

2. If f is the focal length of a convex lens and an object is placed at a distance p from the lens, then its image will be at a distance q from the lens, where f , p and q are related by the lens equation

$$\frac{1}{f} = \frac{1}{p} + \frac{1}{q}$$

If the focal length of the lens is 5 cm, how fast is the distance of the image from the lens changing when the object is 30 cm from the lens?

Want to know $\frac{dq}{dp}(30)$

$$\frac{1}{q} = \frac{1}{5} - \frac{1}{p} = \frac{p-5}{5p} \quad q = \frac{5p}{p-5}$$

$$\frac{dq}{dp} = \frac{(5)(p-5) - (5p)}{(p-5)^2} = \frac{-25}{(p-5)^2}$$

$$\frac{dq}{dp}(30) = \frac{-25}{(25)^2}$$