Physics 220: 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.

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

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

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,

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.

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

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

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