

$$f = 100 \text{ mm}$$

- a) Find The distance to the screen if a slide is placed 103 mm from The lens.
From the given information $d_o = 103 \text{ mm}$

Using The image formula

$$\frac{1}{f} = \frac{1}{d_o} + \frac{1}{d_i}$$

Solve for d_i :

$$\frac{1}{d_i} = \frac{1}{f} - \frac{1}{d_o} = \frac{1}{100 \text{ mm}} - \frac{1}{103 \text{ mm}} = 2.913 \times 10^{-4} \text{ mm}^{-1}$$

$$d_i = 3433 \text{ mm} = \boxed{3.43 \text{ m}}$$

- b) If The slide is 24.0 x 36.0 mm, what are The dimensions of The image.

First find The magnification

$$m = -\frac{d_i}{d_o} = -\frac{3433 \text{ mm}}{103 \text{ mm}} = \boxed{-33.33}$$

Then $h_i = m h_o$

$$\text{height} = (-34.33)(24.0 \text{ mm}) = \frac{800}{823.9} \text{ mm} = \boxed{800 \text{ mm}}$$

$$\text{width} = (-34.33)(36.0 \text{ mm}) = \frac{1200}{1236} \text{ mm} = \boxed{1200 \text{ mm}}$$

Dimensions are ~~0.824 x 1.236 m~~
 $\boxed{0.800 \times 1.200 \text{ m}}$