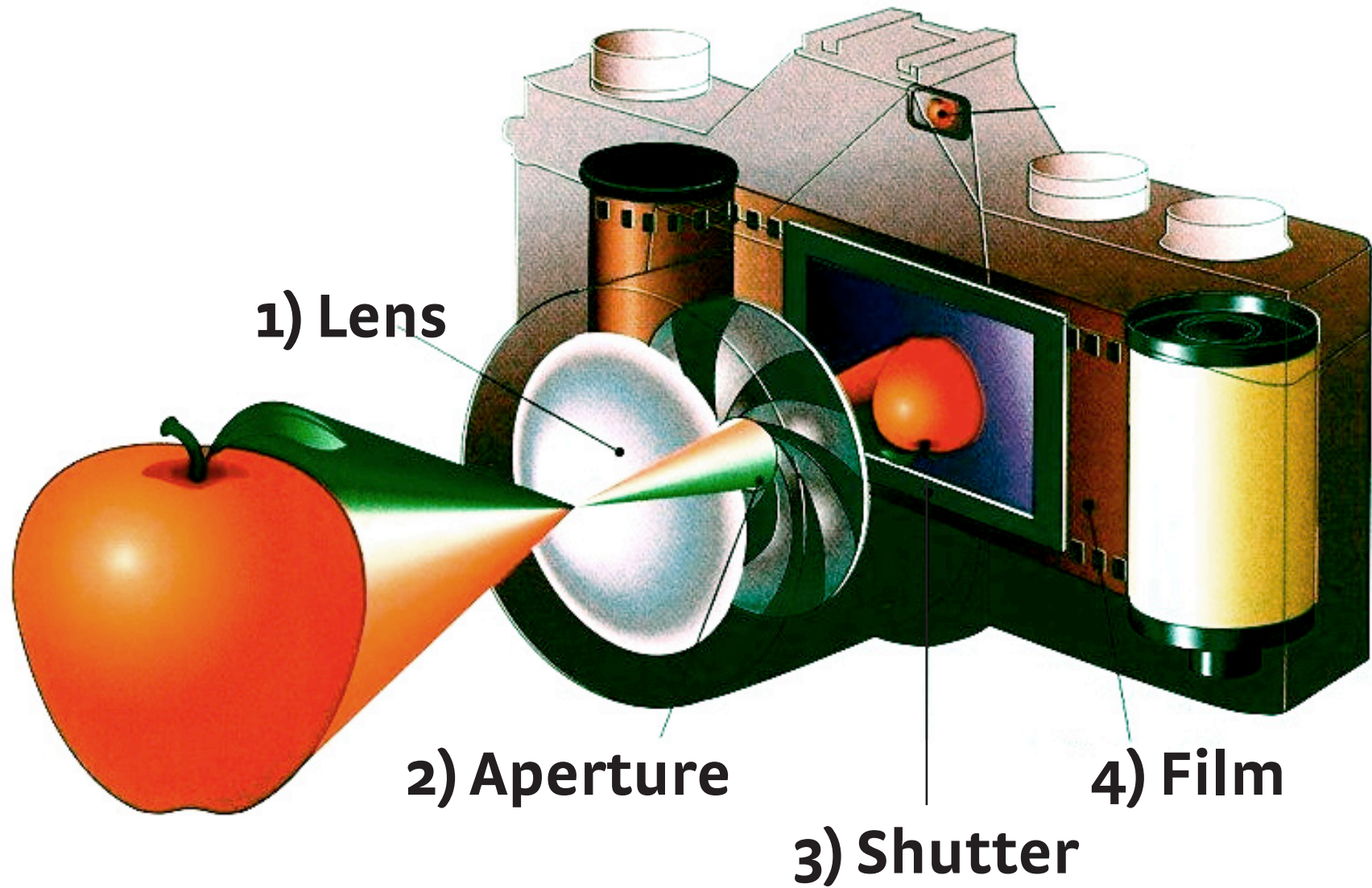




# photo basics

Photo © Luke Woods, 2005–2006



**1**

**Lens**

### STANDARD LENS

A standard, or normal, lens produces an image that is roughly equivalent to the way a scene appears when viewed with the naked eye. Most 35mm SLRs come with a standard lens, but this can be swapped for a shorter or longer lens. Standard lenses often have wide maximum apertures, making them useful in low-light situations.

## 50 mm



Standard 50mm lens

### ZOOM LENS

A zoom lens allows you to fine-tune subject framing by adjusting the focal length of the lens. Each zoom lens covers a range of three or four fixed focal length lenses, giving you great flexibility at a reasonable cost. Since you do not have to think about changing lenses, there is less chance you will miss an important shot.

## 28-85 mm



28-85mm zoom lens

### WIDE-ANGLE LENS

A wide-angle lens takes in a larger angle of view than a standard lens, and is ideal for photographing a group of people or when you are working in confined space. If used too close to a subject, however, distortion may be a problem. Depth of field at each aperture setting is generous, which is useful when all parts of a subject must be sharply rendered.



28mm wide-angle lens

## 28 mm

### LONG-FOCUS LENS

Long-focus lenses are useful for large images of distant subjects or when you cannot move close enough to use a shorter lens. Long lenses tend to be heavy, which makes the use of fast shutter speeds to avoid camera shake more important than with lighter, shorter lenses. A telephoto lens is a long-focus lens with a compact design that makes it shorter.

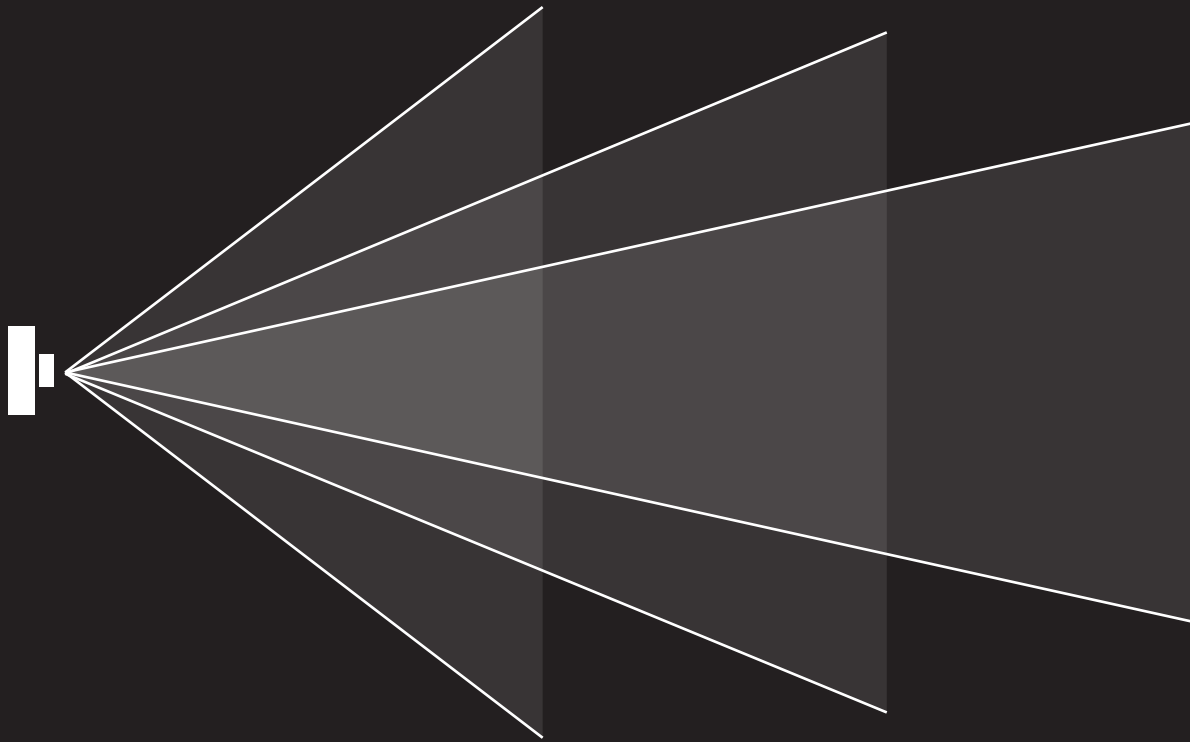


135mm long-focus lens

## 135 mm



# Lens field of view

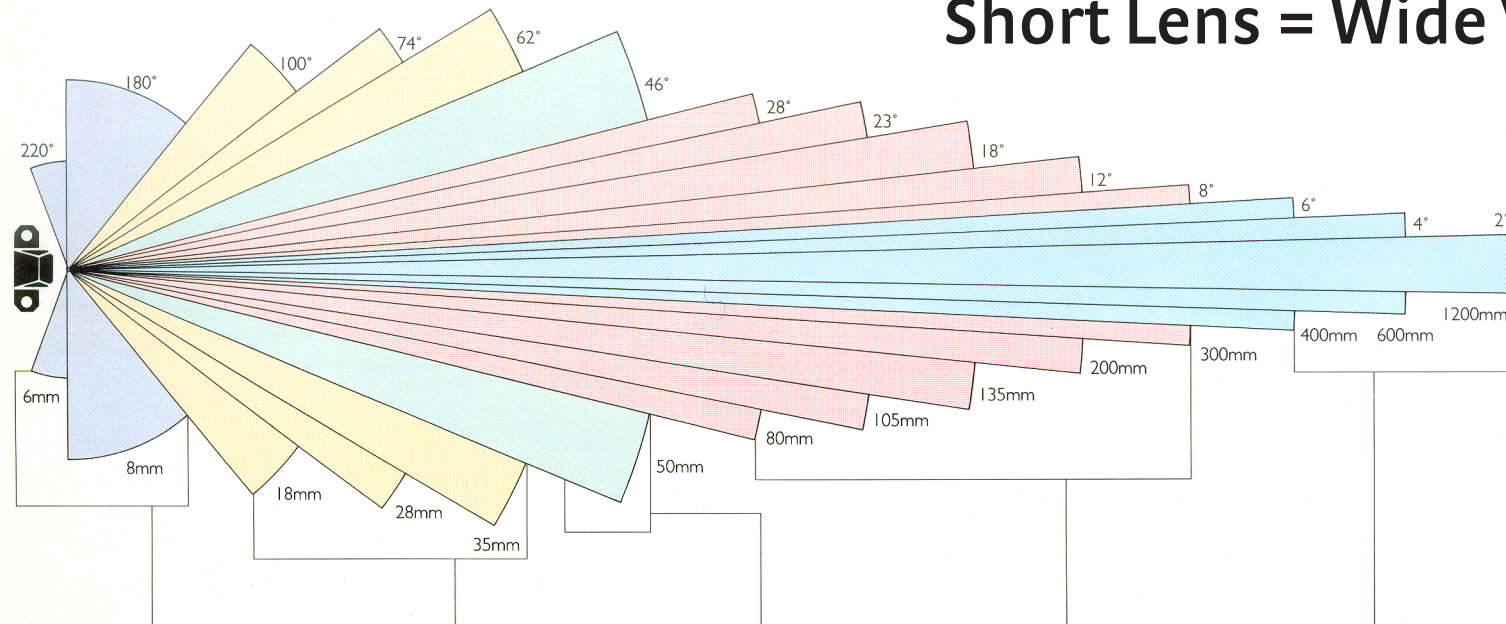


Wide  
28mm  
75°

Normal  
50mm  
45°

Telephoto  
105mm  
25°

# Long Lens = Narrow View Short Lens = Wide View



## Fisheye lens

Extreme wide-angle lenses of 6–8mm are known as fisheyes. They record a circular image of at least 180°, with some lenses even looking behind the camera with a 220° angle of view. The resulting image is very distorted, with vertical and horizontal lines bowed.



## Wide-angle lens

Wide-angle lenses of 18–35mm have more general applications than fisheye lenses. Angles of view are generous and depth of field at all apertures is extensive. Poor-quality wide-angle lenses may sometimes show some distortion toward the edges of the image.



## Standard lens

A standard 50mm lens is fitted on most 35mm SLRs. Useful for most types of subject, it often has a wide maximum aperture, making it good in low light. It does not show the same distortion as a wide or long lens, and its angle of view is similar to that of the human eye.



## Long-focus lens

Angles of view of long-focus lenses of 80–300mm start to diminish rapidly. With so little of the scene filling the frame, the subject is shown very large, making a long lens ideal for distant subjects or detailed close-ups. Depth of field decreases as the lens gets longer.



## Extreme long-focus lens

Long-focus lenses of 400–1200mm are specialized. A tripod to support the lens is essential because of its weight. A long lens has a shallow depth of field and a small maximum aperture, and requires long exposure time even in moderate light (unless you use a fast film).

Basic “point-and-shoot” 35mm camera:

Lens fixed at 28-38mm

Wide angle

Advanced “point-and-shoot” with zoom lens:

Lens varies from 35-105mm

Wide angle to Normal to Close-up





**Kodak**  
12 MEGAPIXELS

**5X**  
optical

KODAK AF 5x Optical Lens

28mm WIDE - 140mm (Equiv)

10.0 MEGA  
PIXELS

Canon

*PowerShot A480*

CANON ZOOM LENS 3.3x

6.6-21.6mm 1:3.0-5.8

3.3x  
OPTICAL  
ZOOM



SONY

Cyber-shot

Sony Lens G

10x Optical Zoom

3,5-5,5 / 4,25-42,5

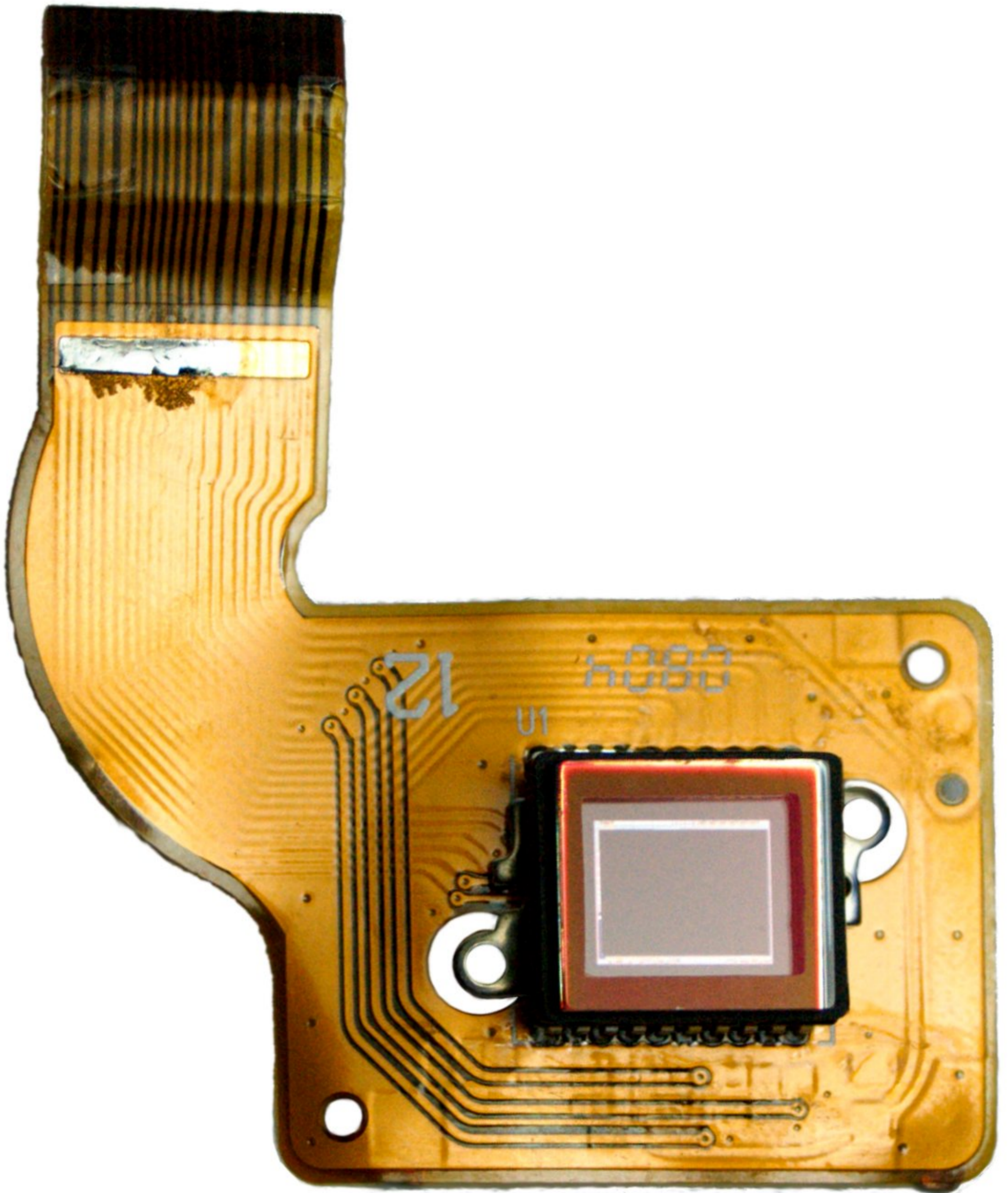
G

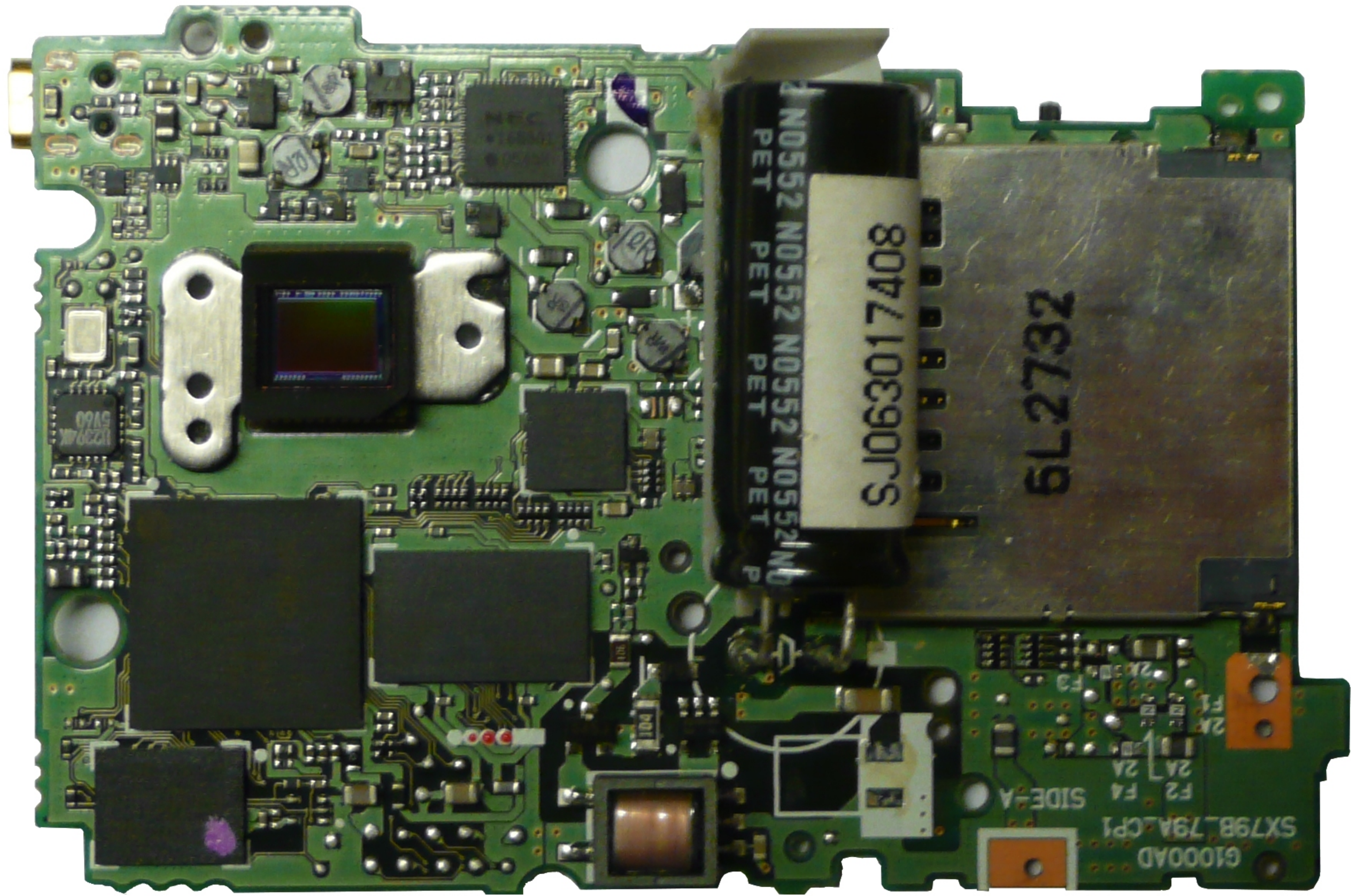
## Optics/Lens

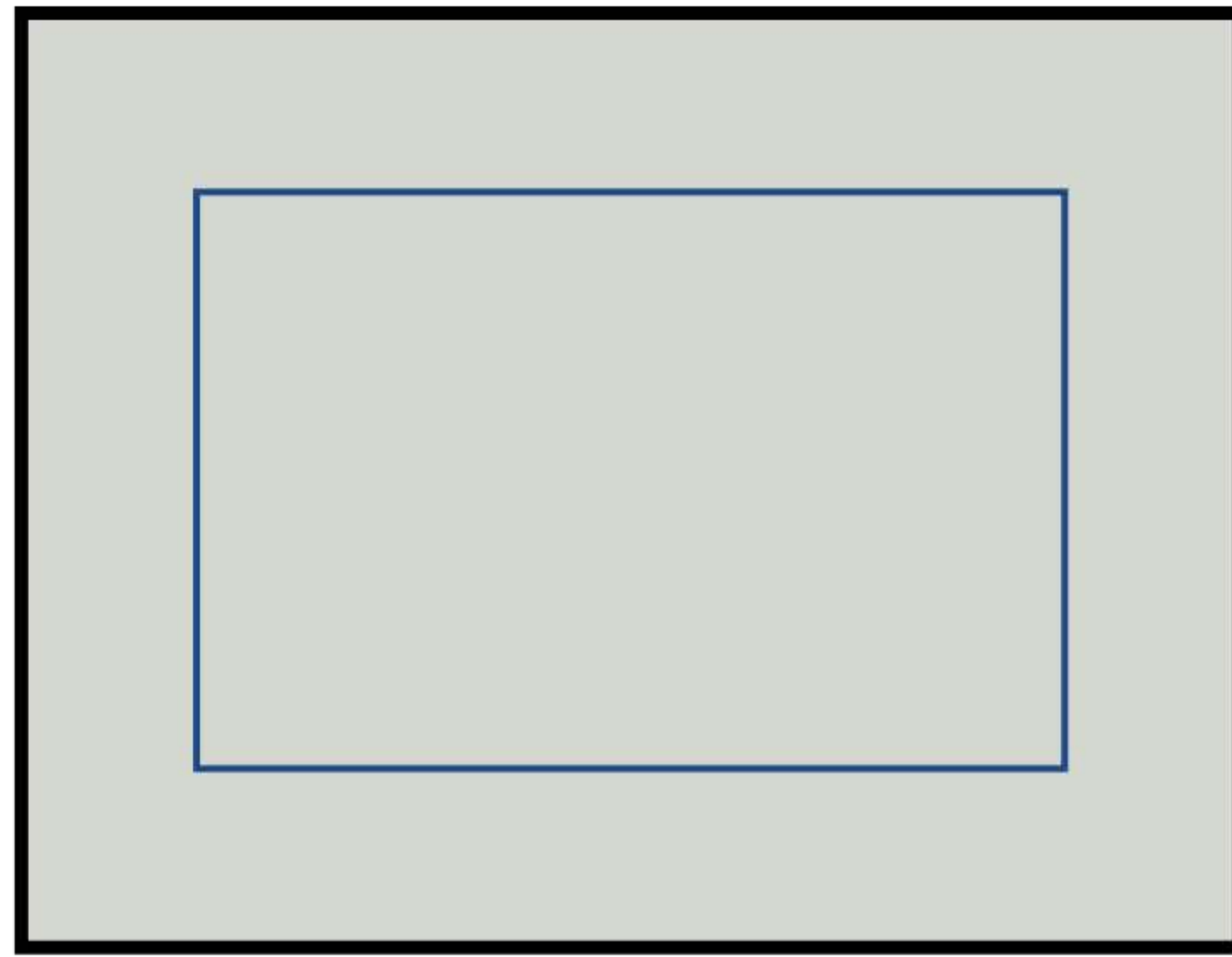
- Lens Type : Sony Lens
- Aperture : iAuto(F3.6/F7.1(W)) / Program Auto(F3.6/F7.1(W)) (2 steps with ND Filter)
- Optical Zoom : 7x
- Digital Zoom : Smart Zoom / Precision Digital Zoom / Off
- Total Zoom : Approximately 14x with Precision Digital Zoom
- Smart Zoom® Technology : 10M:Approx.8.3x(Total),5M:Approx.11x(Total),VGA:Approx.47x(Total),16:9(2M):Approx.15x(Total)
- Focal Length (35mm equivalent) : 6.0-42.0mm
- Lens Construction : 9 elements in 6 groups(including 4 aspheric elements)
- Macro Mode : iAuto W:Approx.10cm(0.33") to Infinity, T:Approx.100cm(3.28') to Infinity

Progressive) (Approx.9.6Mbps) / VGA (640x480) (29.97fps, Progressive) (Approx.3M

- Microphone/Speaker : Mono / Mono







Medium format (Kodak KAF 39000 sensor)

50.7 × 39 mm

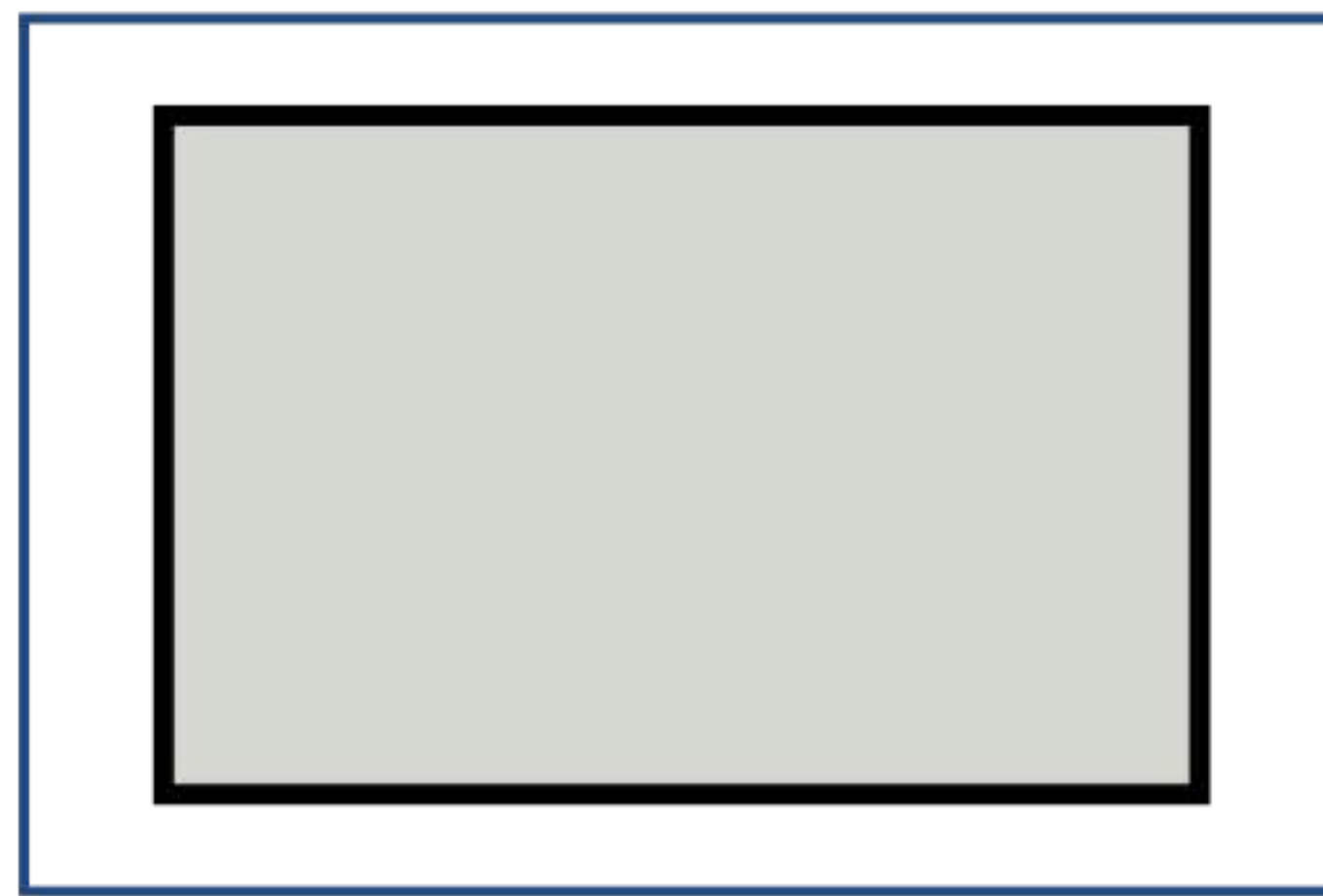
1977 mm<sup>2</sup>



35 mm "full frame"

36 × 24 mm

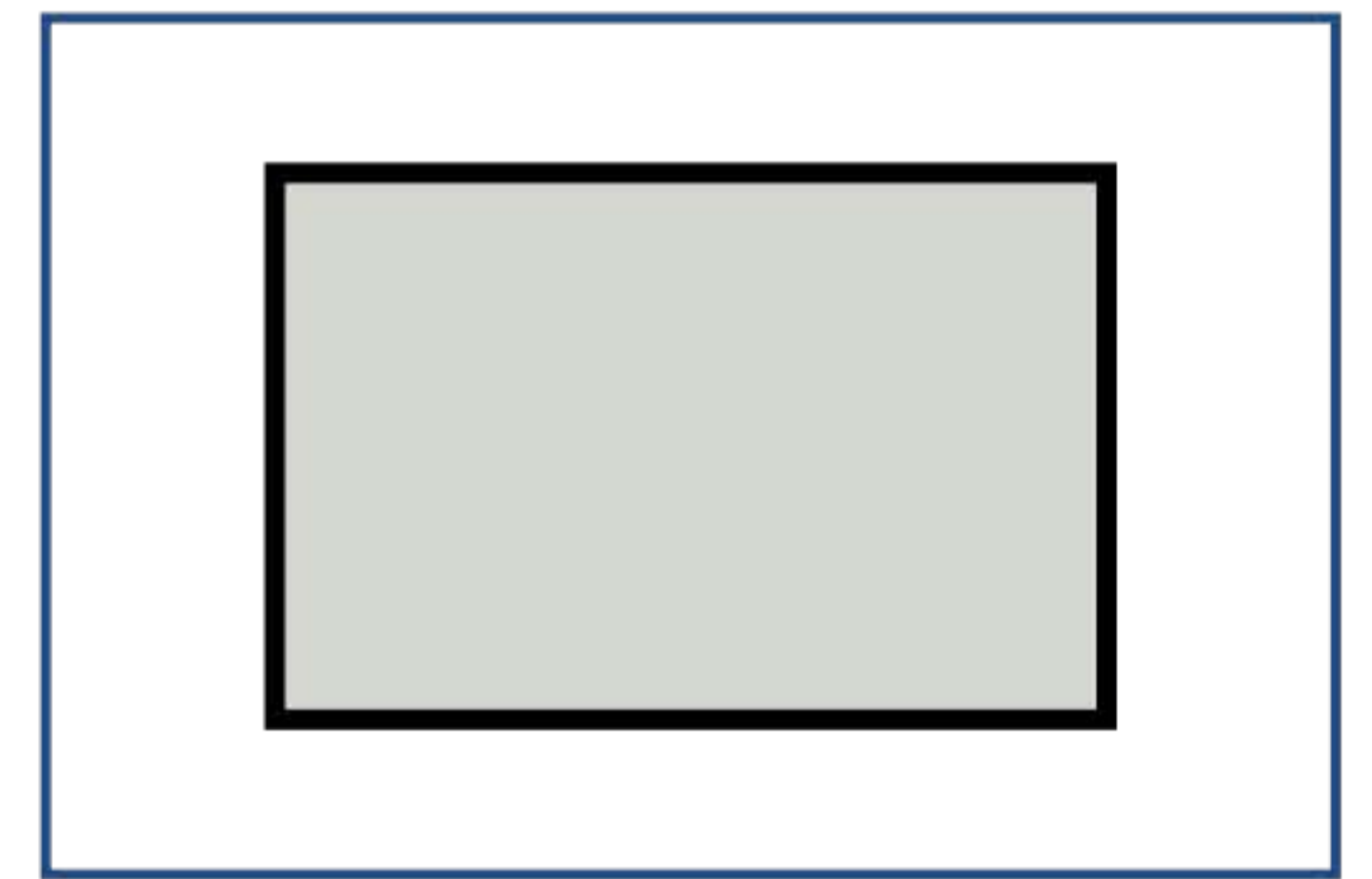
864 mm<sup>2</sup>



APS-H (Canon)

28.7 × 19 mm

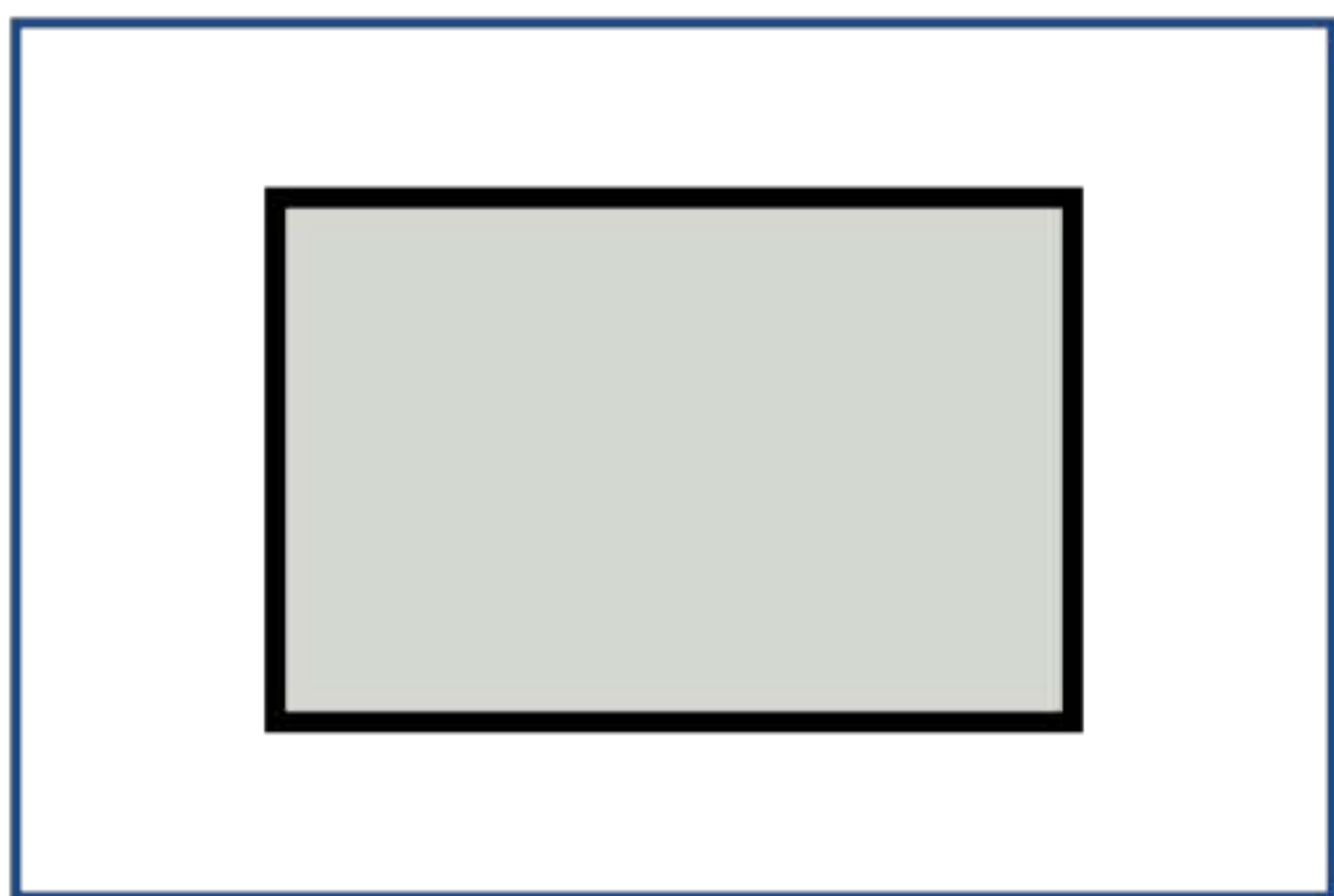
548 mm<sup>2</sup>



APS-C (Nikon DX,  
Pentax, Sony)

~23.6 × 15.7 mm

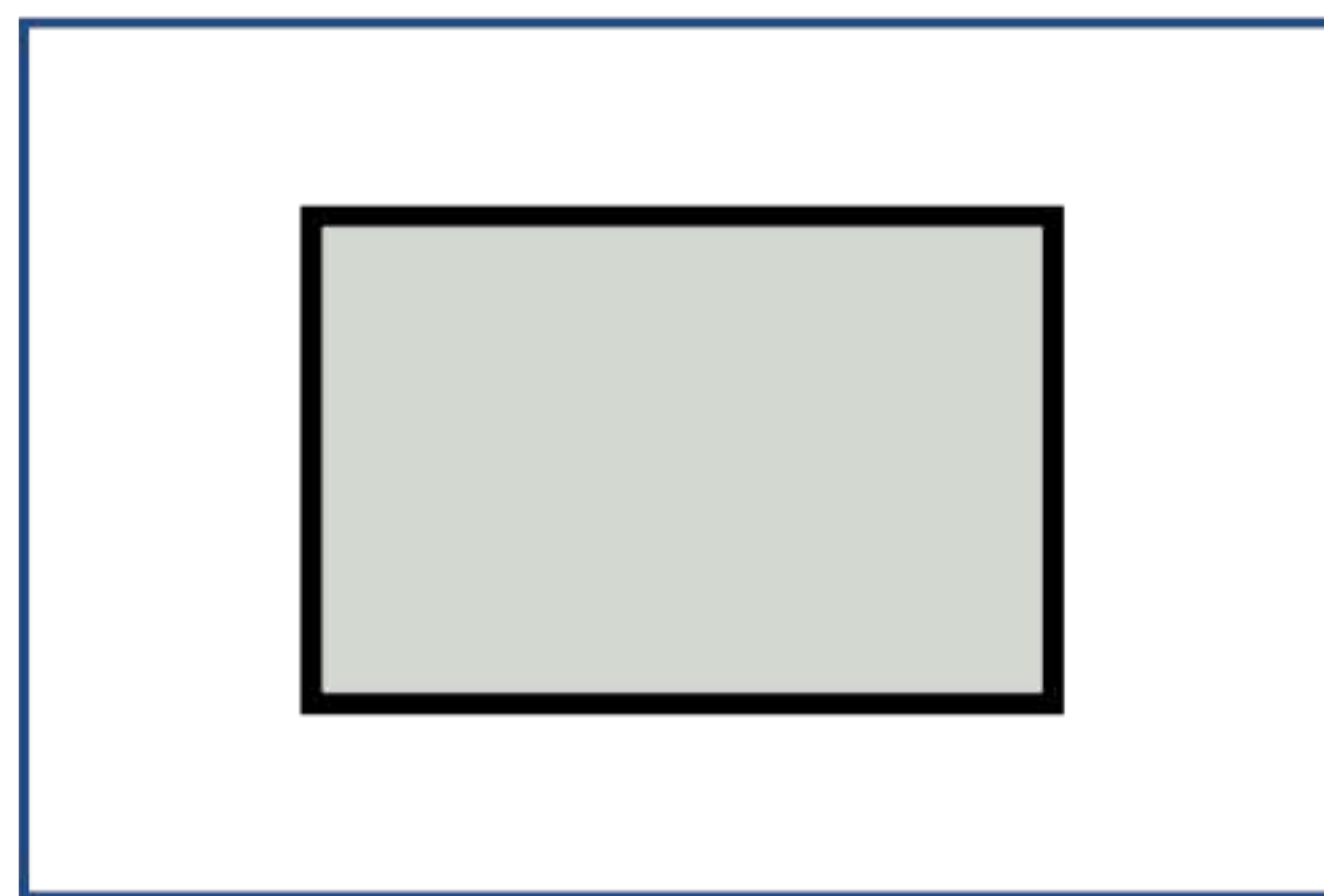
~370 mm<sup>2</sup>



APS-C (Canon)

22.2 × 14.8 mm

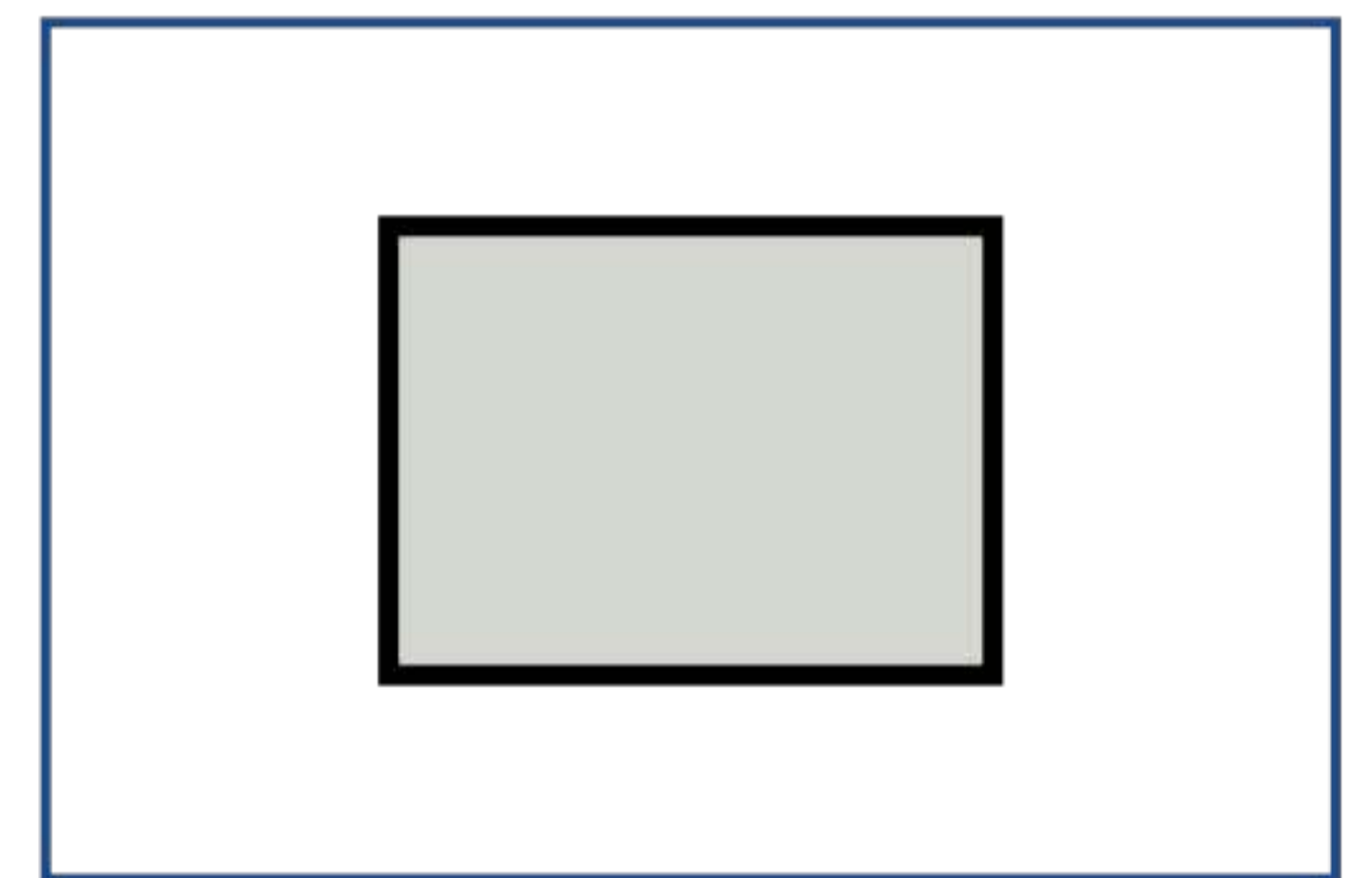
329 mm<sup>2</sup>



Foveon (Sigma)

20.7 × 13.8 mm

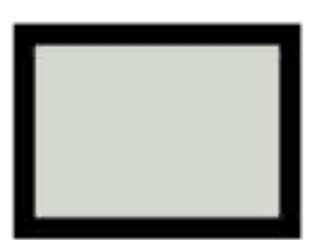
286 mm<sup>2</sup>



Four Thirds System

17.3 × 13 mm

225 mm<sup>2</sup>



1/1.7"

7.6 × 5.7 mm

43 mm<sup>2</sup>



1/1.8"

7.18 × 5.32 mm

38 mm<sup>2</sup>



1/2.5"

5.76 × 4.29 mm

25 mm<sup>2</sup>

Small sensors need short lenses to give the *same field of view* as cameras using larger sensors (in “35mm” DSLRs).

For example, a consumer-level camera may need a **7mm lens** for the *same field of view* as a **35mm lens** would have on a “35mm” DSLR camera.



**2**

**Aperture**



**Each F-stop doubles the size of the opening.**

**Aperture =  
Depth of Field**



aperture setting: f/16

increased depth of field



**f/16**



aperture setting: f/2

shallow depth of field



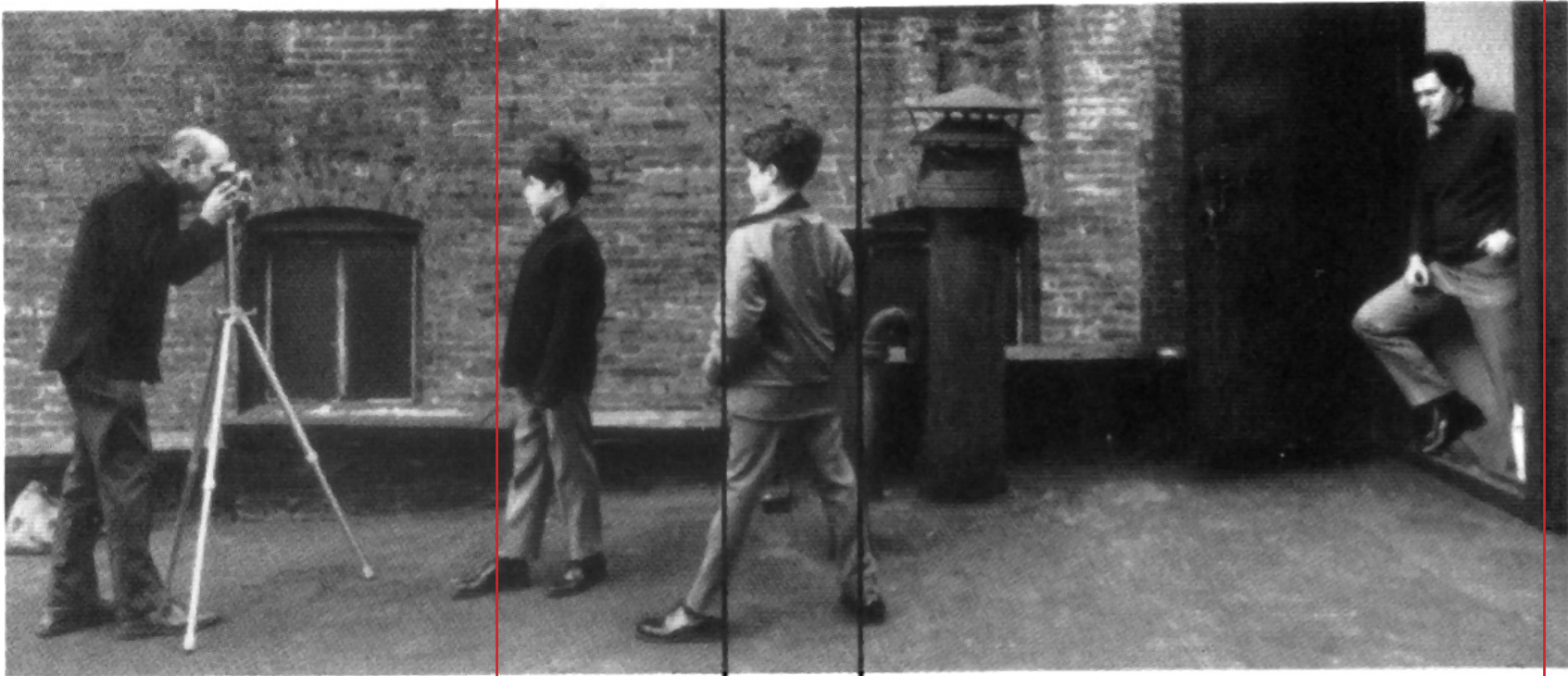
**f/2**

f/16: depth of field = 8 feet

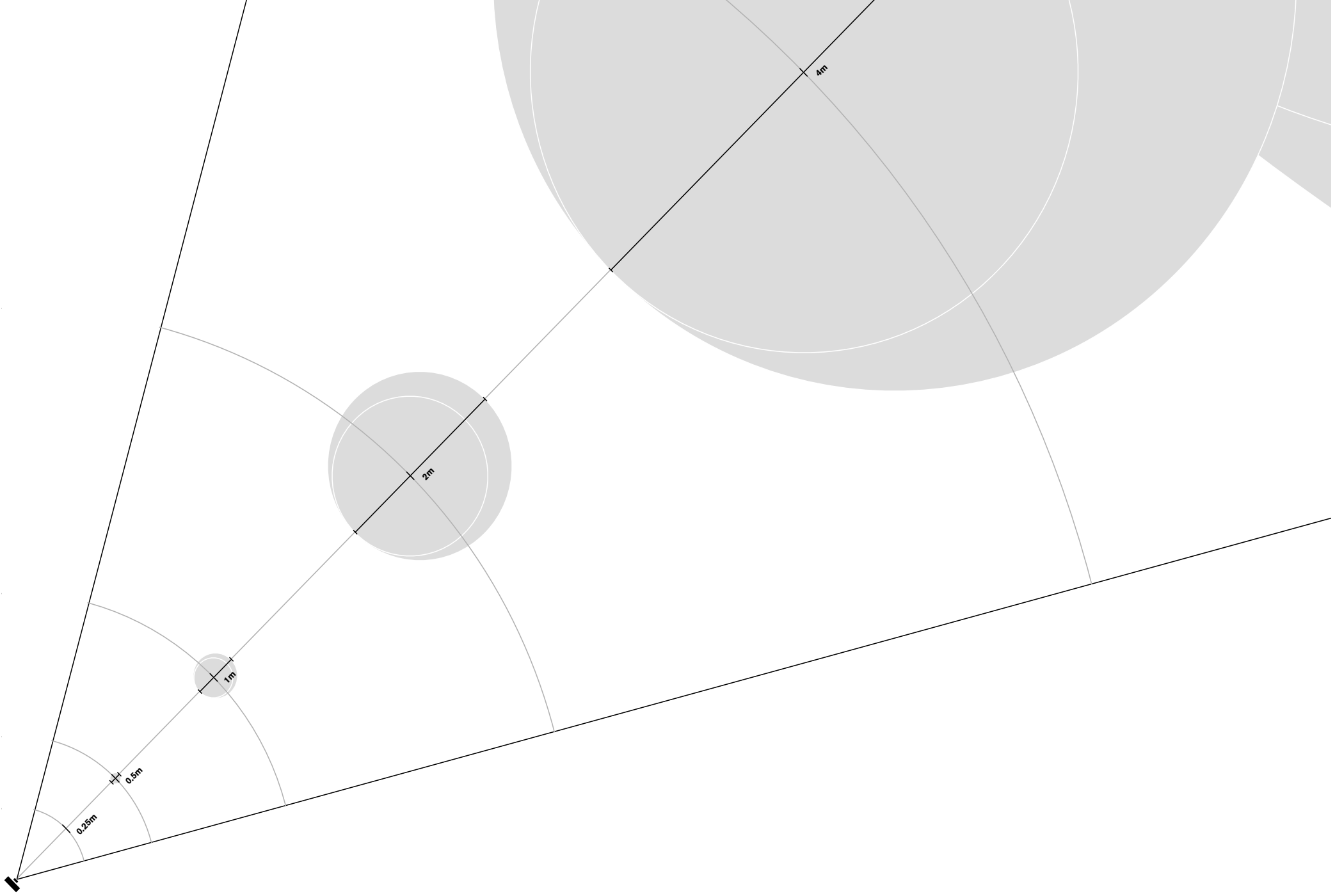
**a**

**b**

**c**



f/2: depth of field = 1 foot





wide aperture



narrow aperture



focal distance increases with smaller aperture





Photograph © Luke Woods, 2005–2006

**Narrow depth of field**



**Basic “point-and-shoot” camera**

**Moderate aperture fixed at F2.8-3.5**

**Large depth of field**



CASIO

8.1 MEGA PIXELS

EXILIM

EXILIM OPTICAL 3x

f=6.2-18.6mm 1:2.8-5.2



OLYMPUS

M.ZUIKO DIGITAL 14-42mm 1:3.5-5.6

OLYMPUS

Ø 40.5





OLYMPUS

μ 725 SW

SHOCK + WATERPROOF

7.1  
MEGAPIXEL

OLYMPUS LENS AF ZOOM 6.7-20.1mm 1:3.5-5.0

Small sensors also affect *depth of field*.

Most consumer-level cameras need small apertures to match their small sensors. Therefore, they tend to have large depth of field — everything is sharp and in focus.




It will be difficult to create blurry areas (i.e., have out-of-focus backgrounds).

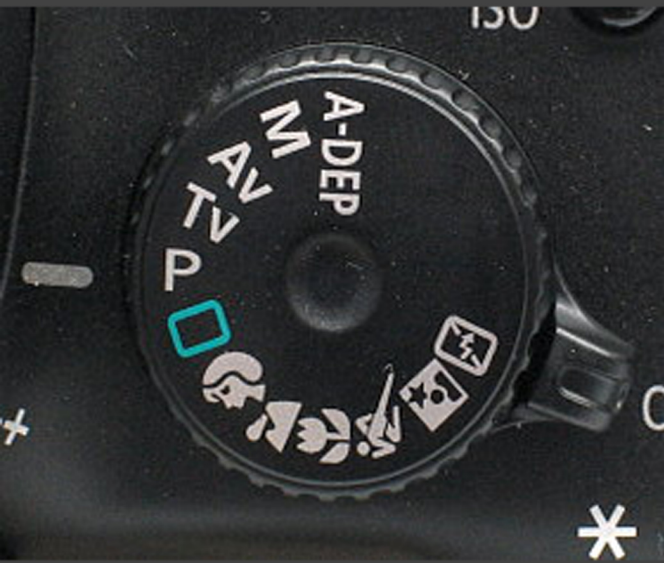






Photograph © Luke Woods, 2005–2006

<b>Vari-Program mode</b>	<b>Description</b>
	<p><b>Portrait mode</b> Camera selects a shallow depth of field (large aperture, low F-number) to give portrait shots with a blurred background and sharp foreground. (eg. Aperture of <math>\sim F2.8</math>)</p>
	<p><b>Landscape mode</b> Camera selects large depth of field (small aperture, high F-number) to ensure near and far objects are all in focus at the same time. (eg. Aperture of <math>&gt; F5.6</math>)</p>
	<p><b>Macro mode (Close-up mode)</b> Camera selects a shallow depth of field (large aperture, low F-number) to make the subject stand out from a blurred background. (eg. Aperture <math>\sim F4.0</math> or less)</p>



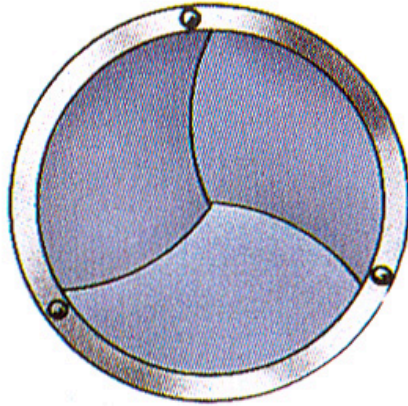
Canon



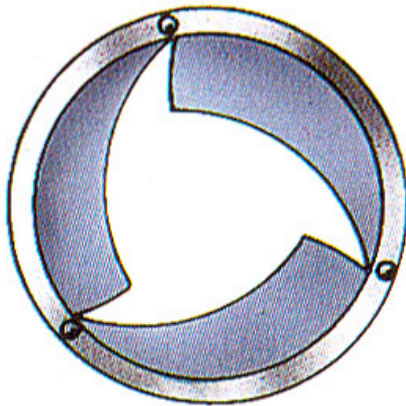
Nikon

**3**

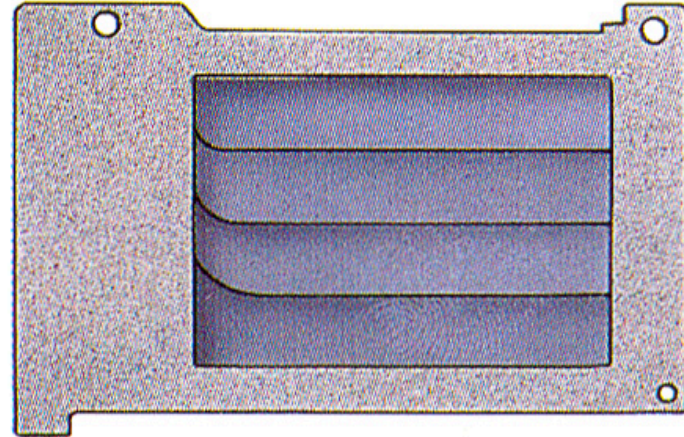
**Shutter**



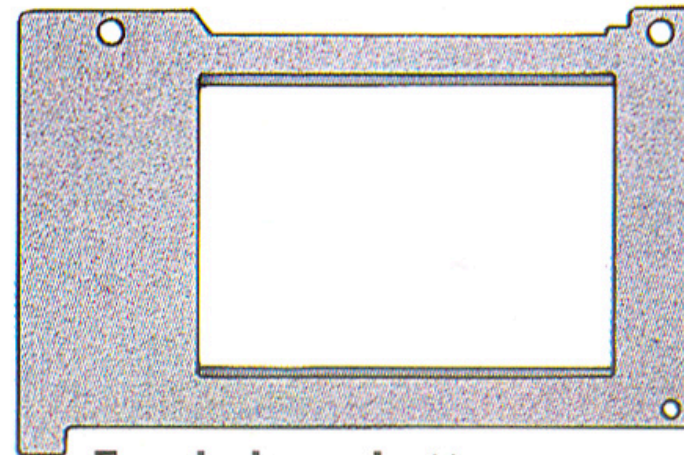
**Blade shutter – closed**



**Blade shutter – open**

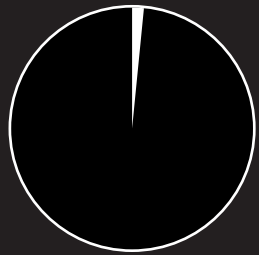


**Focal-plane shutter – closed**

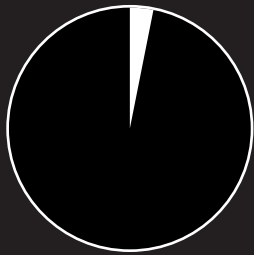


**Focal-plane shutter – open**

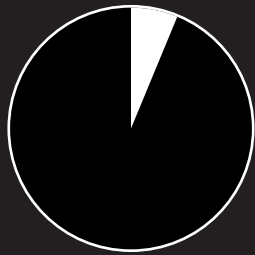
# shutter speed



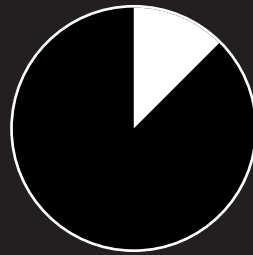
1/1000



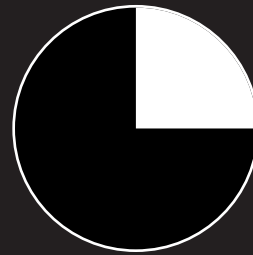
1/500



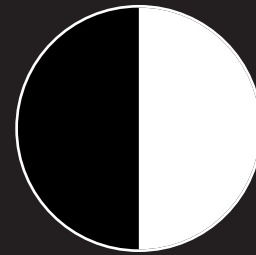
1/250



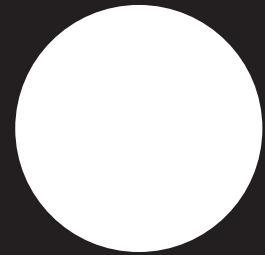
1/125



1/60



1/30



1/15

measured in fractions of a second







Nikon ft 20  
m ∞ 3  
16ft 0 11ft  
AF-S NIKKOR 50mm 1:1.4G

P 1/250 F5.6  
+ ..... -  
AF-C REM [Battery Icon]  
SHOOT A [1] 250 ( 1 )  
CUSTOM A





Canon

-    

---

- AF-assist Beam    On Off
- Digital Zoom     On Off
- Review            ◀ 2 sec. ▶
- Date Stamp        ◀ Off ▶
- Long Shutter     On Off
- Stitch Assist...**

MENU

JUMP

FUNC. SET

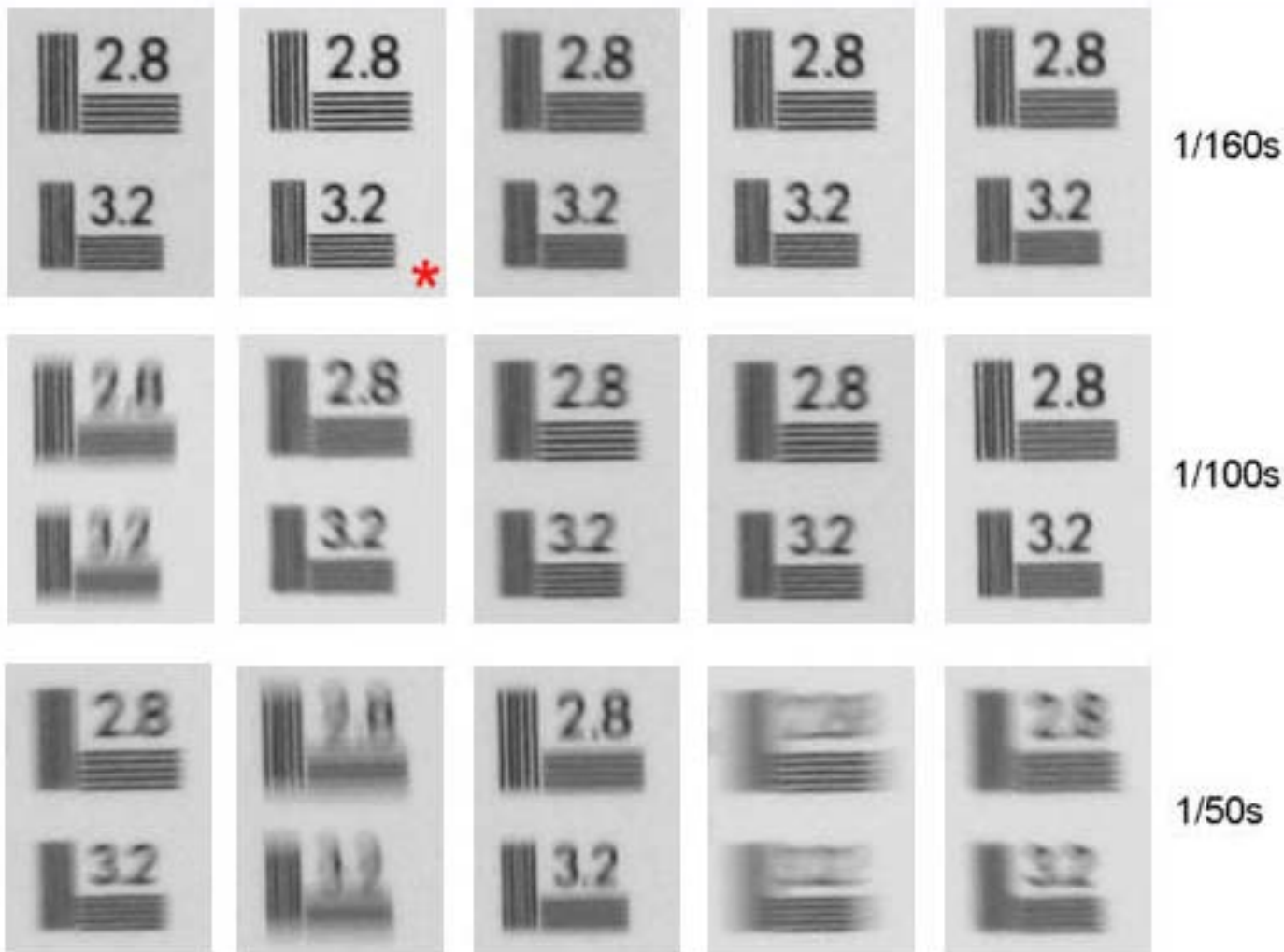
DISP.

What is the **slowest shutter speed** you can use (without blurring) when hand-holding your camera?

What is the **slowest shutter speed** you can use (without blurring) when hand-holding your camera?

$$= \frac{1}{\text{focal length}}$$

i.e., for a 50mm lens, the slowest possible handheld speed is  $\sim 1/50$  second



Handheld shots, EOS 40D, 100mm lens







**Nikon D2H**  
DIGITAL CAMERA  
13.5V -- 2.8A

UL US LISTED I.T.E. 2Z67 E162072

VCCI FC CE N150

NIKON CORPORATION MADE IN JAPAN

BATTERY / CARD

8401794

**PENTAX** DIGITAL CAMERA Optio550

PENTAX Corporation  
MADE IN JAPAN

4.5V



**FC**

Tested To Comply  
With FCC Standards  
FOR HOME OR OFFICE USE



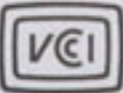
Li-ion





BATTERY

79112953  
MINOLTA CO., LTD.  
OSAKA, JAPAN  
MADE IN CHINA



**Aperture + Shutter  
= Exposure**



**f/16 + 1/8-sec**

long depth of field  
shutter too slow for birds



**f/4 + 1/125-sec**

moderate depth of field  
shutter still too slow for birds



**f/2 + 1/500-sec**

shallow depth of field  
birds are frozen



© Luke Woods, 2005–2006

**frozen motion (fast shutter)**

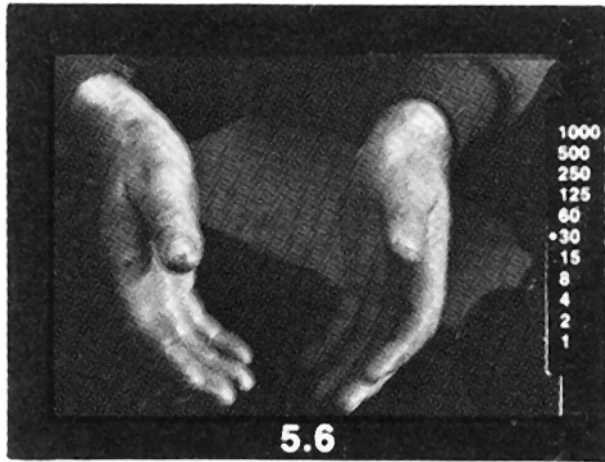


**blurred external motion (slow shutter)**

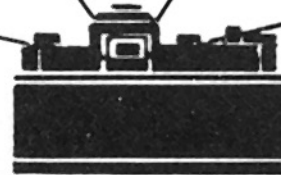
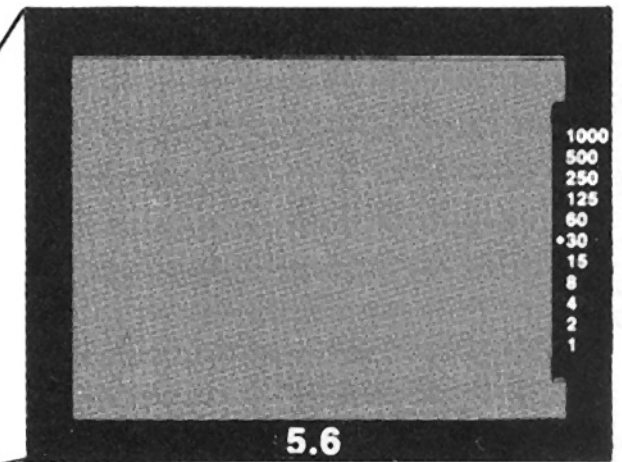


**blurred internal + external motion (slow shutter)**

what you see in the camera's viewfinder



what an averaging meter system "sees"



*In a camera's viewfinder, you can see details of the area that a built-in meter is reading. Most metering systems, however, average together light from all the parts of a scene and as a result "see" only the overall light level.*

DOUGLAS PHOTOGRAPHIC

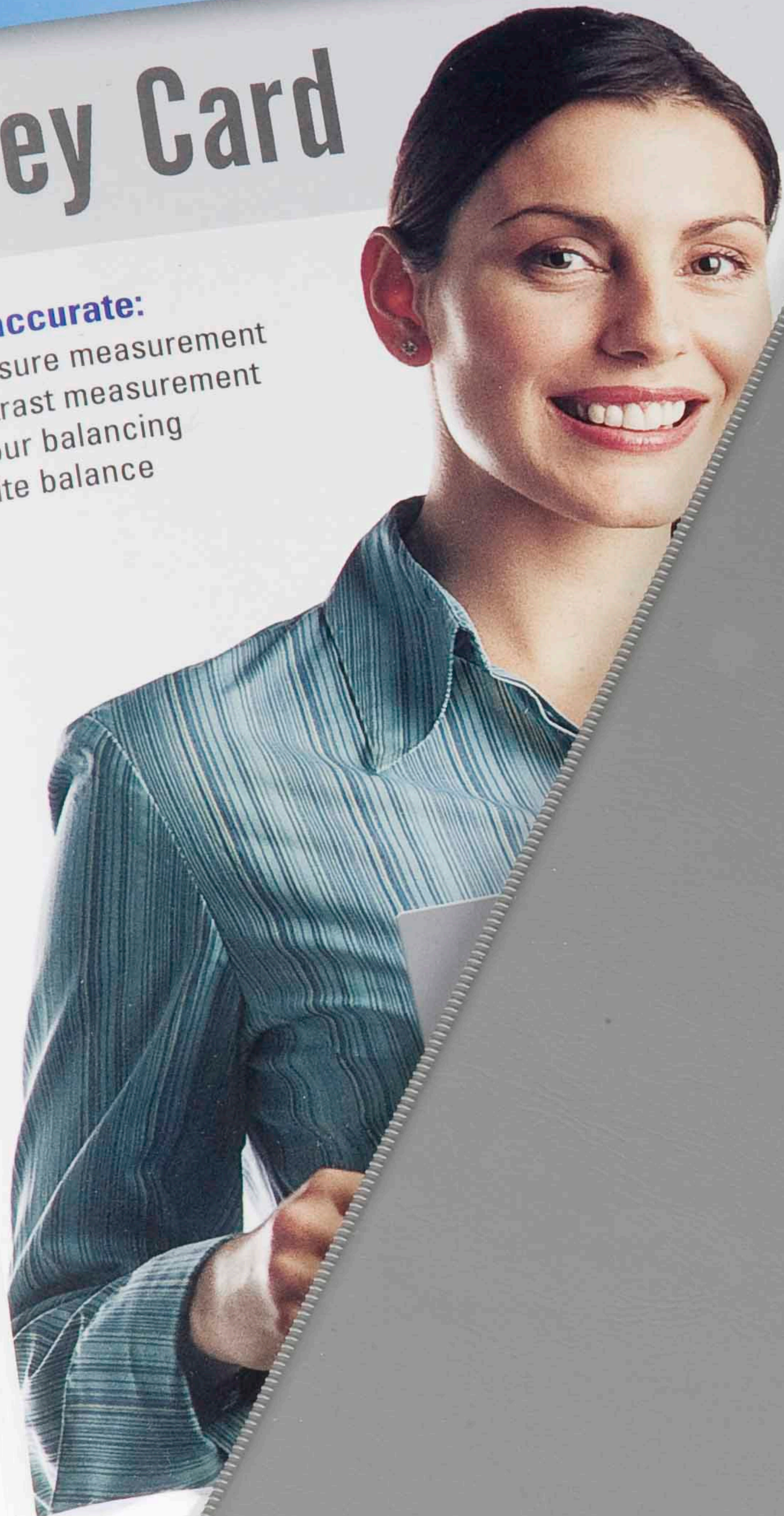
# Photographer's

## Grey Card

**For accurate:**

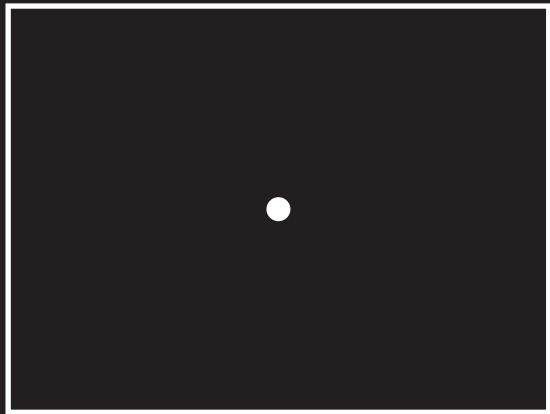
- Exposure measurement
- Contrast measurement
- Colour balancing
- White balance

An indispensable  
part of the serious  
photographer's  
tool kit.

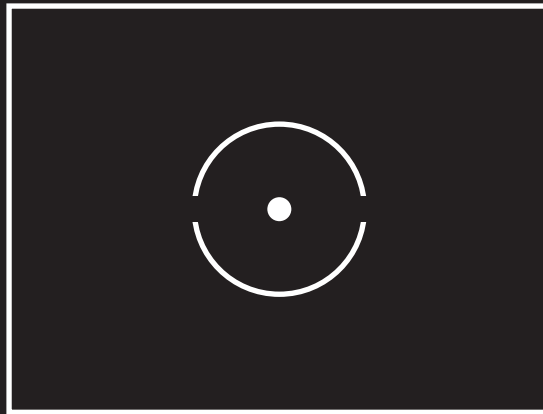




# Light-metering systems



Spot



Center-weighted



Matrix

# the light-meter is dumb



if image is too dark, increase exposure  
up to +2.0EV in 1/3 steps

if image is too light, reduce exposure  
up to -2.0EV in 1/3 steps

# Exposure Compensation



Average (auto)



+1 ev



+2 ev

# Exposure Modes

**Basic “point-and-shoot” camera:  
Moderate aperture fixed at f/2.8-3.5  
This forces fast shutter speed.**






**Advanced “point-and-shoot” with zoom lens:  
Can select manual  
Can select aperture or shutter priority  
Can select fully automatic programs**

**MANUAL** You set aperture.  
You set shutter speed.

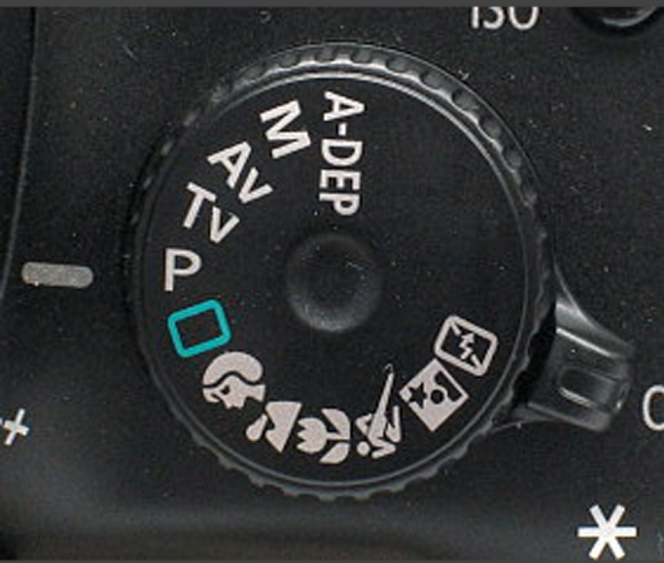
**APERTURE PRIORITY** You set aperture.  
Camera adjusts shutter speed.

**SHUTTER PRIORITY** You set shutter speed.  
Camera adjusts aperture.

**PROGRAM/AUTOMATIC** Camera sets shutter + aperture.  
Program may favor fast shutter  
and/or smaller aperture.

<b>Vari-Program mode</b>	<b>Description</b>
	<p><b>Portrait mode</b> Camera selects a shallow depth of field (large aperture, low F-number) to give portrait shots with a blurred background and sharp foreground. (eg. Aperture of <math>\sim F2.8</math>)</p>
	<p><b>Landscape mode</b> Camera selects large depth of field (small aperture, high F-number) to ensure near and far objects are all in focus at the same time. (eg. Aperture of <math>&gt; F5.6</math>)</p>
	<p><b>Macro mode (Close-up mode)</b> Camera selects a shallow depth of field (large aperture, low F-number) to make the subject stand out from a blurred background. (eg. Aperture <math>\sim F4.0</math> or less)</p>
	<p><b>Sports mode</b> Camera selects high shutter speeds to capture fast action. (eg. Shutter speed of <math>1/180</math> s or greater - up to <math>1/2000</math> s)</p>
	<p><b>Night Scene mode</b> Camera controls exposure to capture very dimly lit subjects (which may otherwise not be metered) for evening or night shots. Flash can be used.</p>





Canon



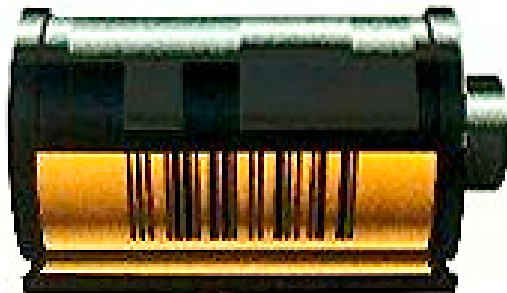
Nikon

4

Film



Film speed



**Analog Film is  
rated for  
light sensitivity**

**Higher ISO/ASA  
numbers are  
more sensitive  
to light**

# ISO sensitivity

50

100

200

400

800

1600

Least  
sensitive

Most  
sensitive

**ASA32**



**ASA1000**



**Higher ASA/ISO=Visible Film Grain**



noisy



clean



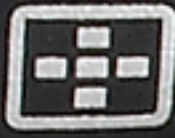
2511/0.011



ISO

ON

OFF





# Film Types – White Balance

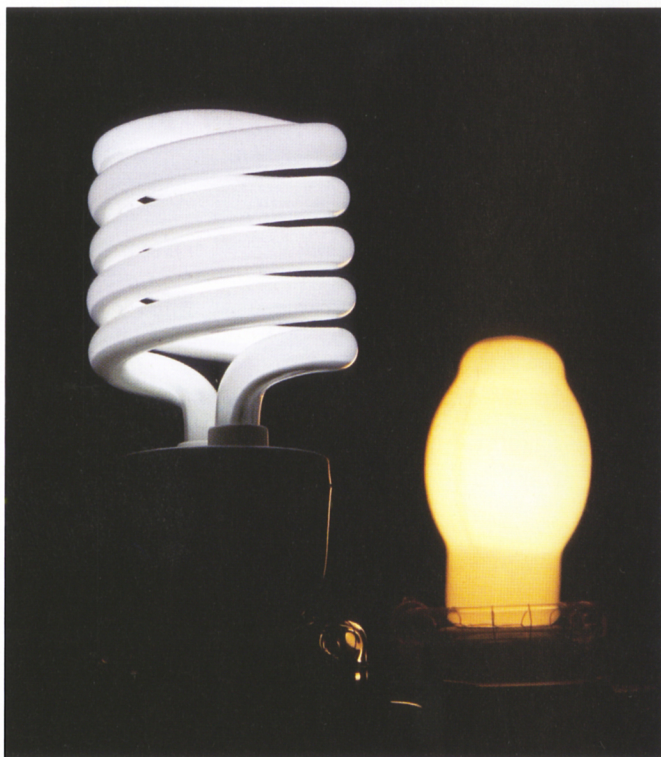
Sun/Daylight

Tungsten

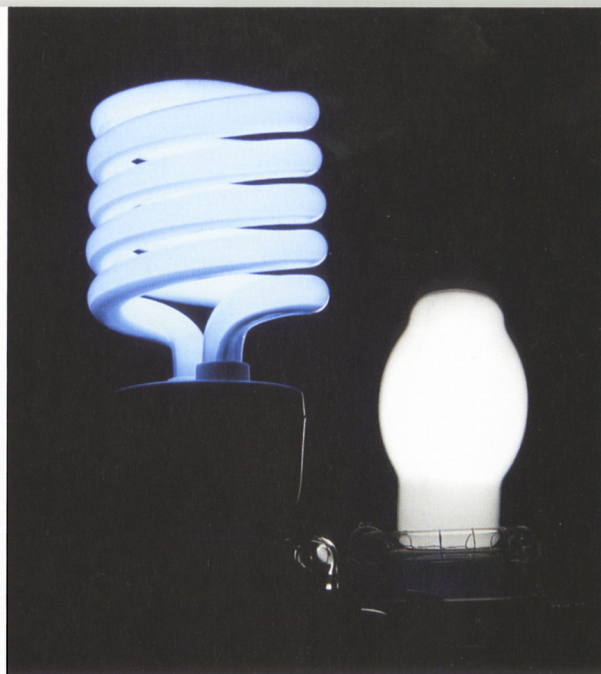
Fluorescent

## White Balance

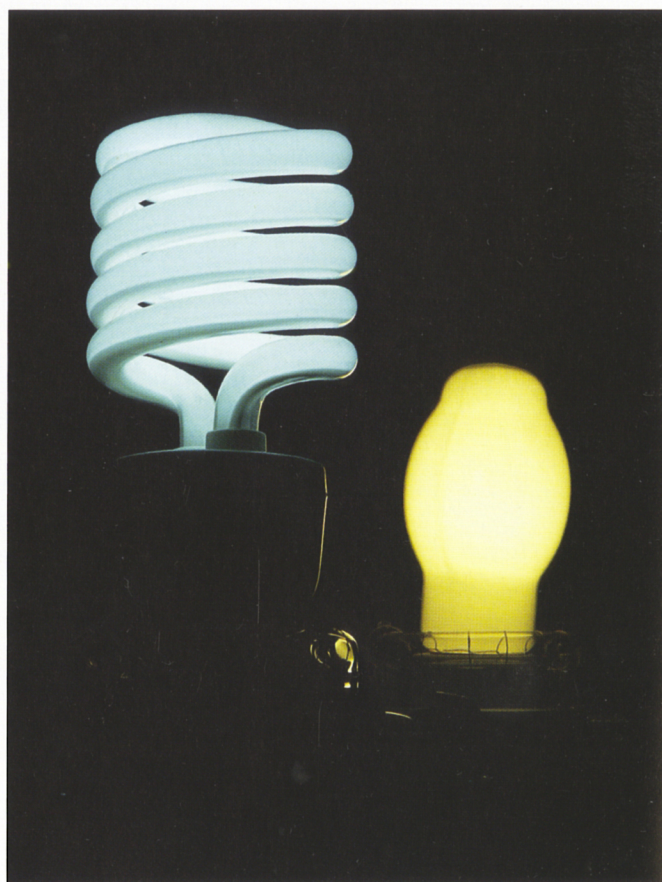
The camera's white balance system adjusts your camera for the color of the light source so that whites will be rendered neutrally and colors will be rendered accurately. White balance makes a white surface white in the picture, eliminating color cast. If the white is white, all other colors will be accurate too.



In each photo of this series, the lamp on the left is a coiled day-light-balanced fluorescent, while the right bulb is a standard tungsten lamp that produces a warmer, yellow-red light. With the camera's white balance set for daylight, the fluorescent records as white, while the tungsten is yellowish.



When the camera's white balance is switched to Tungsten, the fluorescent lamp records blue and the tungsten light is rendered as white.

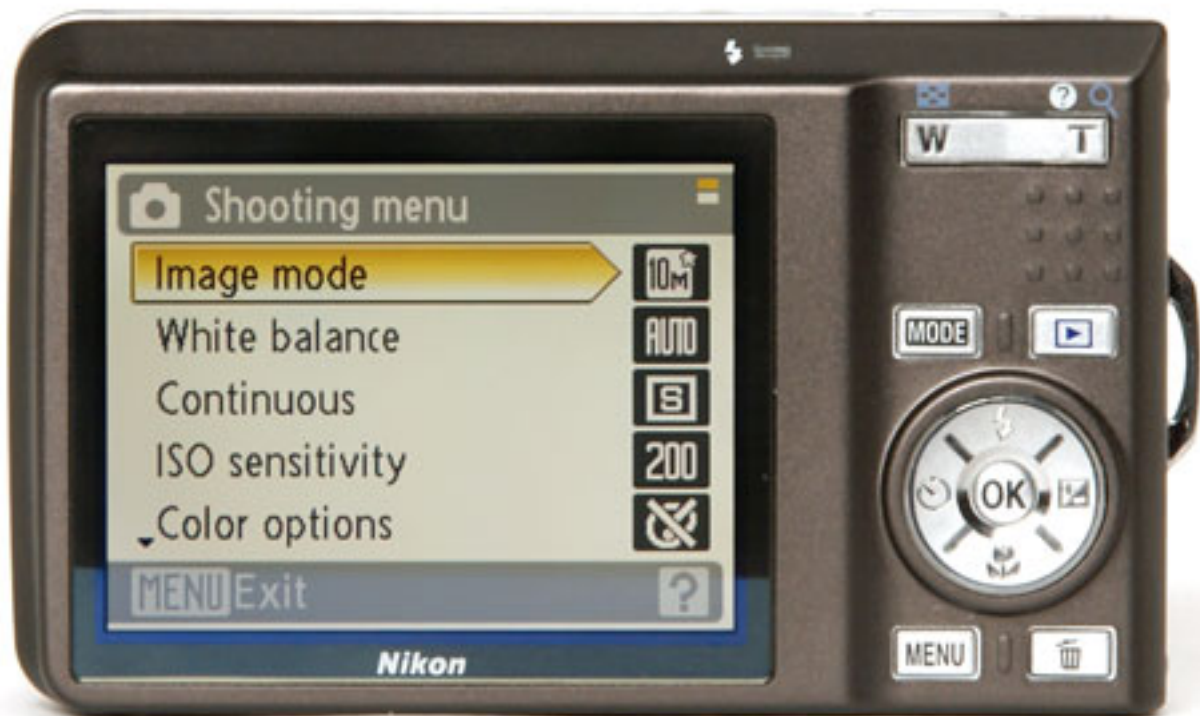


In this photo, the white balance is set to Auto (AWB). Note that neither light is white because this is a compromise setting that doesn't correctly balance either light.



**CONAIR®**

OFF EVENING HOME OFFICE DAY



Shooting menu

Image mode

White balance

Continuous

ISO sensitivity

Color options

10M

AUTO

S

200

MENU Exit

?

Nikon

MODE



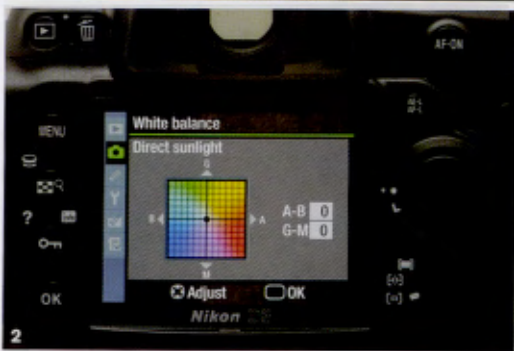
OK

MENU





**1-2** A typical white balance menu offers these choices, and they can often be refined by hue in a second-level control.



**3-5** White balance choices are self-explanatory, but there is still room for personal taste. The color temperature differences between sunlight, cloud, and shade are evident here in three versions of a coastal scene on a sunny, but slightly hazy day.

**6-7** Balancing for fluorescent lighting is trickier than for other light sources, as it varies and is fairly unpredictable, involving not just color temperature, but hue. It is worth experimenting with the Auto setting also. Here I shot Raw so I could precisely fine-tune the white balance.

**5**

**Perspective:**

**Camera position**

**Camera tilt**

**Distance to subject**



**Look up**

# Look down





# Make it flat



# Look along a surface



Get closer





William Eggleston, *Untitled (Memphis)*, ca. 1970