Afocal System – Pupils

a) Focal Length and Separation

Two Positive Lenses $\longrightarrow$ $m = -0.1$

$$m = -\frac{f_2}{f_1} = -\frac{f_2}{200} = -0.1$$

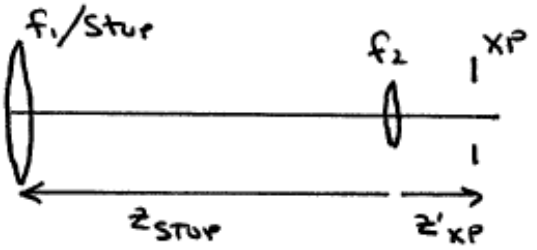
$$f_2 = 20\ mm$$

$$t = f_1 + f_2 = 220mm$$

b) Pupils

EP: is at the first lens with the same diameter. $D_{EP} = 50mm$

XP: Image the stop (first lens) through the second lens.



$$z_{STOP} = -f = -220mm$$

$$\frac{1}{z'_{XP}} = \frac{1}{z_{STOP}} + \frac{1}{f_2}$$

$z'_{XP} = 22\ mm$ to the right of f_2

$$m_{XP} = \frac{z'_{XP}}{z_{STOP}} = \frac{22\ mm}{-220\ mm} = -0.1$$

$$D_{XP} = |m_{XP}| D_{STOP} = 0.1 \cdot 50mm$$

$$D_{XP} = 5.0\ mm$$

or

Use the m of the afocal system:

$$D_{XP} = |m| D_{EP}$$

$$D_{XP} = 5.0\ mm$$