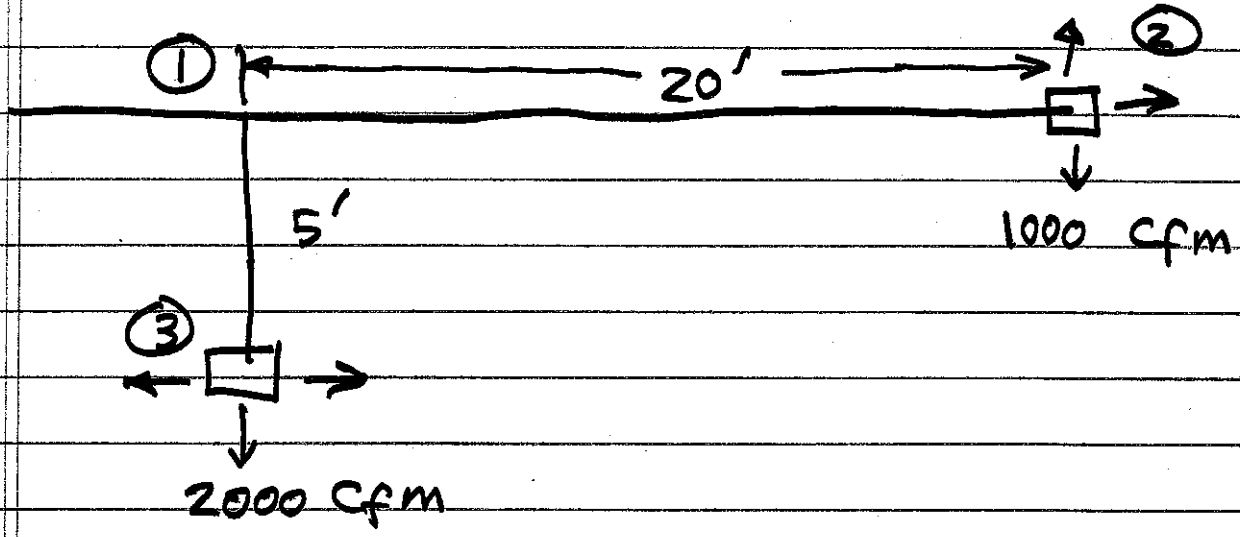
Example of Duct Sizing Guide:

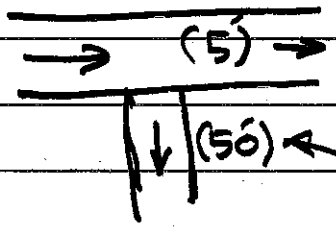


Note that ΔP from ① → ② must be the same as ① → ③

Size the duct system to keep velocity approximately below 40 ft/s (2400 fpm)

Note that equivalent length $L_{12} = 20 + 5 = 25'$

$L_{13} = 5' + 50 = 55'$



← equivalent length for fittings (see handout)

So given 2000 cfm and $V \lesssim 2400$ ft/min

select a duct size of $D_{1-3} = 14''$ ←

and the corresponding $\frac{\Delta P}{L} = 0.32 \frac{\text{in w.g.}}{100'}$

with $L_{13} = 55' \rightarrow (\Delta P)_{1-3} = 0.176$ in w.g.

Thus $(\Delta P)_{1-2}$ must be $= 0.176$ in w.g.

$$\frac{(\Delta P)_{1-2}}{L_{1-2}} = \frac{0.176 \text{ in w.g.}}{25'} = \frac{0.704}{100'} \text{ w.g.}$$

Use $\begin{cases} \frac{(\Delta P)_{1-2}}{L_{1-2}} = \frac{0.7}{100'} \text{ w.g.} \Rightarrow D_{1-2} \simeq 9'' \leftarrow \\ \text{flow } 1000 \text{ cfm} \end{cases}$

@ 3000 cfm $D_1 \simeq 16''$