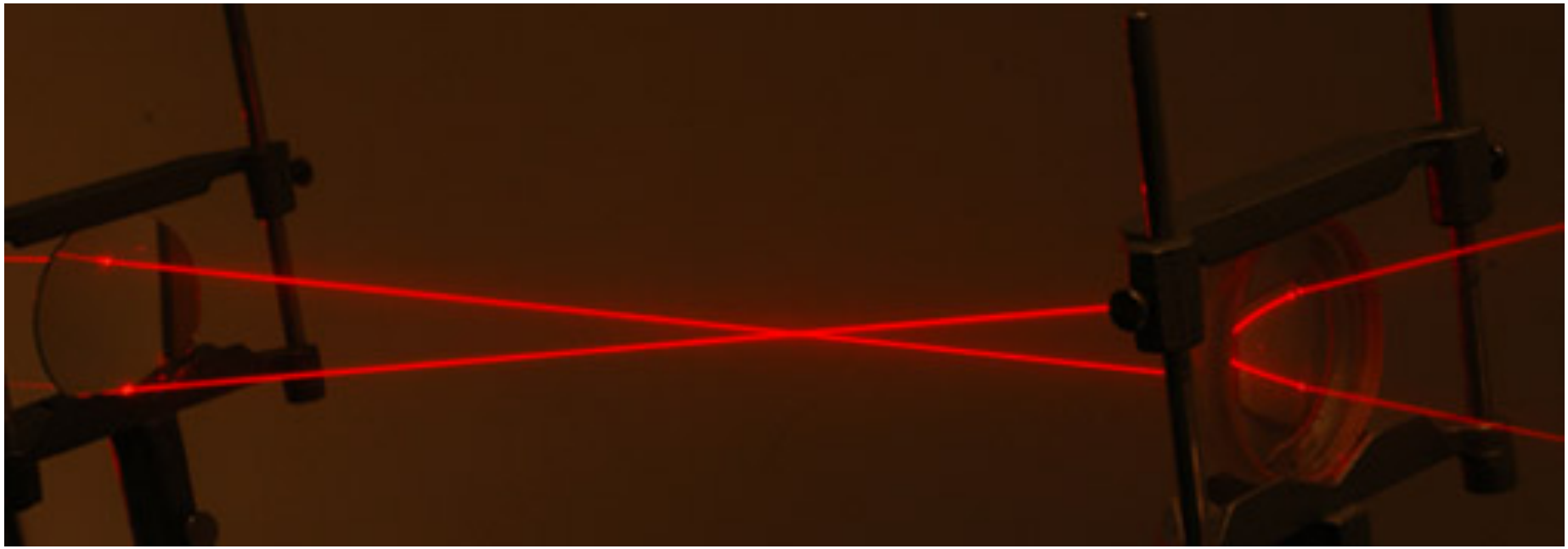
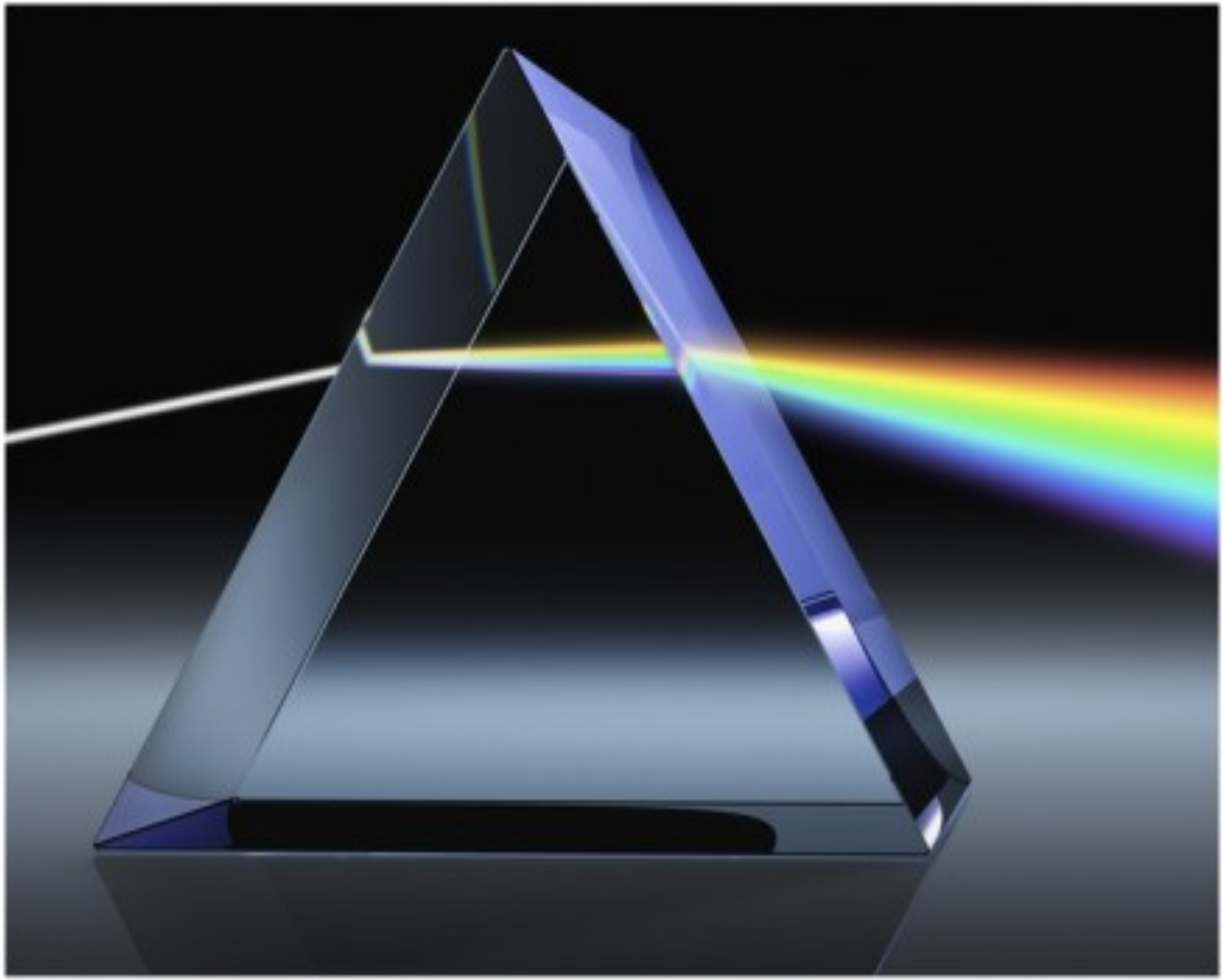
THE LENS

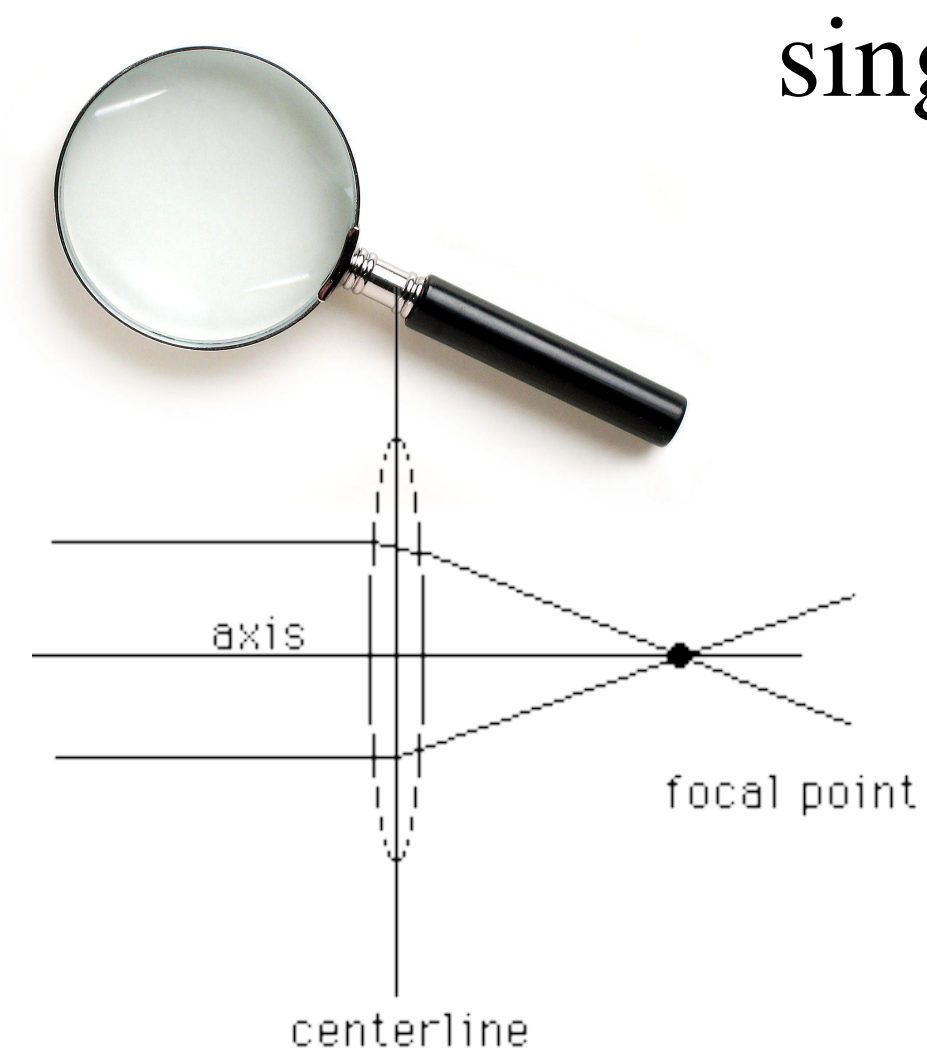
FILMP/MEDP 160 • LEC 03 FALL 2012

Laser light shows how lens bends or REFRACTS…



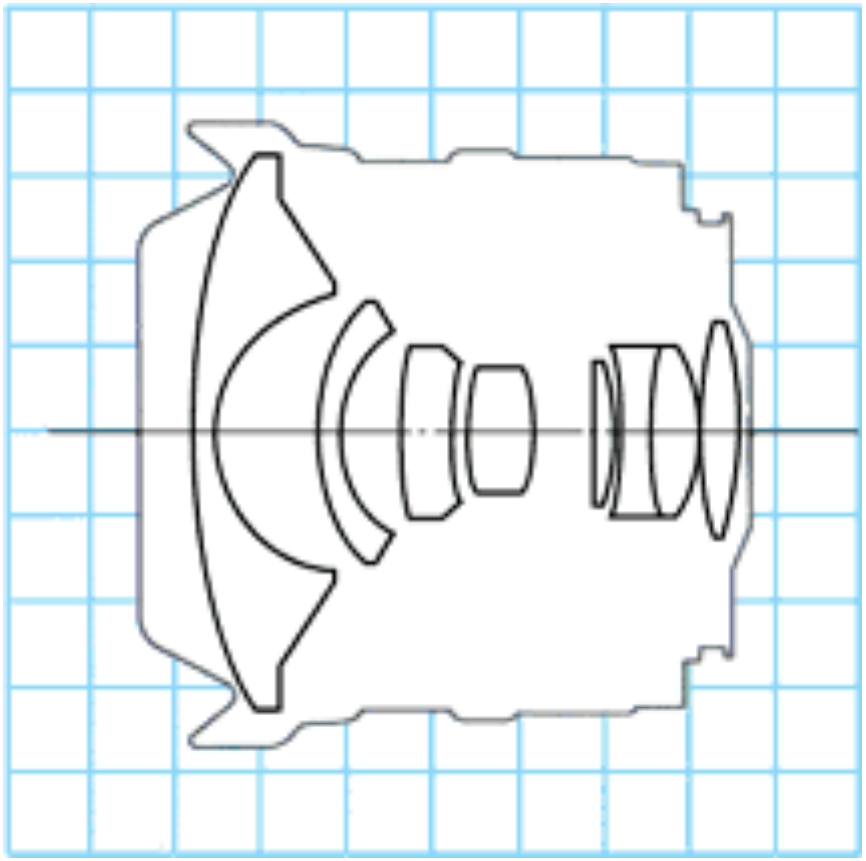


Simple lens = single glass

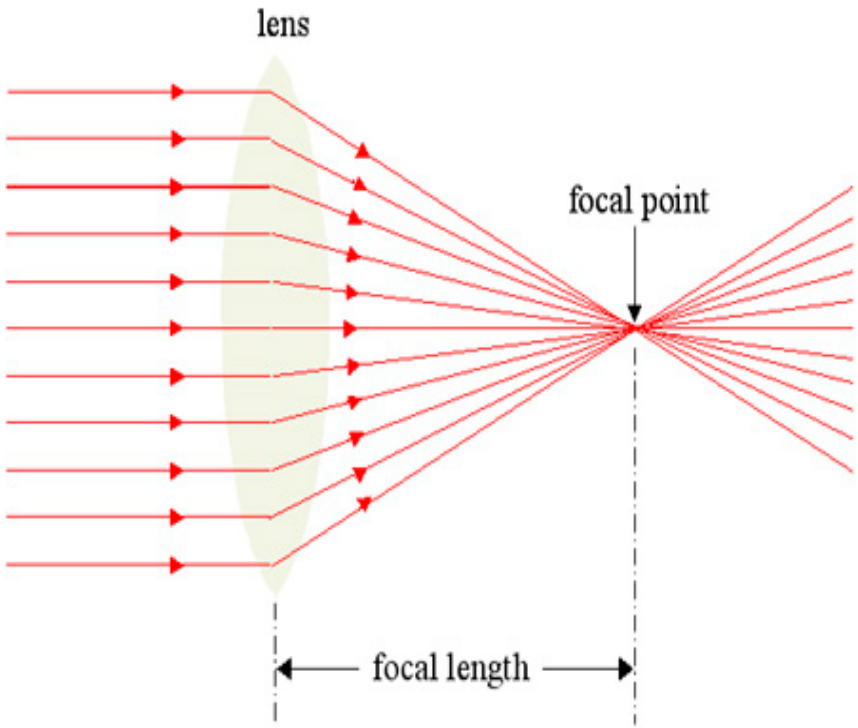


This is a simple CONVEX lens
It bulges out, and has the effect of making light CONVERGE

A *compound lens* is made of multiple ELEMENTS



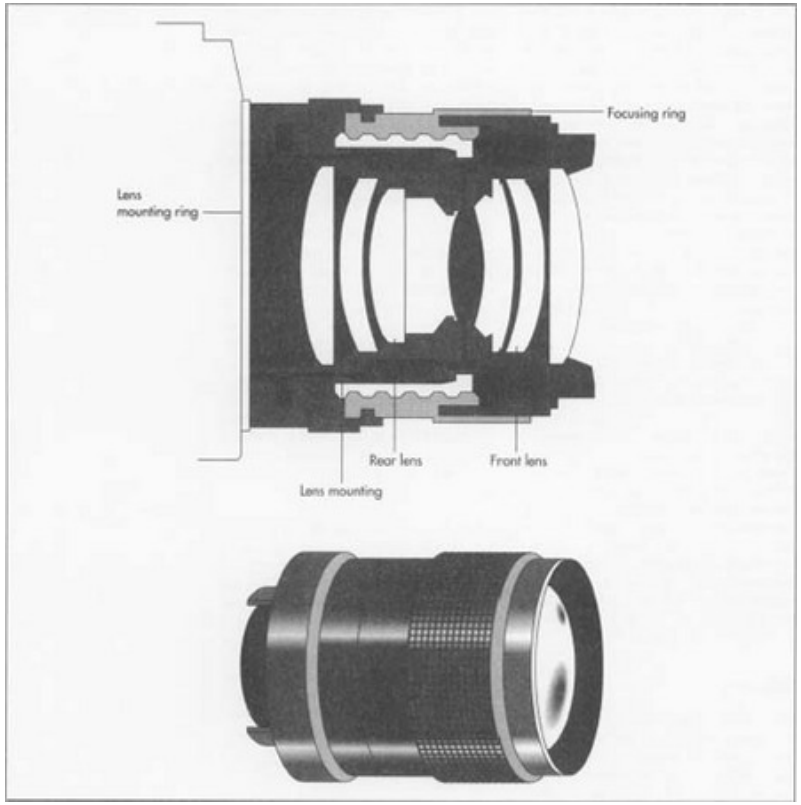
Focal length



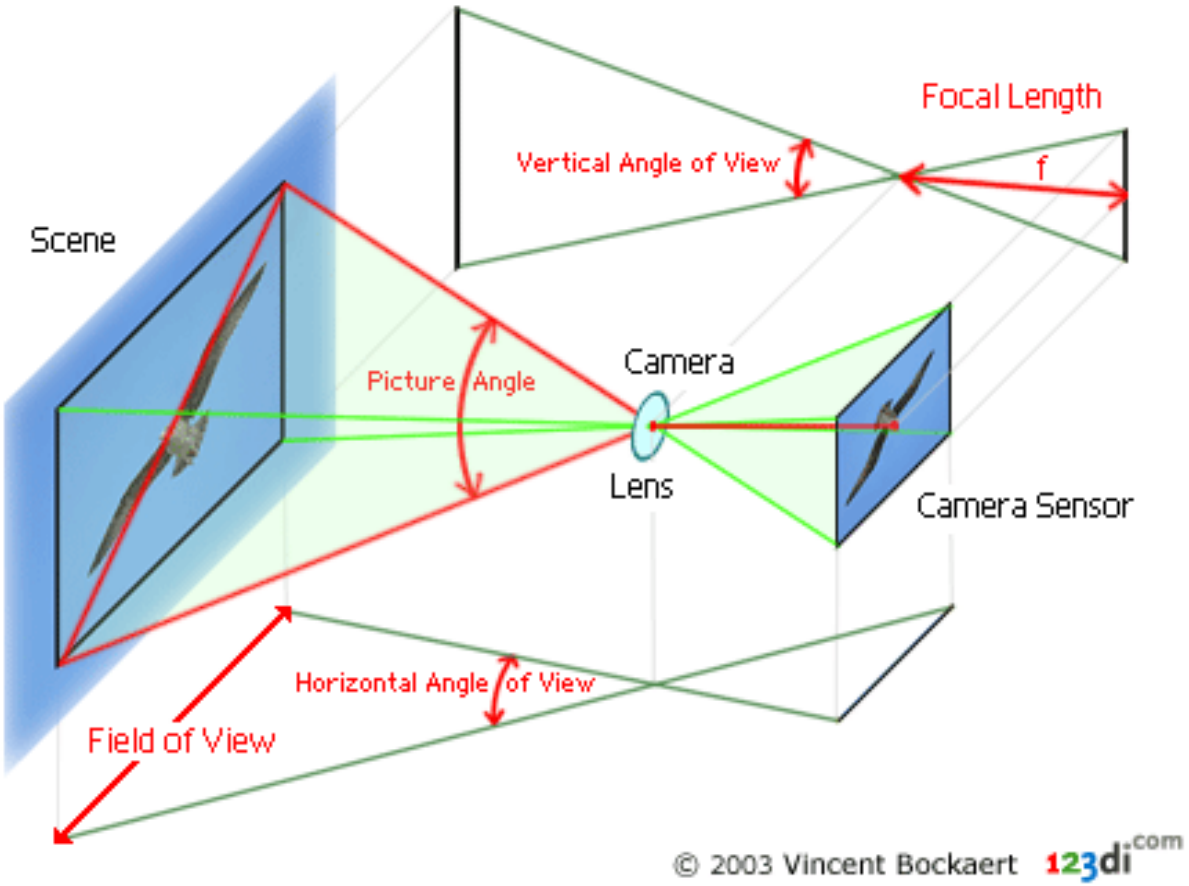
- A key aspect of any lens is its FOCAL LENGTH, the distance between its OPTICAL CENTER and the FOCAL POINT where rays of light from infinity converge.

A lens is known by its focal length

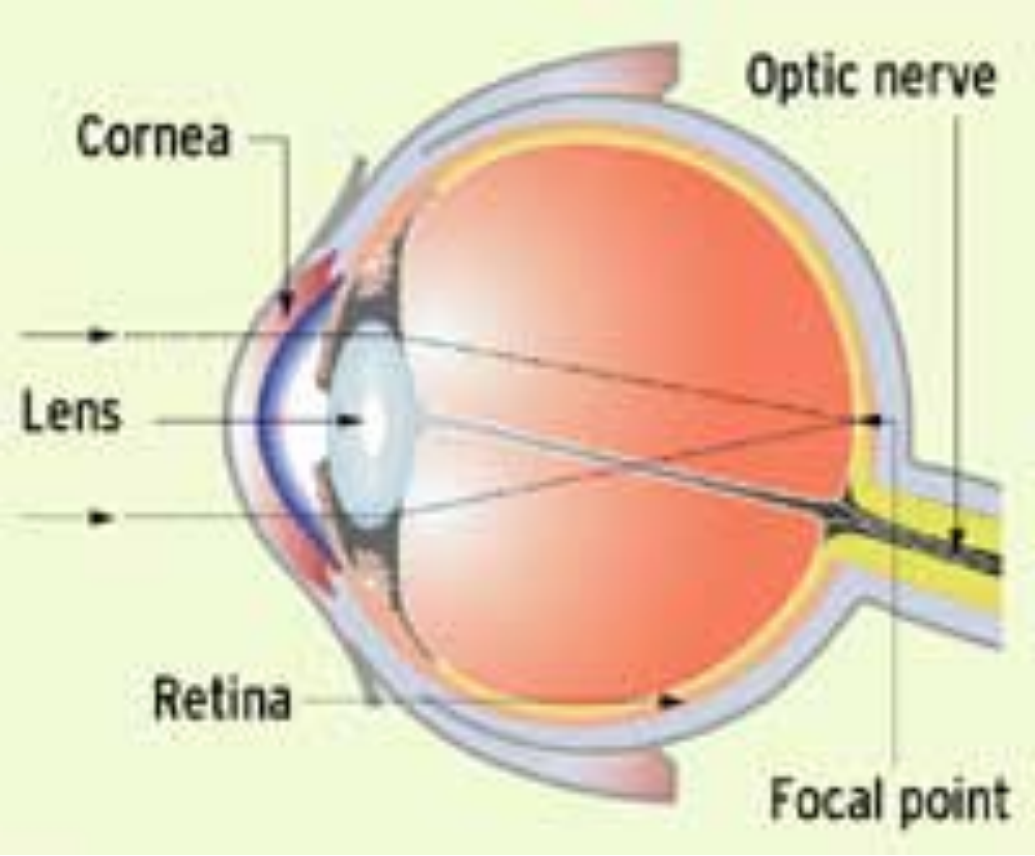
- A wide angle lens on a 35mm camera might be a 25 millimeter focal length lens. A telephoto lens might be 100mm or 200 mm.
- On a 16mm camera, cut these numbers in half.



Angle of View depends on FOCAL LENGTH



Fixed focal length…but autofocus



A *fixed* focal length lens is called a *prime* lens in filmmaking

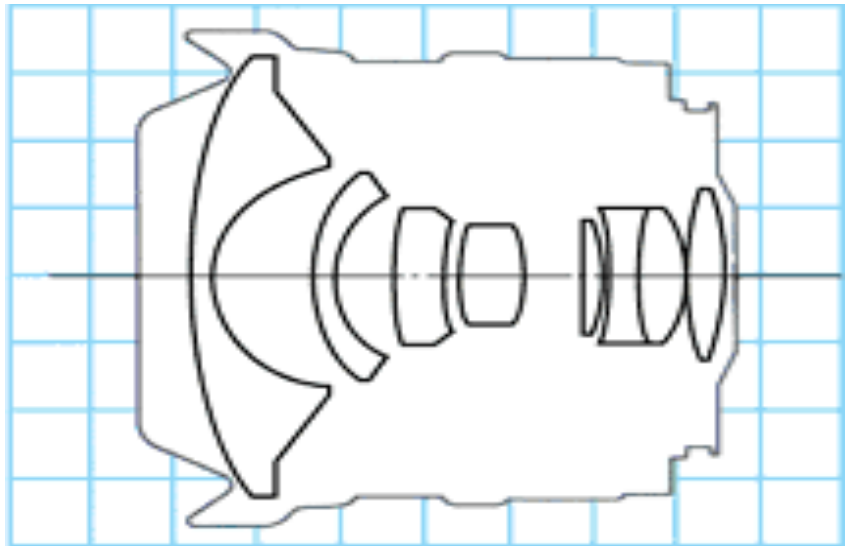
Telephoto (50mm)

Normal (25mm)

Wide (12mm)

Arri S
With
3 Primes

Zoom lenses have *multiple* focal lengths, typically from wide to telephoto.



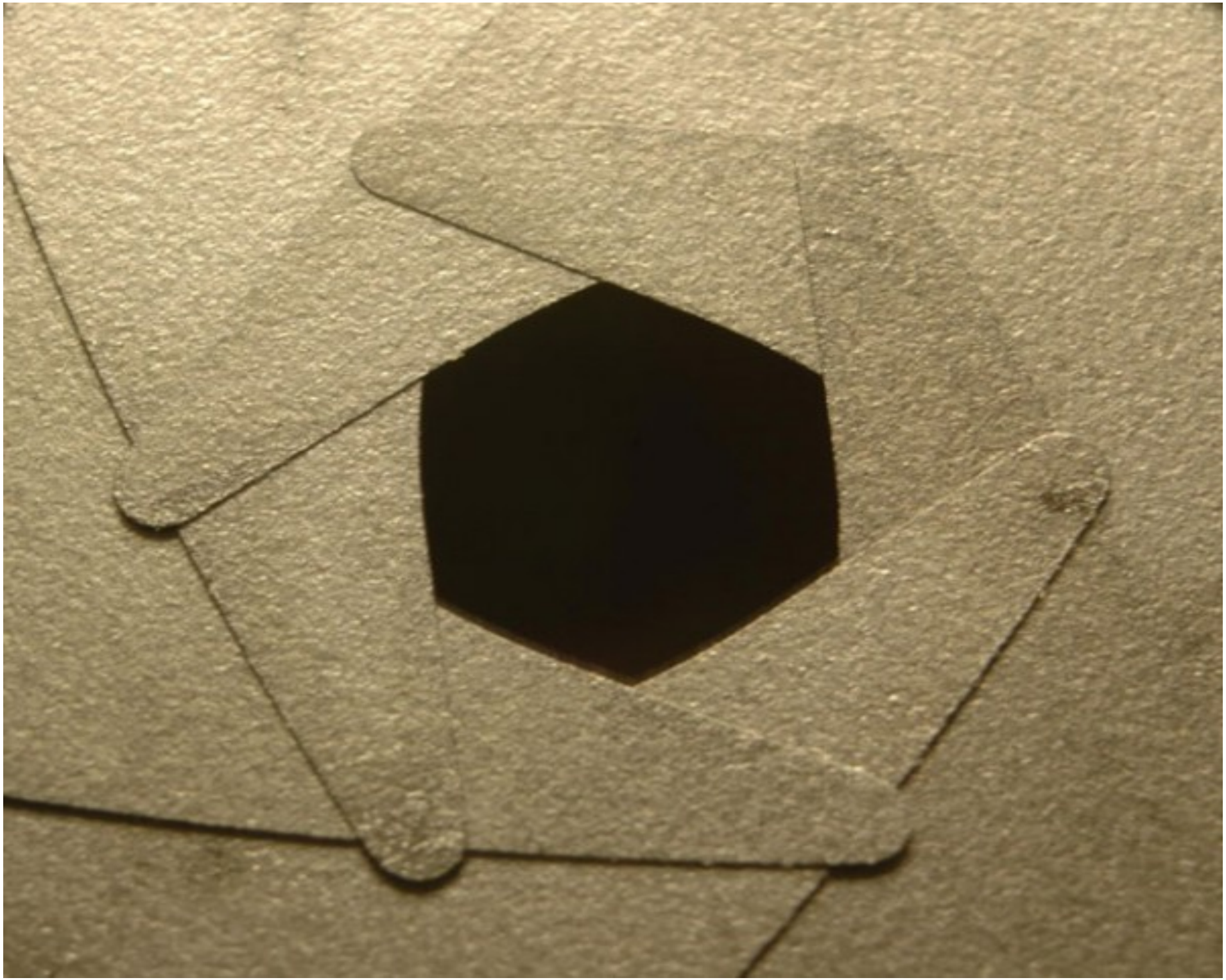
Fixed vs. Variable Focal Length

- Fixed = ‘prime’
- Usually better optical quality
- Usually ‘faster’ i.e. lower *f*-stop

- Variable =zoom
- More flexible for spontaneous shooting.
- Usually ‘slower’ i.e. higher *f*-stop
- Can push in/pull out on a shot.

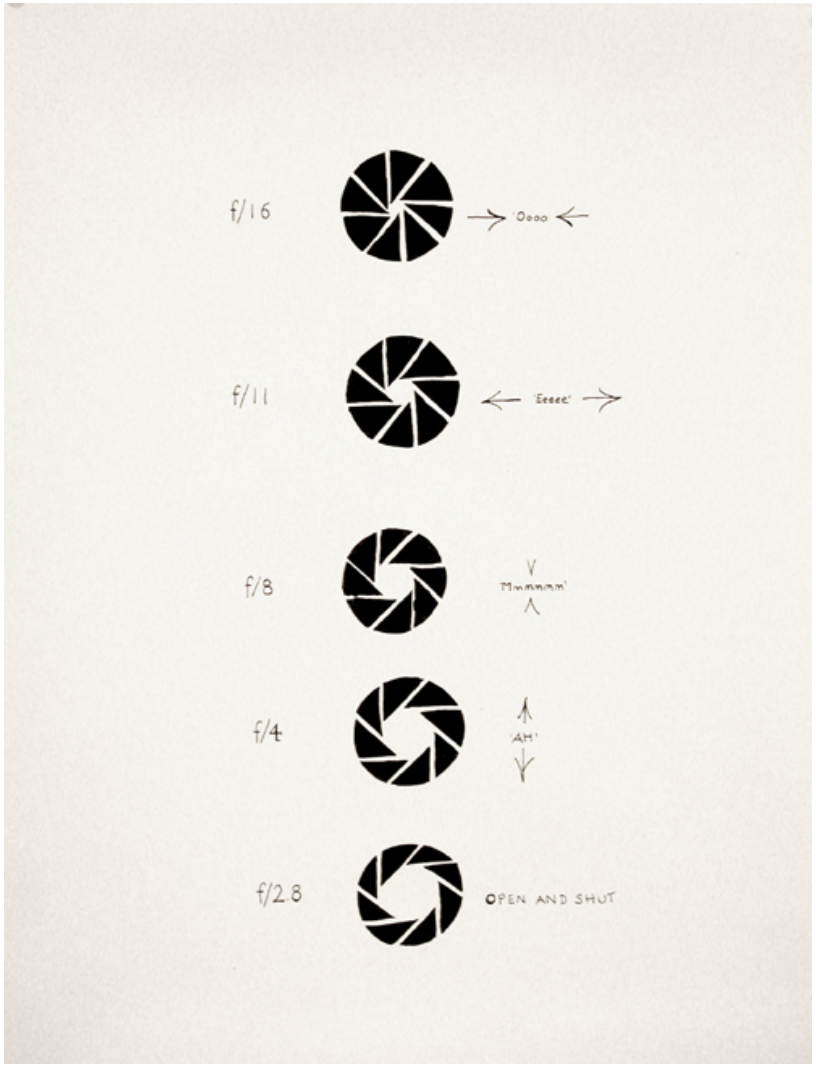
Exposure Control

- The amount of light entering the lens is controlled by the *iris*.



The *f*-Stop

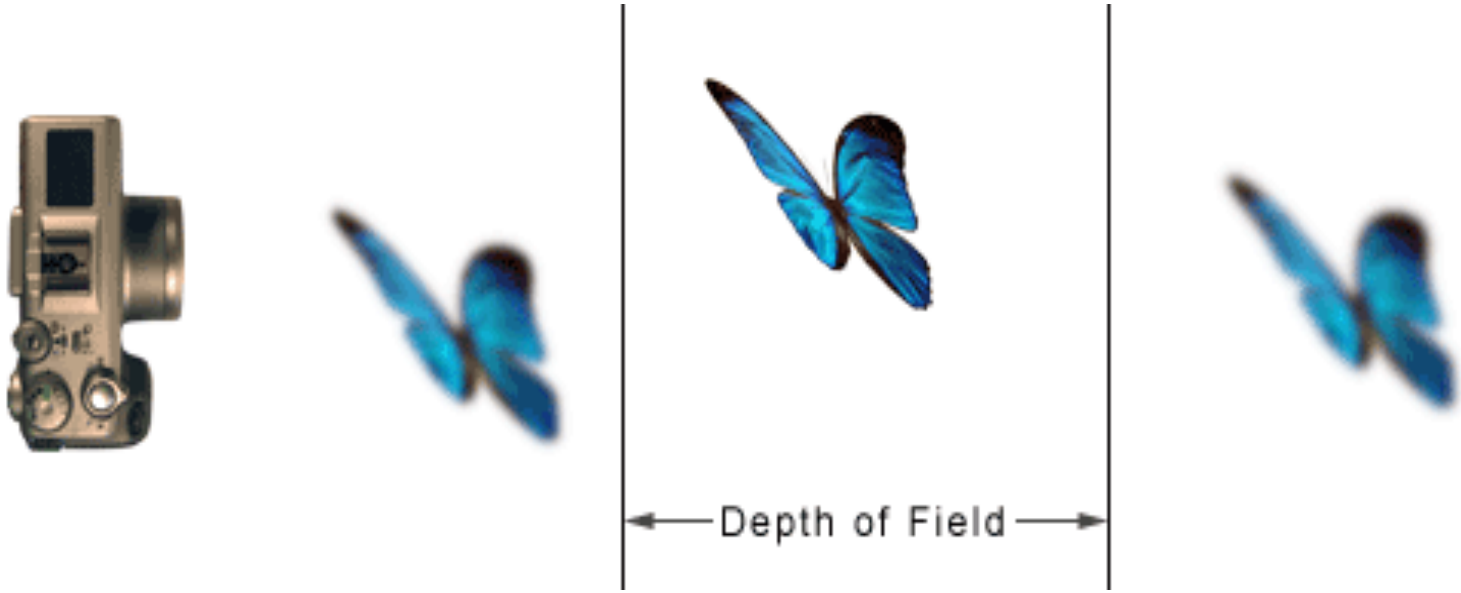
- The *f* stop is a *ratio* between the diameter of the iris opening and the focal length of the lens.
- Each change in *f*-stop means doubling or halving the light. *f*/8 gives you twice the light of *f*/11.



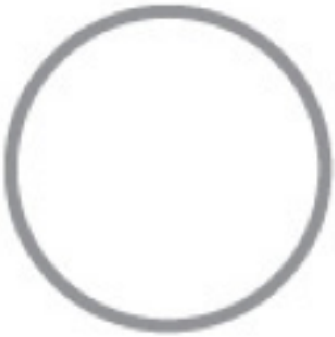
What's in an *f*-stop?

- A lens with a low *f*-stop like *f*/2 or *f*/1.4 lets in more light and is typically more expensive.
- The *f* stop number is *COUNTER-INTUITIVE*.
- A **low** number, like *f*/2.0 means the lens is 'wide open', letting in a lot of light, while a **high** number like *f*/16 means only a tiny pinhole is letting light through.

Depth of Field



Telephoto lenses have a shallow or narrow depth of field,
While wide-angle lenses have a broad depth of field.



f2.8

more light

f5.6

f8.0

f11

less light

Narrow

Wide

Why is Depth of Field affected by the f stop?

- f/32

F/2.8

Depth of Field in exterior

Depth of field
In an Interior
as
Jean Harlow
Takes the forground.

Deep focus and shallow field