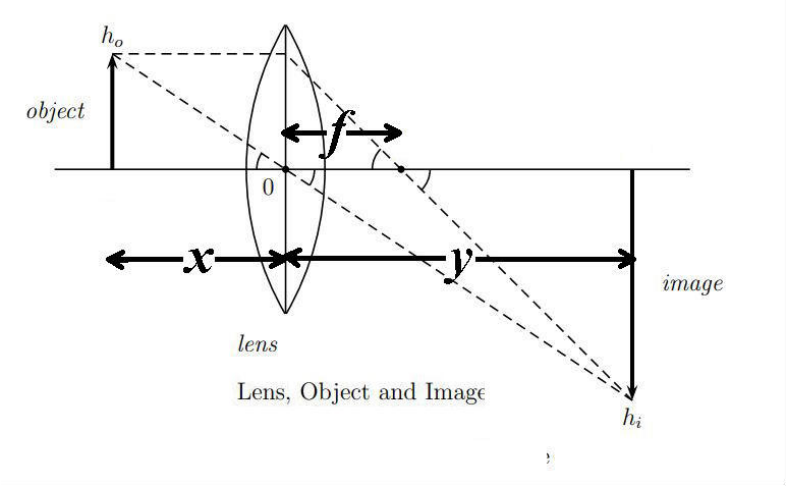
Let $x$ be the distance from an object to a lens
Let $y$ be the distance from the lens to the image
Let $f$ be the focal length



Lens, Object and Image

$$\frac{1}{f} = \frac{1}{x} + \frac{1}{y}$$

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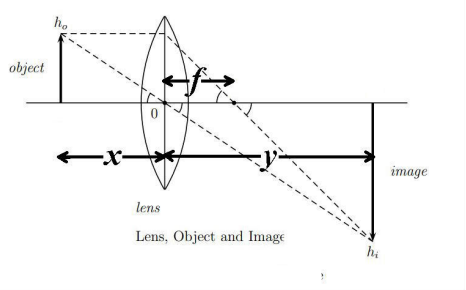


Suppose the positions of the object and its image are changing with time.

$$\frac{dx}{dt} = \frac{1}{8} \text{ cm/min} \qquad \frac{dy}{dt} = \frac{3}{8} \text{ cm/min}$$

At the point in time when $x = 4$ cm and $y = 4$ cm, find $\frac{df}{dt}$