

Physics 250: Unquiz 07

A converging lens of focal length $f=10$ cm has an image located at $s'=50$ cm. Find the object position and characterize the image.

A diverging lens of focal length $f=20$ cm has a virtual object located at 2 cm. Characterize the resulting image.

A converging lens of focal length f has a real image located at $2f$. Is this possible and what is the magnification of the image? Give the complete characterization.

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A converging lens of focal length $f=10$ cm has an image located at $s'=50$ cm. Find the object position and characterize the image.

$$\frac{1}{s} = \frac{1}{f} - \frac{1}{s'} \Rightarrow \frac{1}{s} = \frac{1}{10} - \frac{1}{50} = \frac{5-1}{50} = \frac{4}{50} \Rightarrow s = \frac{50}{4} = \frac{25}{2} = 12.5$$

$$M = \frac{-s'}{s} = \frac{-50}{12.5} = -4$$

Image is inverted, enlarged, real

A diverging lens of focal length $f=20$ cm has a virtual object located at 2 cm. Characterize the resulting image.

$$\frac{1}{s} + \frac{1}{s'} = \frac{1}{f} \Rightarrow \frac{1}{s} = \frac{1}{f} - \frac{1}{s'} = \frac{1}{-20} - \frac{1}{-2} = \frac{-1+10}{20} = \frac{9}{20} \Rightarrow s' = 2.22 : M = -\frac{s'}{s} = -\frac{2.22}{2} = -1.111$$

Image is inverted, enlarged, real

A converging lens of focal length f has a real image located at $2f$. Is this possible and what is the magnification of the image? Give the complete characterization.

$$\frac{1}{s} = \frac{1}{f} - \frac{1}{2f} = \frac{2-1}{2} = \frac{1}{2f} \Rightarrow s = f$$

$$M = -\frac{s'}{s} = -\frac{2f}{f} = -2$$

It is possible, image is real, inverted, enlarged.