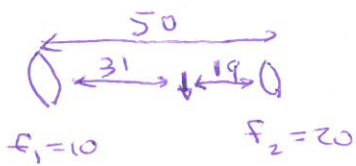


old #44 class 17



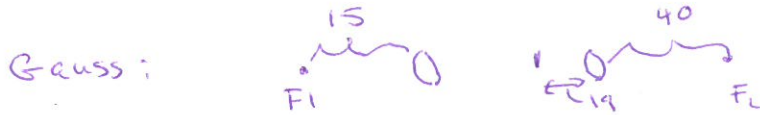
apparently  
upright  
virtual

$$\frac{1}{s_2} = \frac{1}{20} + \frac{1}{19} \Rightarrow s_2 = 9.74$$

$$s_1' = 40.26$$

$$M = \begin{bmatrix} -19 \\ 9.74 \end{bmatrix} \begin{bmatrix} -40.26 \\ 13.3 \end{bmatrix} = -5.9$$

invert  
real

$$\frac{1}{s_1} = \frac{1}{10} - \frac{1}{40.26} \Rightarrow s_1 = 13.305$$


$$F_1 = \frac{f_1(f_2 - d)}{f_1 + f_2 - d} = \frac{10(-30)}{-20} = 15$$

$$f = \frac{f_1 f_2}{f_1 + f_2 - d} = \frac{10 \cdot 20}{-20} = -10 \text{ cm}$$

$$F_2 = \frac{f_2(f_1 - d)}{f_1 + f_2 - d} = \frac{20(-40)}{-20} = 40$$

$$y = -5.9 \quad x = \frac{f^2}{y} = \frac{100}{-5.9} = -1.695 \Rightarrow \text{distan from lens } f_1 = 15 - 1.7 = 13.3 \text{ cm}$$

$$M = \frac{-f}{y} = \frac{10}{-1.7} = -5.9$$



$$F_1 = \frac{10 \cdot 0}{10} = 0$$

$$f = \frac{10 \cdot 20}{10} = 20$$

$$F_2 = \frac{20(-10)}{10} = -20$$

$$x = 14 \Rightarrow y = \frac{20^2}{14} = 28.6 \text{ (from } F_2) \quad M = \frac{-20}{14} = -1.4$$

old way:

$$\frac{1}{s_1} = \frac{1}{10} - \frac{1}{14} \Rightarrow s_1 = 35 \Rightarrow s_2 = -15$$

$$\frac{1}{s_2} = \frac{1}{20} + \frac{1}{15} \Rightarrow s_2' = 8.57 \text{ (from lens } f_2)$$

$$M = \left(\frac{-35}{14}\right) \left(\frac{-8.57}{-15}\right) = -1.4 \checkmark$$

$$101: f = \frac{f_1 f_2}{(f_1 + f_2 - d)}$$

$$f_1 = 12 \quad f_2 = -18 \quad d = 4$$

$$\rightarrow 36 \text{ cm} \quad \rightarrow 21.6 \text{ cm}$$

$$f_1 = 12 \quad f_2 = -18 \quad d = 1.2$$

$$\rightarrow 30 \text{ cm}$$

51 near pt  $s' = ?$  ← where image seen  
 $s^* = 25$  ← object at  
 $f = \frac{1}{2.75} = .36 \text{ m} = 36.36 \text{ cm}$

$$\frac{1}{s'} = \frac{1}{36.36} - \frac{1}{25}$$

$$s' = -80 \text{ cm}$$

far point  $s = \infty$  ← object at  
 $s' = ?$  ← where object seen  
 $f = \frac{1}{-1.3} = -.769 \text{ m} = -76.9 \text{ cm}$

$$\frac{1}{s'} = \frac{1}{f} - \frac{1}{\infty}$$

$$s' = f = -76.9 \text{ cm}$$

53 put image 43 cm in front of glasses  
 put object at 23 cm ← yes

$$\frac{1}{f} = \frac{1}{23} + \frac{1}{-43}$$

$$f = 49.5 \text{ cm}$$

$$D = \frac{1}{.495} = \text{not } D$$

2.02