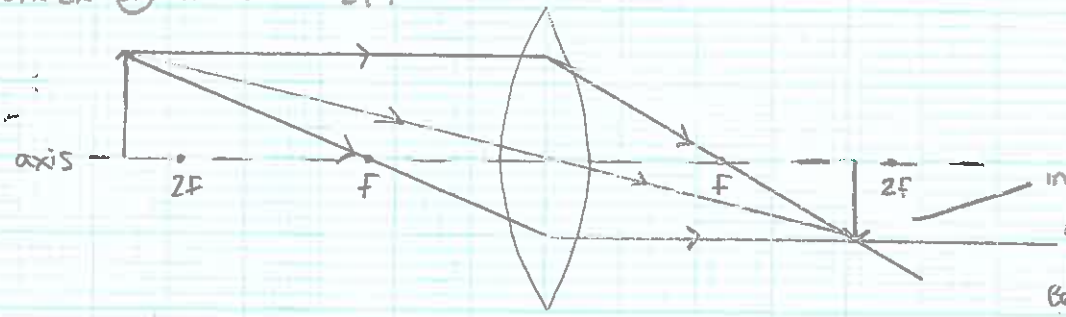
Convex @ 2F.



inverted real image → Light is converging on this point.

Same size

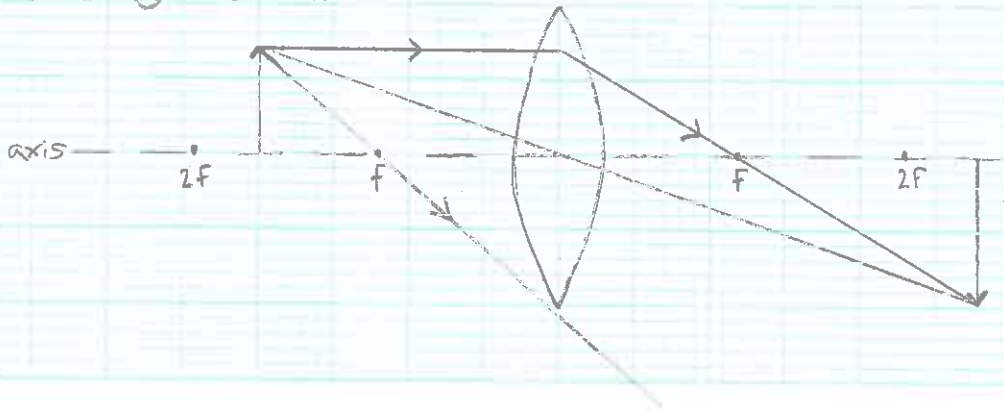
Convex @ more than 2F.



inverted real image — smaller in size!!

Before 2F

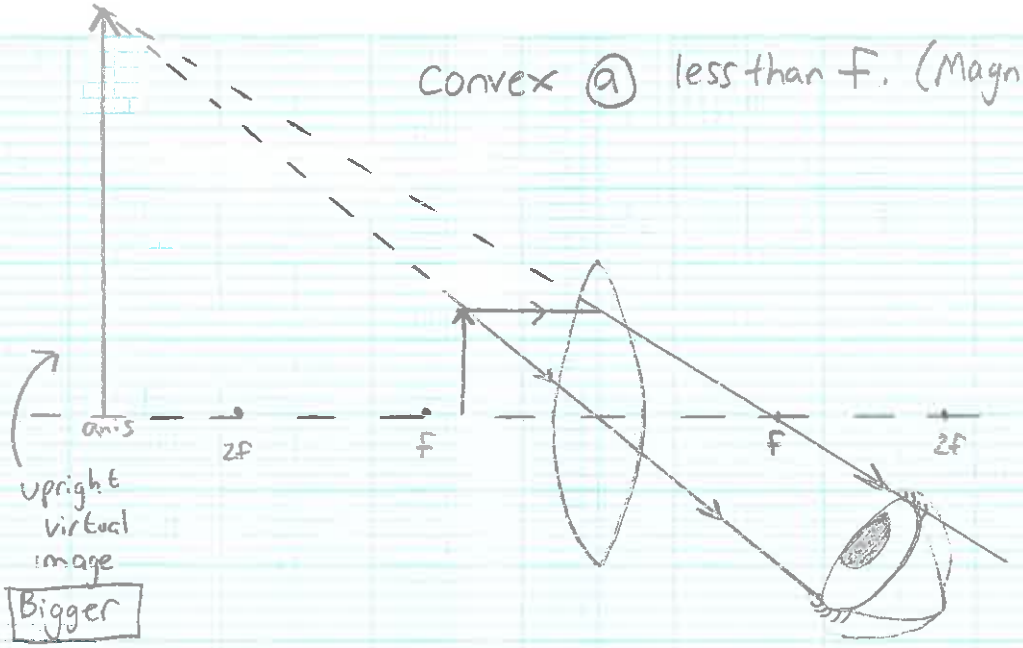
Convex @ less than 2F



inverted real image — Larger in size!!

Beyond 2F

Convex @ less than f. (Magnifying glass)



upright virtual image

Bigger

Concave lens - image always smaller no matter where.