about
field of view

Field of view (FOV) is the visible area when looking through the microscope eyepiece (eyepiece FOV) or camera (camera FOV) and is usually expressed as a diameter

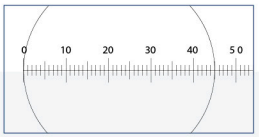
CALCULATING FOV OF AN EYEPIECE

The FOV through an eyepiece is equal to:

$$FOV = \frac{\text{Field Number}}{\text{Object Magnification}}$$

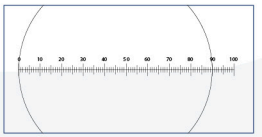
Field number (FN) is usually engraved on the eyepiece as a figure next to the magnification and expressed in mm, e.g. WF 10x/18. A 10x/18 eyepiece with a 40x objective will have a FOV = 18 mm / 40 = 0.45 mm or 450 nm

450 nm FOV with 10x/18 eyepiece and S40x objective



Micrometer stage 1 mm/100

900 nm FOV with 10x/18 eyepiece and S20x objective

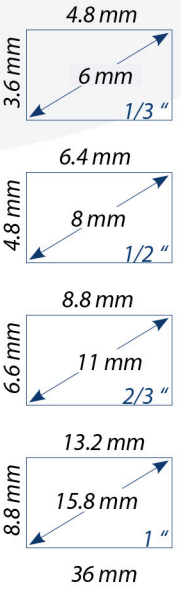


Micrometer stage 1 mm/100

FIELD OF VIEW WITH CAMERA

Most commercially available microscope digital cameras use 1/3, 1/2- or 2/3-inch rectangular sensors. A few will use a 1 inch camera sensor

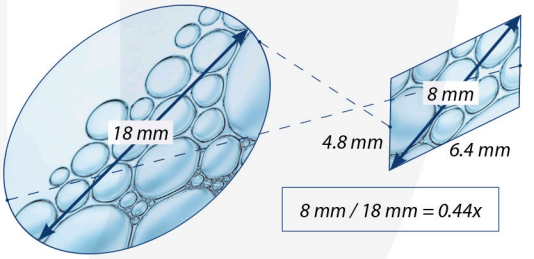
As a consequence, a rectangular camera sensor cannot capture the circular FOV that exits from a eyepiece, microscope third tube or photo port



EYEPIECE VERSUS CAMERA FOV

Circular FOV through a WF10x/18 eyepiece

1/2 " camera sensor and its rectangular FOV



Furthermore, the circular eyepiece FOV is much larger than the camera FOV and thus the microscope FOV must be "reduced" with a so-called "relay" lens or "photo-adapter" to fit the camera FOV. However - in order to avoid vignetting (dark shadows in the corners of an image), the circular microscope FOV must just be projected outside the image sensor area. Subsequently the camera FOV will always be smaller than the microscope FOV by 50 to 60%

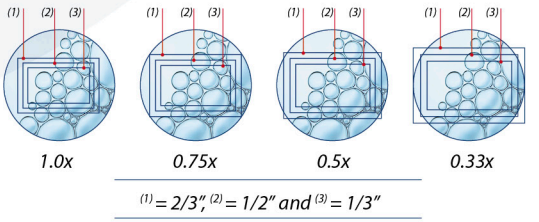


Figure: different camera sensor sizes (2/3, 1/2, 1/3 inch) with different "demagnifying" lenses (C-mount photo-adapters) 0.33x, 0.50x, 0,75x and 1.0x

IN ORDER TO OBTAIN THE DESIRED FIELD OF VIEW WITHOUT VIGNETTING USE:

a 0.33 x photo adapter for cameras with a 1/3" sensor
a 0.50 x photo adapter for cameras with a 1/2" sensor
a 0.75 photo adapters for cameras with a 2/3" sensor
a 1.0x or 1.2x photo adapters for cameras with a 1"
or larger camera sensor