

G13TINNEG

Negative lens

Focal length f is negative, light from left propagating from medium with index 1 to lens of refractive index n

x_o on left of lens (negative)

Calculation for 4 positions for real and virtual objects, to the left and right of the object focus and image focus.

Calculation of x_i from given x_o and focal length

Calculation of magnification

$$f \equiv -10 \quad n1 := 1 \quad n2 := 1.5$$

Image focus: $-f$

Object focus: f

a

$$x_{1o} := -30$$

$$x_{1i} := \frac{1}{\left(\frac{1}{f}\right) + \frac{1}{x_{1o}}}$$

$$x_{1i} = -7.5$$

$$mm1 := \frac{x_{1i}}{x_{1o}}$$

$$mm1 = 0.25$$

b

$$x_{2o} := -5$$

$$x_{2i} := \frac{1}{\left(\frac{1}{f}\right) + \frac{1}{x_{2o}}}$$

$$x_{2i} = -3.333$$

$$mm2 := \frac{x_{2i}}{x_{2o}}$$

$$mm2 = 0.667$$

c

$$x_{3o} := 5$$

$$x_{3i} := \frac{1}{\left(\frac{1}{f}\right) + \frac{1}{x_{3o}}}$$

$$x_{3i} = 10$$

$$mm3 := \frac{x_{3i}}{x_{3o}}$$

$$mm3 = 2$$

d

$$x_{4o} := 30$$

$$x_{4i} := \frac{1}{\left(\frac{1}{f}\right) + \frac{1}{x_{4o}}}$$

$$x_{4i} = -15$$

$$mm4 := \frac{x_{4i}}{x_{4o}}$$

$$mm4 = -0.5$$