

G19MICNP

Microscope. Configuration for Magnifier : Near Point .

In most microscopes the tube length is 16cm and we have for the image distance $x_{i1} = 16 + f_1$.

Magnification and angular magnification.

1. Lens: Objective lens. Calculation to get x_{o1}

$$f_1 := 2$$

$$x_{i1} := 16 + f_1$$

$$x_{o1} := \frac{-1}{\left(\frac{1}{f_1}\right) - \frac{1}{x_{i1}}} \quad x_{o1} = -2.25$$

2. Magnifier Lens (ocular). In the "Near Point Configuration" the image should be virtual and at -25 cm from the lens.

$$x_{i2} := -25$$

$$f_2 := 6$$

$$x_{o2} := \frac{-1}{\left(\frac{1}{f_2}\right) - \frac{1}{x_{i2}}} \quad x_{o2} = -4.839$$

We can calculate the distance a between the objective lens (L1) and ocular lens (L2) as

$$a := 16 + f_1 - x_{o2} \quad a = 22.839$$

3. Magnification (The eye is not involved)

$$M_1 := \frac{x_{i1}}{x_{o1}} \cdot \frac{x_{i2}}{x_{o2}} \quad M_1 = -41.333$$

Calculation using the angular magnification or magnifying Power for the magnifier

$$MM_1 := \left(1 - \frac{x_{i1}}{f_1}\right) \cdot \left(1 + \frac{25}{f_2}\right) \quad MM_1 = -41.333$$

Neglecting f_1 with respect to 16 we have

$$xx_{i1} := 16$$

$$MM_2 := \left(1 - \frac{xx_{i1}}{f_1}\right) \cdot \left(1 + \frac{25}{f_2}\right) \quad MM_2 = -36.167$$