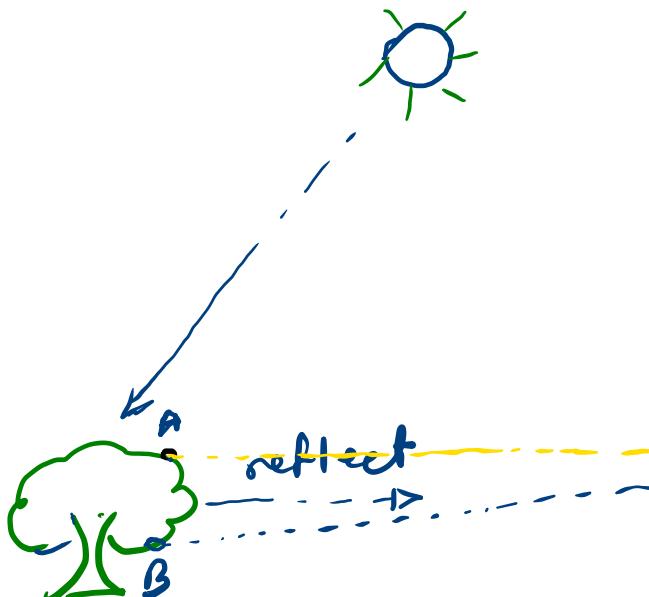


Image Formation

newton's

(optics, lens)

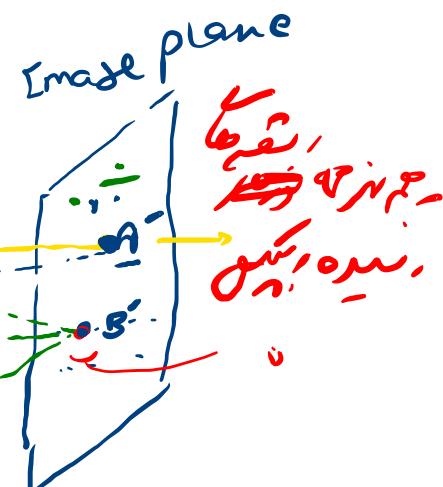
light source.



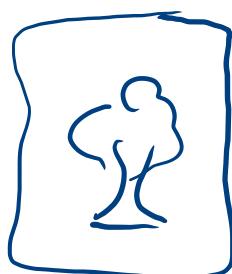
زطه

لصورة تارو لور !

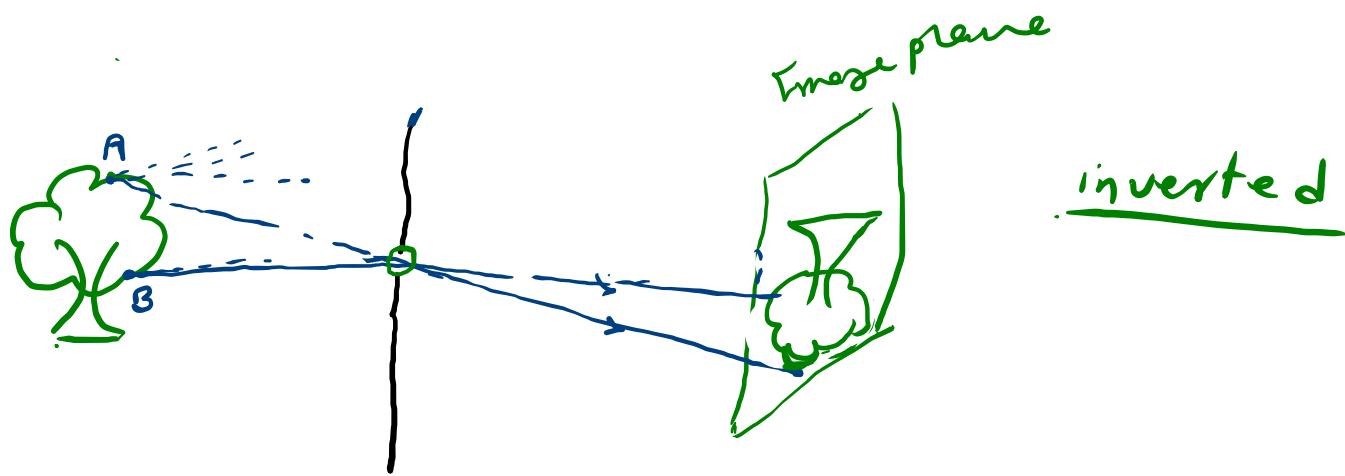
Film - Image sensor arrays.



لصورة تارو لور
لصورة تارو لور!



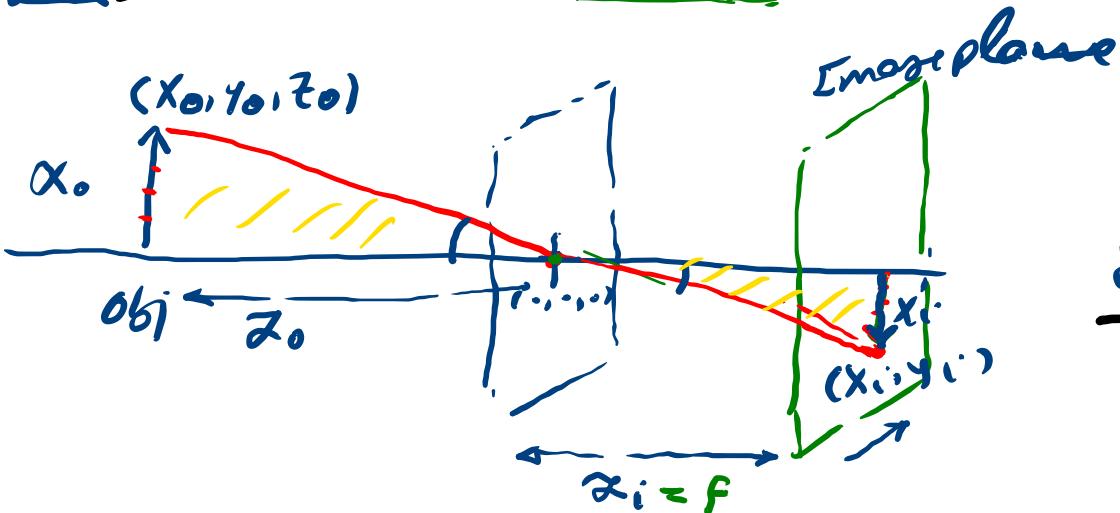
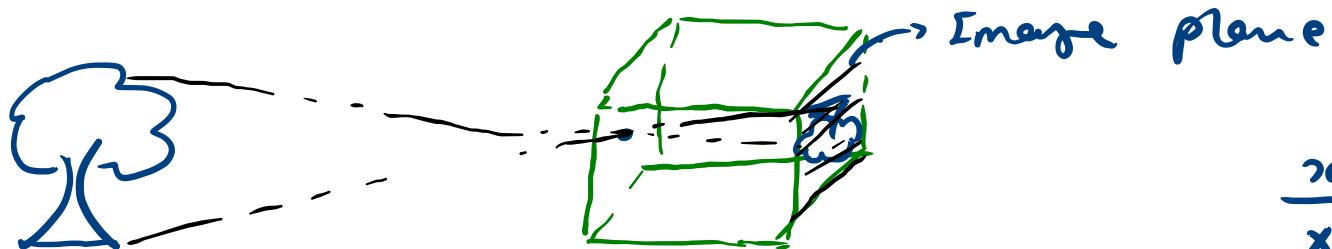
دستگاه
که نور را
۰٪
رد نمایند
نیز
میتوانند



هر آن دو اثر نزاعم دایمی در لعنت صور میدهند

استفاده کنیم!
pinhole

pinhole camera

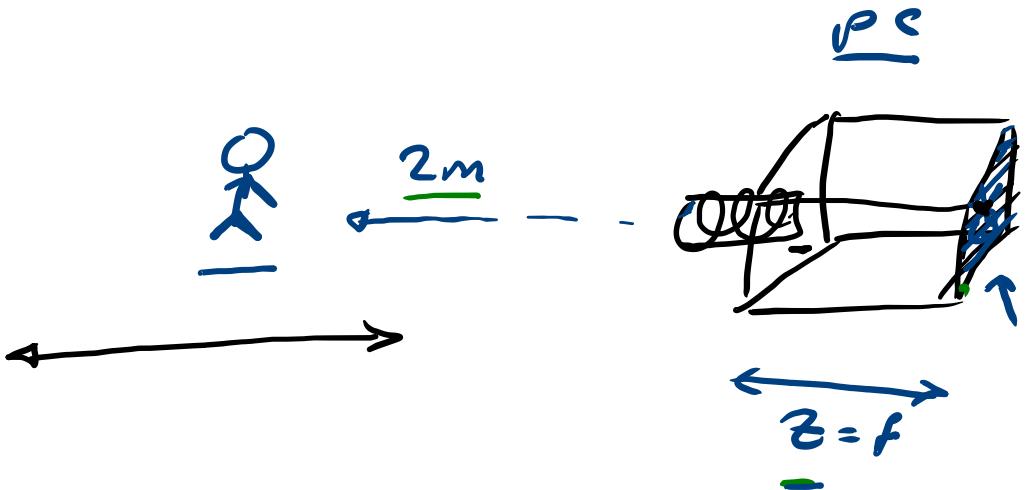


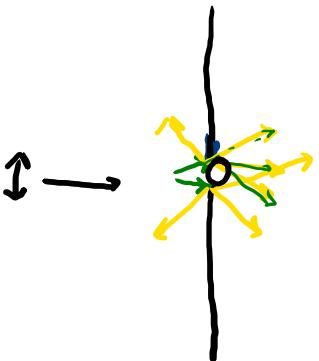
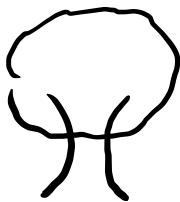
$$\frac{x_i}{x_0} = \frac{x_i}{z_0}$$

$$\frac{x_i}{z_0} = f \frac{x_0}{z_0}$$

$$y_i = f \frac{y_0}{z_0}$$

f : Focal length





pinhole camera

میکرو هدایت شده!

میکرو هدایت شده!

کامپکت کوچک و روزمره

diffraction

pinhole camera
میکرو هدایت شده!



2 mm

1 mm



0.6 mm



0.35 mm



0.15 mm



0.07 mm

نفع کریم!



pc

درجه
-

α

دی تکریبی از مقادیر؟

NO



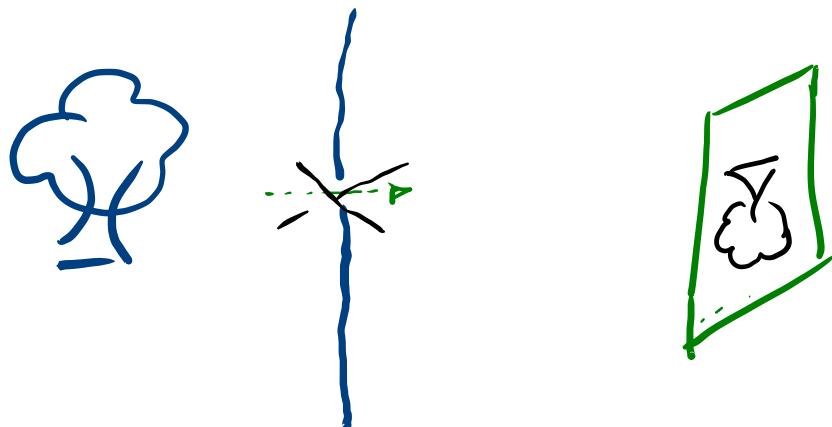


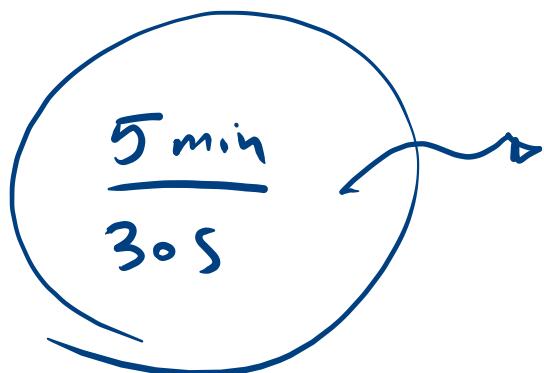
image. ~~جیسا کہ~~ جیسا کہ پس سے pinhole
camera میں

pinhole camera → عدم صوره کافی از تغییرات

pc → high rate

که نظریه ایان لئو برادری (لئو براون)

pc → IF



کسر بازرسی

سریع بازرسی

pinhole camera

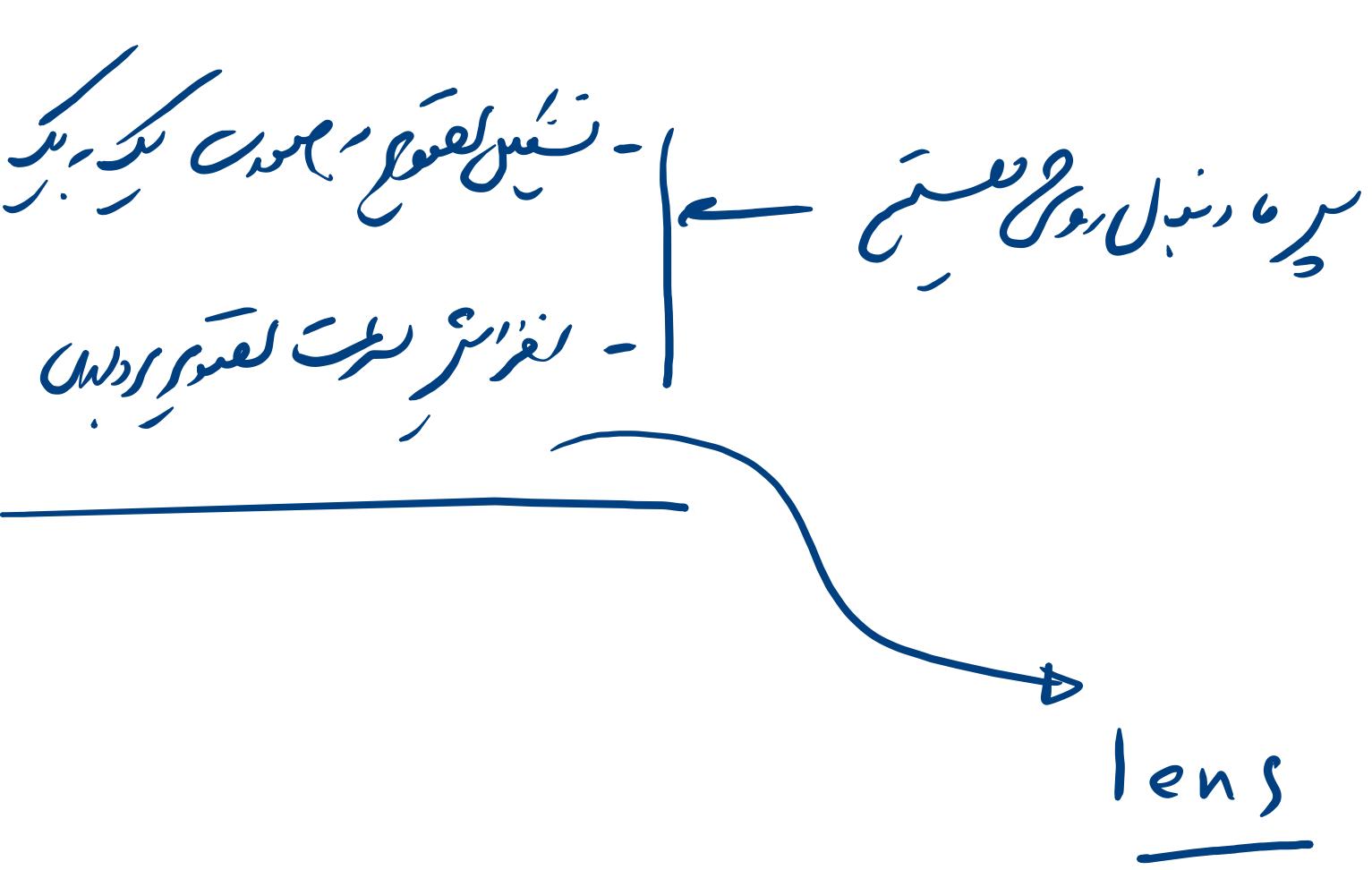
reason

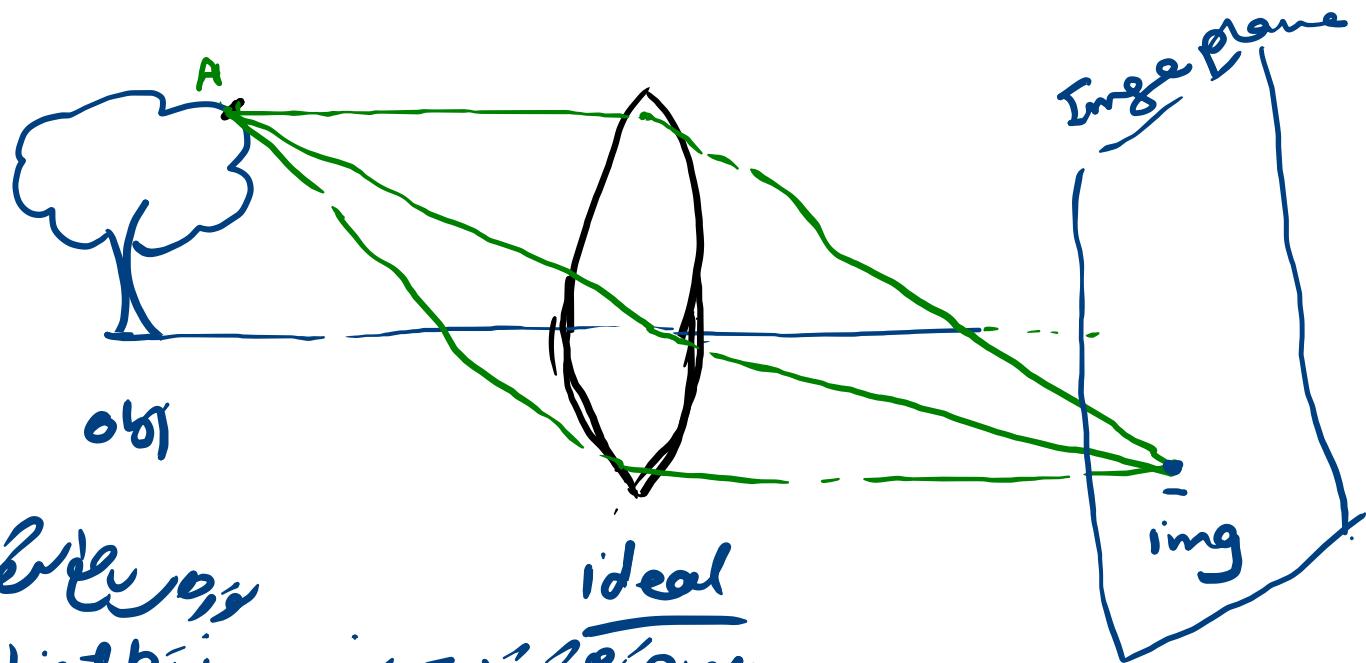
صُورِيَّةِ لِذِكْرِ رُوْحِ مَفْهُومِ

ازْمَانِيَّةِ إِسْبَاغِ

↳ افْتَرِيزَةِ نَسْخَةِ صَوْرٍ

problem





ویرایش از

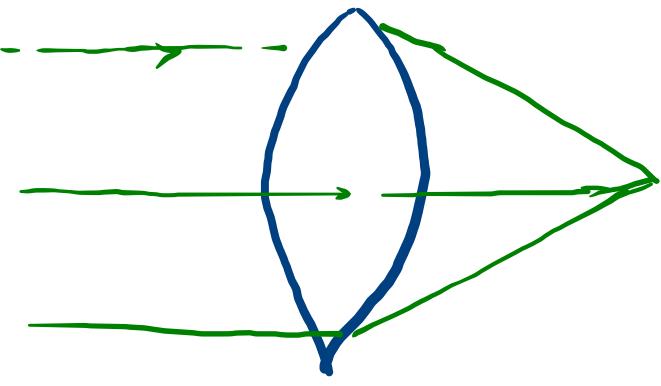
object blue نماینده معرفه کن

که در پر لغزه را داشت.

که داشت.

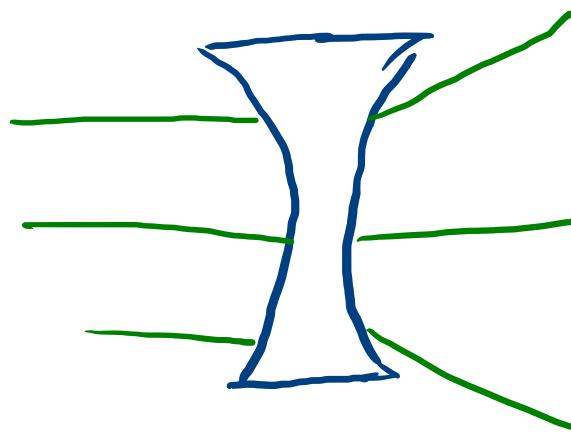
حُبْرٌ

Convex

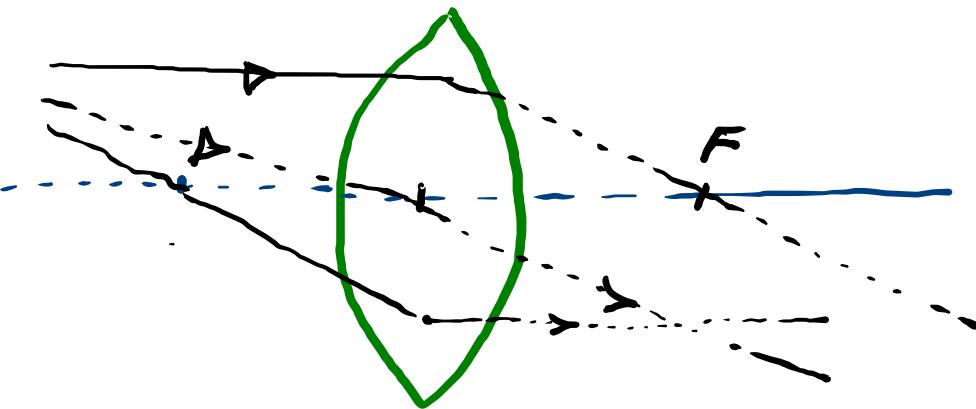


حُبْرٌ

Concave



Convex



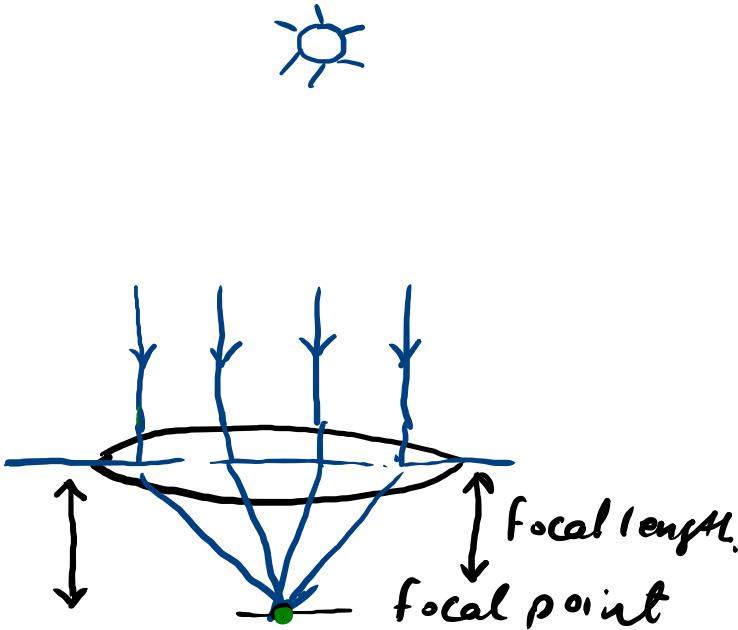
Focal length.

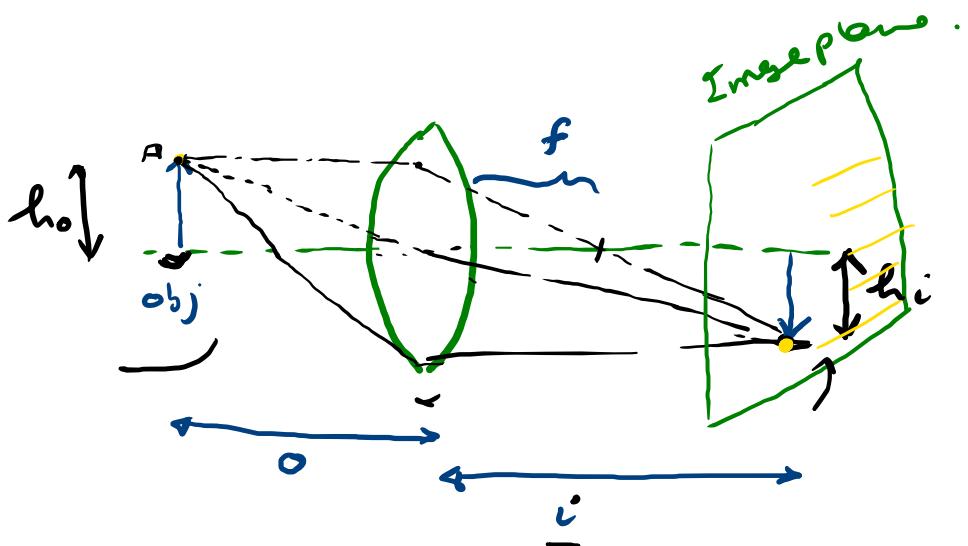
shorter focal length curve
longer curve

! Curves

Dioptric

$$\text{power , D} = \frac{1}{f}$$





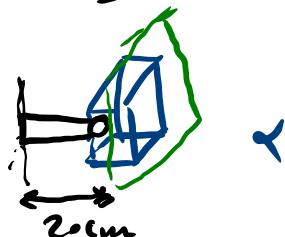
$$\frac{1}{F} = \frac{1}{i} + \frac{1}{o}$$

magnification:

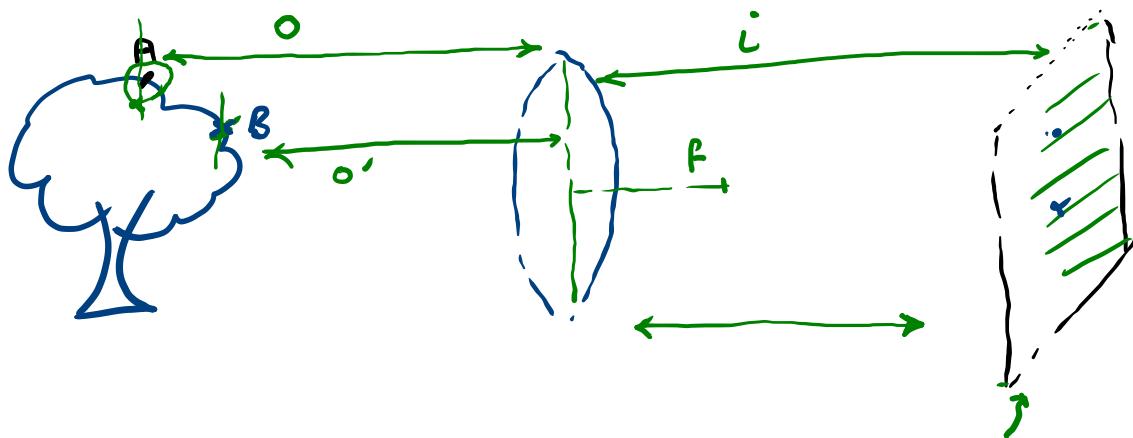
$$M = \frac{h_i}{h_o} = \frac{i}{o}$$

سیکل میں پرتوں کا سفر، O کے لئے، $M > 1$ کی وجہ سے $M = \frac{h_i}{h_o} = \frac{i}{o}$

IP : where?



$$\frac{1}{F} = \frac{1}{i} + \frac{1}{o}$$

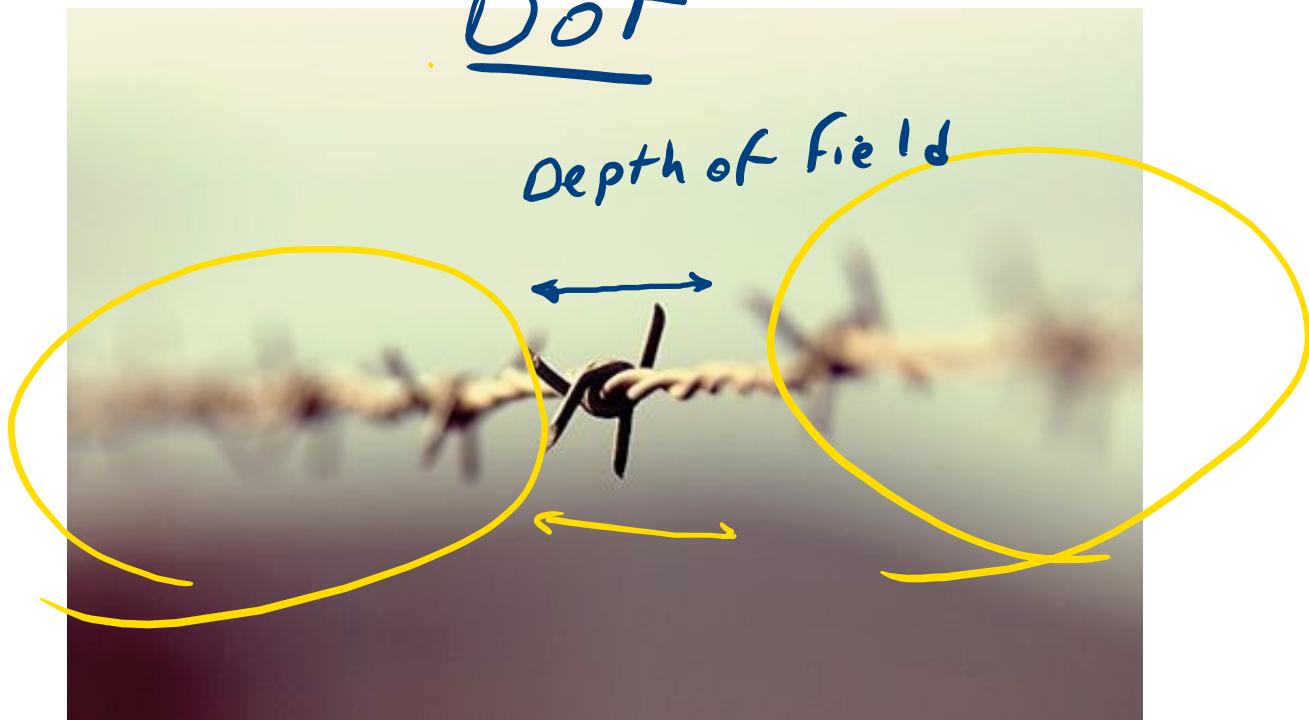


مُجَنَّب $\frac{1}{F} = \frac{1}{i} + \frac{1}{o}$ صِيقْ مَا هَذِبْ A -نَطْحِ سُوَابْ، لَعْظَى B -

Lens \rightarrow جَزْرٌ \rightarrow سُقْرَ السَّقْدَارِ!

Dof

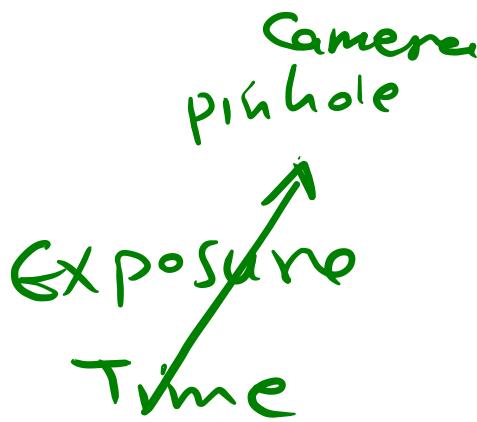
Depth of Field



کامپیوٹر، ابتوں کی دنیا میں
objects

lens پر چھپا جائے

camera pinhole

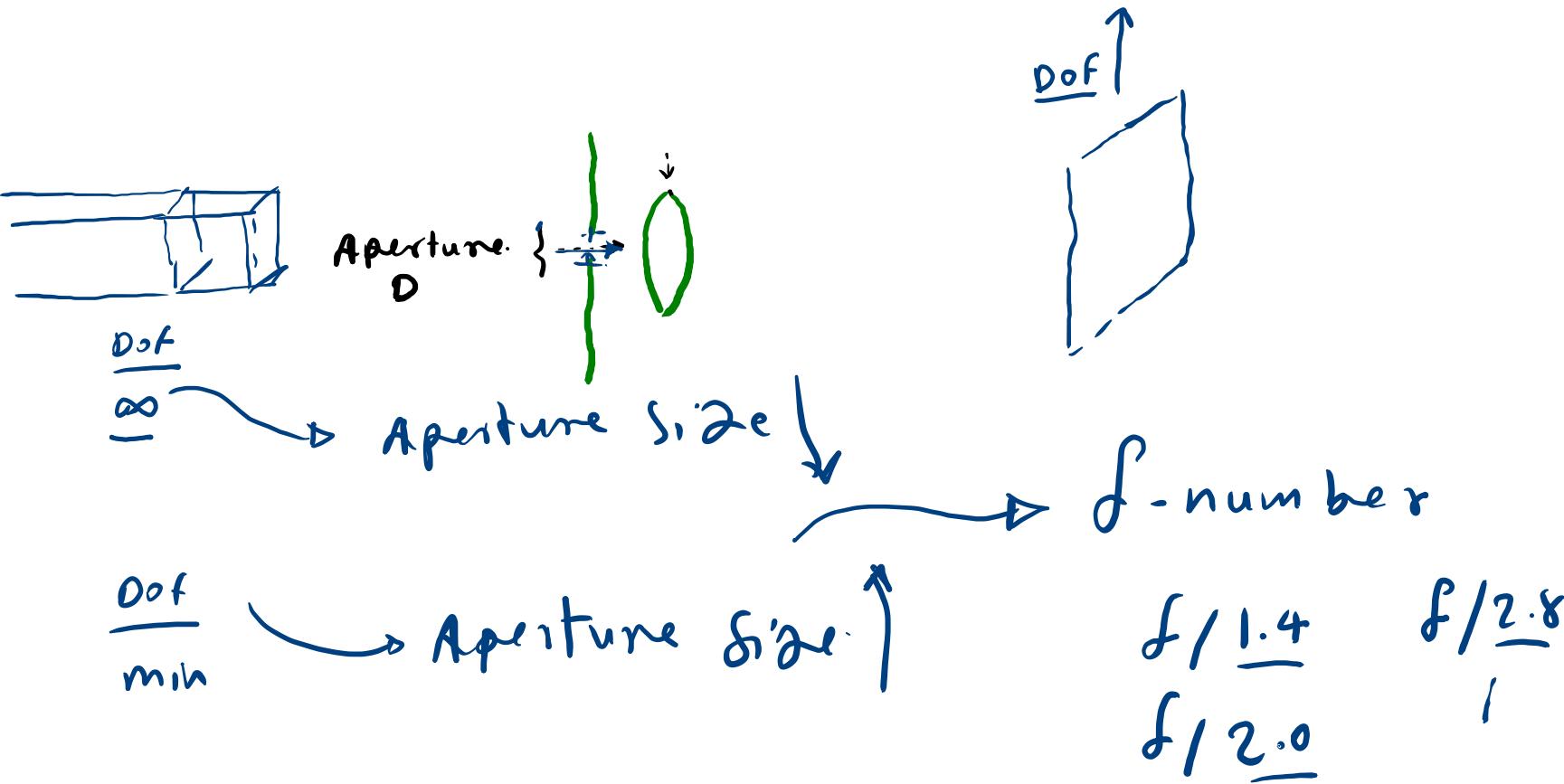


pinhole + lens α

۱. لرکه مزدوج لعصر دسته بشهی.

۲. ۰.۵ دوین مایکرول بجه!

۳. هیچ کلم لعصر باید!



Aperture Diameter = F

Dof



D: f/16



f/11



f/8



f/5,6



f/4



f/2,8



f/2



f/1,4
 $1,4 \times \sqrt{2}$

1,4

2

.

16

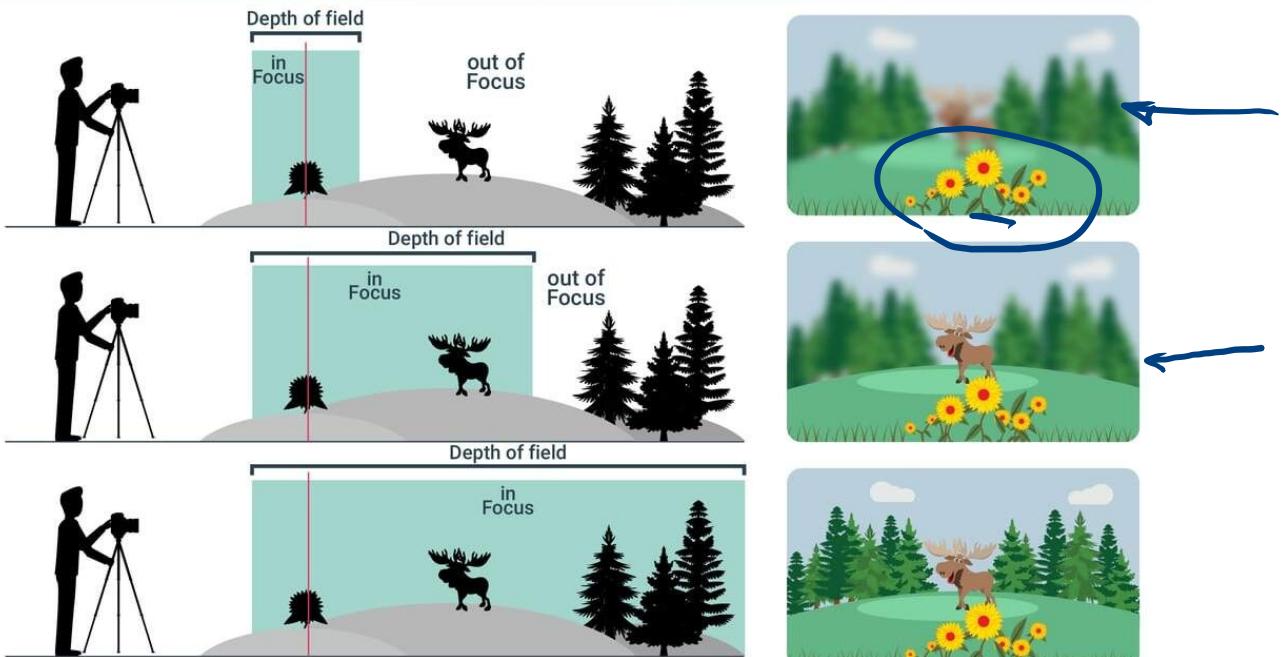
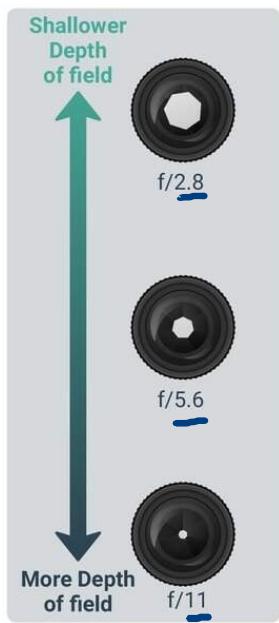
Focal
length

F-number

Aperture
objektiv



DEPTH OF FIELD



Dotf = ∞

pinhole
AP-D : min

O
↓

Exposure
time



$f/22$

$\text{DoF} : \infty$



End

Exercises 15

Optics (700)

1. An engineer wishes to image an object $0.01m$ in height that is 0.20m in front of a lens and have its image appear on a screen 0.40m behind the lens. What focal length lens should they use? How large will the image be?

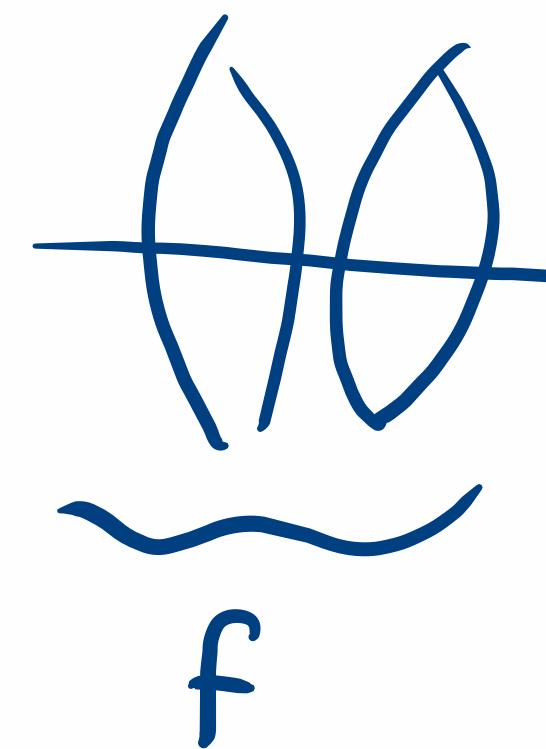


image size

2. The engineer now wants to image another different object onto a CCD camera. The pixel pitch of the camera is $10\mu m$ and it has 512×512 pixels. If the object is $0.75m$ in height and $4m$ away from the lens what focal length lens should they use to ensure the object fills 90% of field of view?

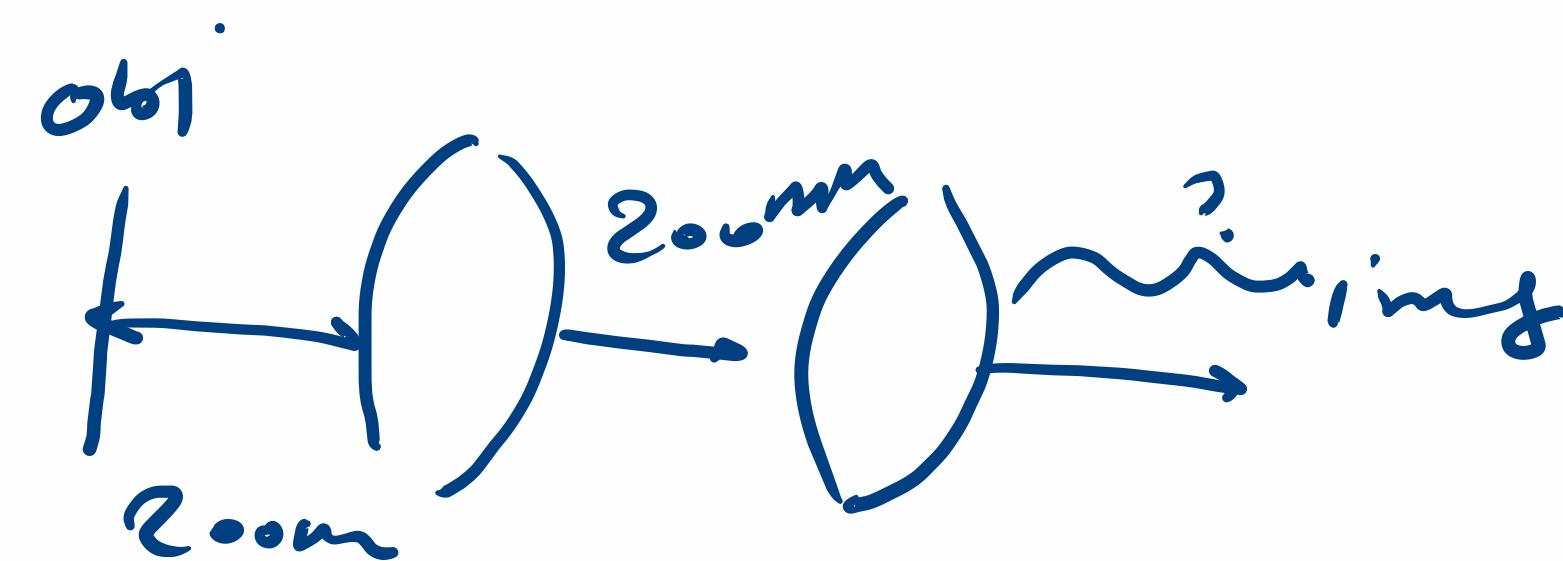
X

3. If two lenses are placed next to each other and the first has a power of 40 diaopters and the second has a power of 10 diaopters. What is the focal length of the system?



$$D = \frac{1}{F}$$

4. An optical system consists of two lenses. The first has a focal length of 60mm and the second has a focal length of 70mm. If they are separated by 200mm find the position of the image after the second lens if the object is placed 200mm in front of the first lens.



صيغة الصورة

