The Field In My Garden

(Depth of Field Close Up)

Why this subject?

f7.1 100mm APS

f8 100mm APS

f14 100mm APS

Old lenses often included a scale that showed linked f-number to the nearest and furthest distance that would be “in focus”

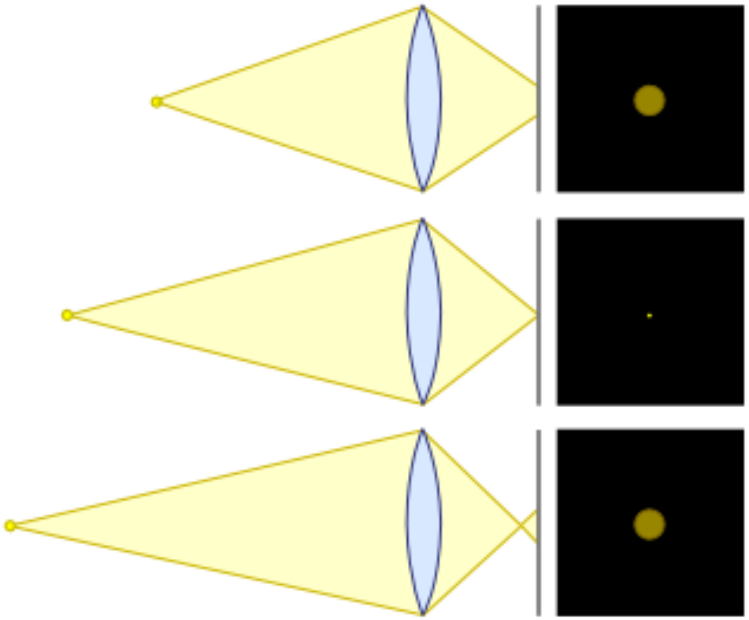
i.e. the depth of field.

In this example with the lens set at 50mm and f8, and the focus point at 0.61m, the near and far points in focus are approximately 0.59m and 0.63m. Increasing the f-number to f22 would change the near and far points to approximately 0.53m and 0.72m.

However, new lenses don’t include this helpful feature….

Depth of Field:– an equation from Wikipedia

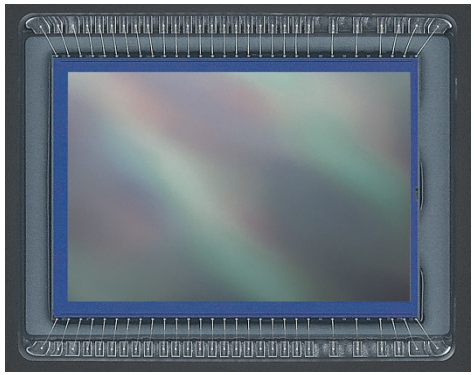
Back to basics: circle of confusion



The depth of field is the region where the CoC is less than the resolution of the human eye (or the display medium).

This is often taken as 5 lines per mm.

Based on a 30cm (across corners) print, at 25cm viewing distance this gives the following:



4/3rds sensor 0.015

APS sensor 0.018 / 0.019

35mm sensor 0.029

$$DOF = \frac{2\,N\,c\,f^2\,s^2}{f^4 - N^2\,c^2\,s^2}$$

where

- f focal length of the lens (mm)
- N f-Number
- s subject distance (mm)
- c circle of confusion (mm)

Examples: f=35 N=11 s=300 c=0.02

DOF = 32mm

Changing the lens from 35mm to f=100mm

DOF = 4mm

doubling the aperture from 11 to N=22

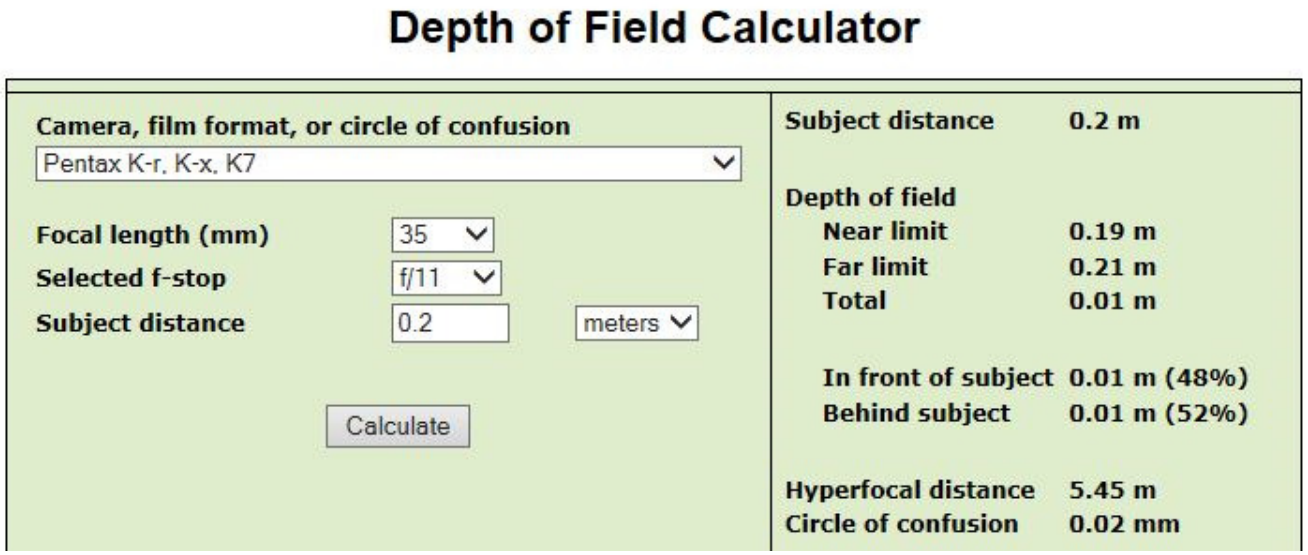
DOF = 8mm

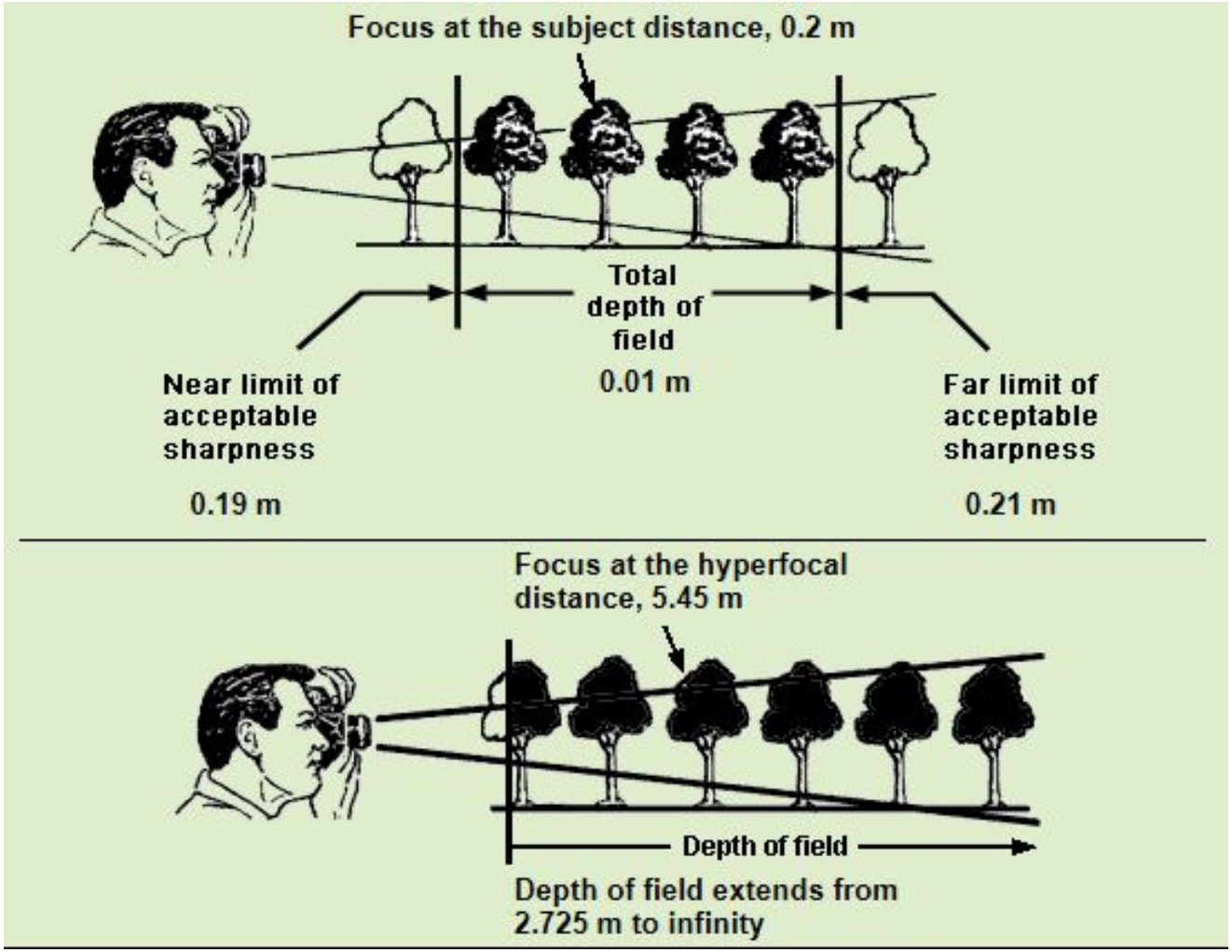
Equivalent DOF for different sensors using aperture:

4/3rds sensor	f1.9
APS sensor	f2.8
35mm sensor	f4

No maths required – a depth of field calculator can be put on your phone/computer……..

2 examples

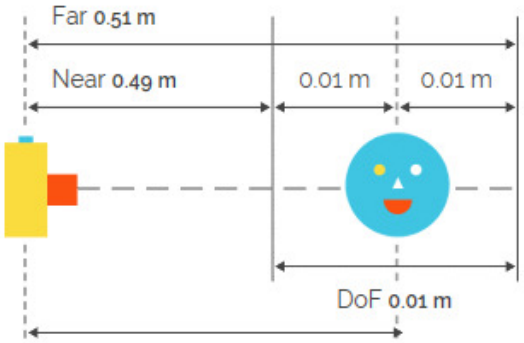


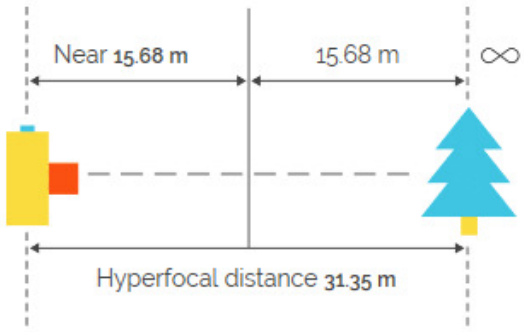

Focus at the subject distance, 0.2 m
Total depth of field
0.01 m
Near limit of acceptable sharpness
0.19 m
Far limit of acceptable sharpness
0.21 m
Focus at the hyperfocal distance, 5.45 m
Depth of field
Depth of field extends from 2.725 m to infinity

DEPTH OF FIELD (DOF) CALCULATOR

Camera	Pentax K-7, K-5 II, K-5 IIs, K-5, K-3, K-r, K-x, K-m	
Focal length	100	mm
Aperture	f/16	
Subject distance	0.5	meters
Teleconverter	--	

Hyperfocal distance	**31.35 m**
Hyperfocal near limit	**15.68 m**
DoF near limit	**0.49 m**
DoF far limit	**0.51 m**
Depth of field	**0.01 m**
Depth of field in front	**0.01 m (49.36%)**
Depth of field behind	**0.01 m (50.64%)**





MACRO DEPTH OF FIELD (DOF) CALCULATOR

Camera	Pentax K-7, K-5 II, K-5 IIs, K-5, K-3, K-r, K-x, K-m	
Focal length	100	mm
Aperture	f/16	
Aperture is already an effective f-stop	No	

Set to YES if you're using a Nikon camera. These cameras automatically correct for the effective f-stop and show it on the LCD display.

Pupil magnification	1	

When using long focal lengths, such as 105mm or 180mm, enter the pupil magnification to get more accurate results. Set it to 1 if you don't know its value.

Focusing distance	500	millimeters

Distance from the subject to the camera sensor. It must be at least 4 times grater than the focal length.

Extension tube length	0	mm

Magnification	**0.38x (1:2.6)**
Effective aperture	**f/22.1**
Depth of field	**6.06 mm**
Smallest Subject which can fill the image	**42 mm**
Safe step size for stacking (20% image overlapping)	**4.85 mm**