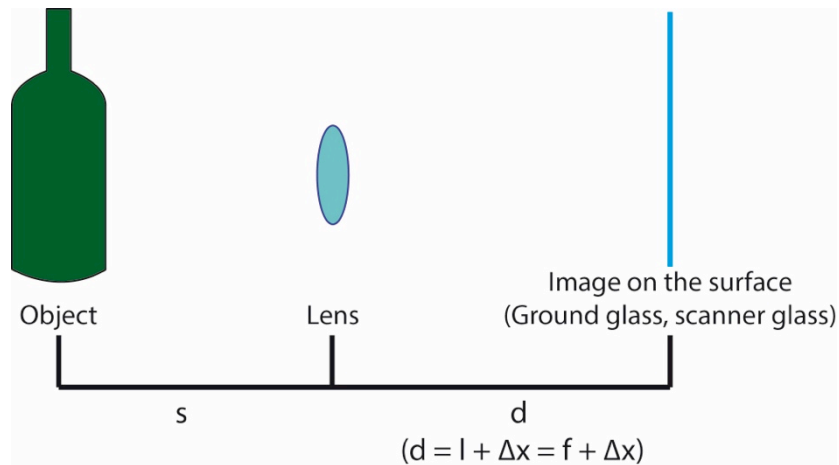


HOW TO CALCULATE THE FOCUSING DISTANCE



These are the variables used to calculate the focusing distances.

s = distance from lens to object (focusing plane)

d = distance from lens to image

f = focal length

- Every lens has a focal length expressed in millimeters. If we don't know the focal length of a lens we take the lens, we focus the infinite and project the image on a surface (e.g. a wall) until the image is focused. Then we have to measure the distance between the lens and the wall. That's the focal length expressed in centimeters (we convert to millimeters by multiplying by ten).

- Notice that in a camera obscura with bellows $d = l + \Delta x$, where $l = f$ expressed in centimeters. That means that when the lens is in the closest position to the image the infinite is on focus. Δx is the sliding distance of the bellows. It's a variable. If we move the lens backwards or forwards we will focus on different depth planes.

These are the two practical formulas to use:

A.
$$s = \frac{f \times (f + \Delta x)}{\Delta x}$$

We use this formula if we want to calculate where we have to place an object for a given sliding distance. For example, if we have a camera with a lens with a focal distance, $f = 200 \text{ mm} = 20 \text{ cm}$ and we move the sliding box, $\Delta x = 10 \text{ cm}$. we get:

$$60 = \frac{20 \times (20 + 10)}{10}$$

(All the figures in centimeters) So the object must be placed 60 centimeters (25,58 inches) away from the lens. With the same formula we can calculate the closest focusing plane if we substitute Δx for the furthest sliding distance.

B.
$$\Delta x = \frac{f \times f}{s - f}$$

We use this formula if we want to calculate how far we have to move the sliding box if we want to focus an object placed at a given distance. For example, if we have a camera with a lens with a focal length, $f = 300 \text{ mm} = 30 \text{ cm}$ and we want to focus an object place, $s = 150 \text{ cm}$, we get.

$$7,5 = \frac{30 \times 30}{150 - 30}$$

(All the figures in centimeters) So we move the sliding box 7,5 centimeters (2,9 inches) forwards.

NOTE: 1 centimeter = 0,393 inches / 1 inch = 2,54 centimeters