

Name:

1) Mo Ti uses a small camera to take a photo from a little coin. This camera has only one lens, with focal length $+10$ mm. Image distance can vary, $8 \text{ mm} < d_i < 25 \text{ mm}$.

a) Find the range for the object distance, d_o , that this camera can focus. [2 pts]

b) Find the maximum magnification, m . [2 pts]

2) Aristophanes has a concave lens with focal length -10 cm and a convex lens with focal length $+20$ cm. He uses concave lens as the objective (closer to the object). The concave lens sits 10 cm from the object. To make the final image sharp he needs to put the screen 60 cm from the convex lens.

a) Write an equation for the concave lens and find where its image is. [2 pts]

b) Write an equation for the convex lens and find where its object is. [2 pts]

c) What is the distance between the lenses? [2 pts]

3) Hans Lippershey builds a microscope with two convex lenses with focal lengths $f_o = 8.0$ mm and $f_e = 10$ cm. The tube length, i.e. the distance between the lenses, is $d = 16$ cm. The image of the objective lens is located at the focal point of the eyepiece lens (relaxed eye).

a) Find the magnification (aka linear magnification) of the objective lens. [2 pts]

b) Find the angular magnification of the eyepiece lens. [1 pt]

c) What is the total magnification? [1 pt]