An optical device (OD) is known to be either a mirror or a lens. If an object is placed in front of the OD, it is observed that a real image is formed which is also in front of the OD.

a. Is the OD a mirror or lens? Is it convex or concave? (2 points)
b. If the image is three times larger than the object, what is the magnification? (2 points)
c. If the object is 8 inches from the OD, how far is the image from the OD? (3 points)
d. What is the focal length of the OD? (3 points)

a) Real image in front $\Rightarrow$ Concave mirror

b) Real image $m$ is ($) $\Rightarrow m = -3$

c) $m = -3 = -\frac{c'}{p}$

\[ c' = 3p = 3(8) = 24'' \]

d) \[ \frac{1}{c} + \frac{1}{p} = \frac{1}{f} \]

\[ \frac{1}{24} + \frac{1}{8} = \frac{1}{f} \]

\[ \frac{1}{24} + \frac{3}{24} = \frac{1}{f} \]

\[ \frac{4}{24} = \frac{1}{f} \]

\[ f = 6'' \]