

# Sample Problem

- We must bridge a gap of  $L = 8'$
- The bridge must have a width of  $b = 4''$
- A load  $P = 300 \text{ lb}$  can be applied at any point
- There must be a safety factor  $X = 1.5$  for strength
- The deflection,  $v$ , must not exceed  $1''$
- Weight (mass) and cost have equal importance

OBJECTIVE: select the best candidate material from...

AISI 1020 steel

AISI 4340 steel

7075-T6 aluminum

Ti-6Al-4V (titanium alloy)

Polycarbonate

Loblolly pine

GFRP (glass fiber reinforced polymer)

CFRP (carbon fiber reinforced polymer)