

# Truss Analysis

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# Review: Member Design

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- **Compression elements have lower stresses due to buckling**

$$P_{cr} = \pi^2 EI / (kL)^2$$

- **When using graphic statics for truss analysis, use clockwise convention to determine if an element is in tension or compression.**

# Truss Lecture

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- **Moments of forces for finding reactions**
- **Method of joints for analyzing trusses**
- **Graphical analysis for analyzing trusses**

# Three Equations of Equilibrium

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**1. Sum of vertical forces must be zero**

$$\Sigma F_y = 0$$

**2. Sum of horizontal forces must be zero**

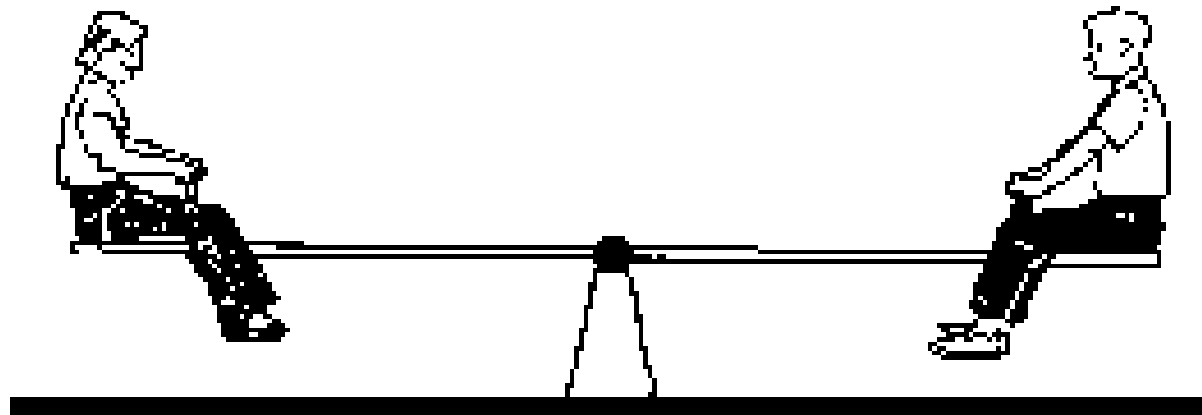
$$\Sigma F_x = 0$$

**3. Sum of moments must be zero**

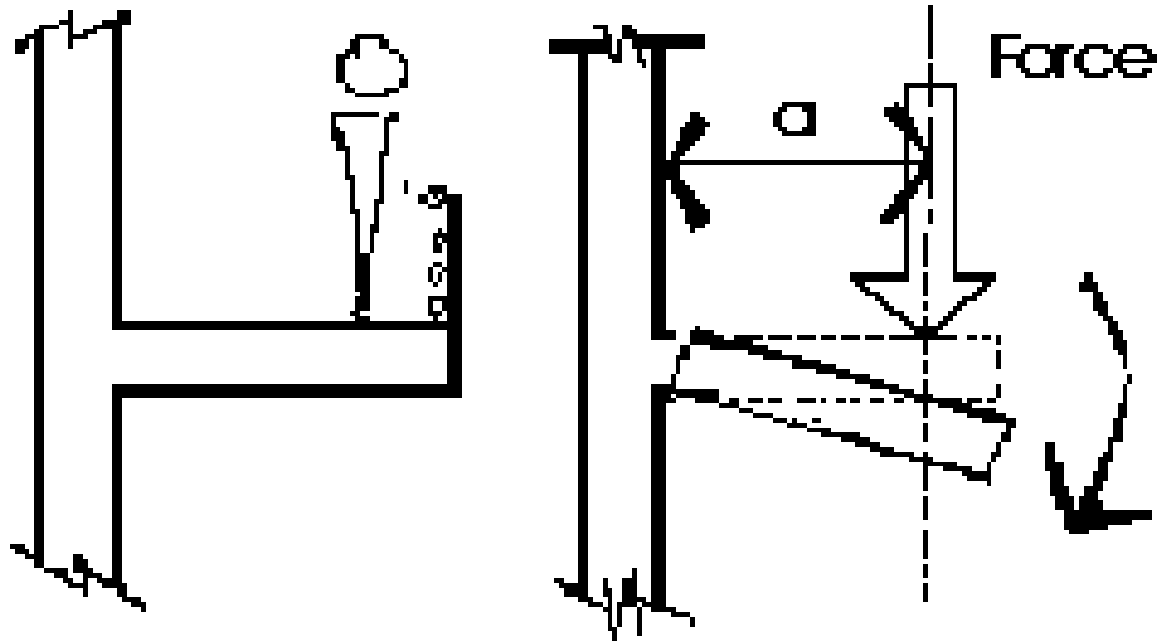
$$\Sigma M = 0$$

# Moment Equilibrium

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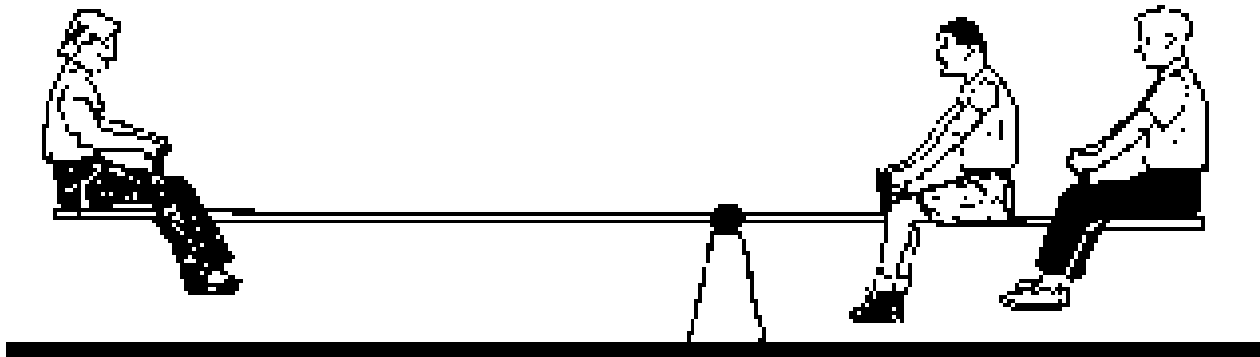
# Moment of Force



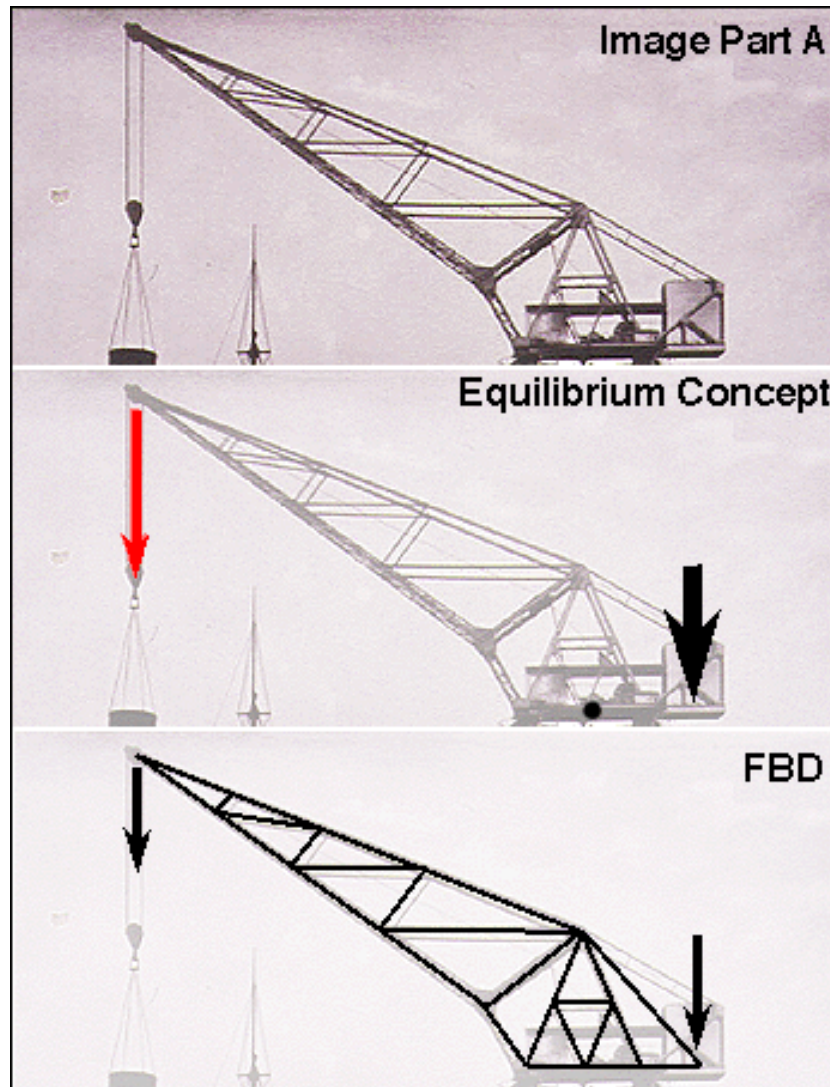
$$M = Fa$$

# Moment Equilibrium

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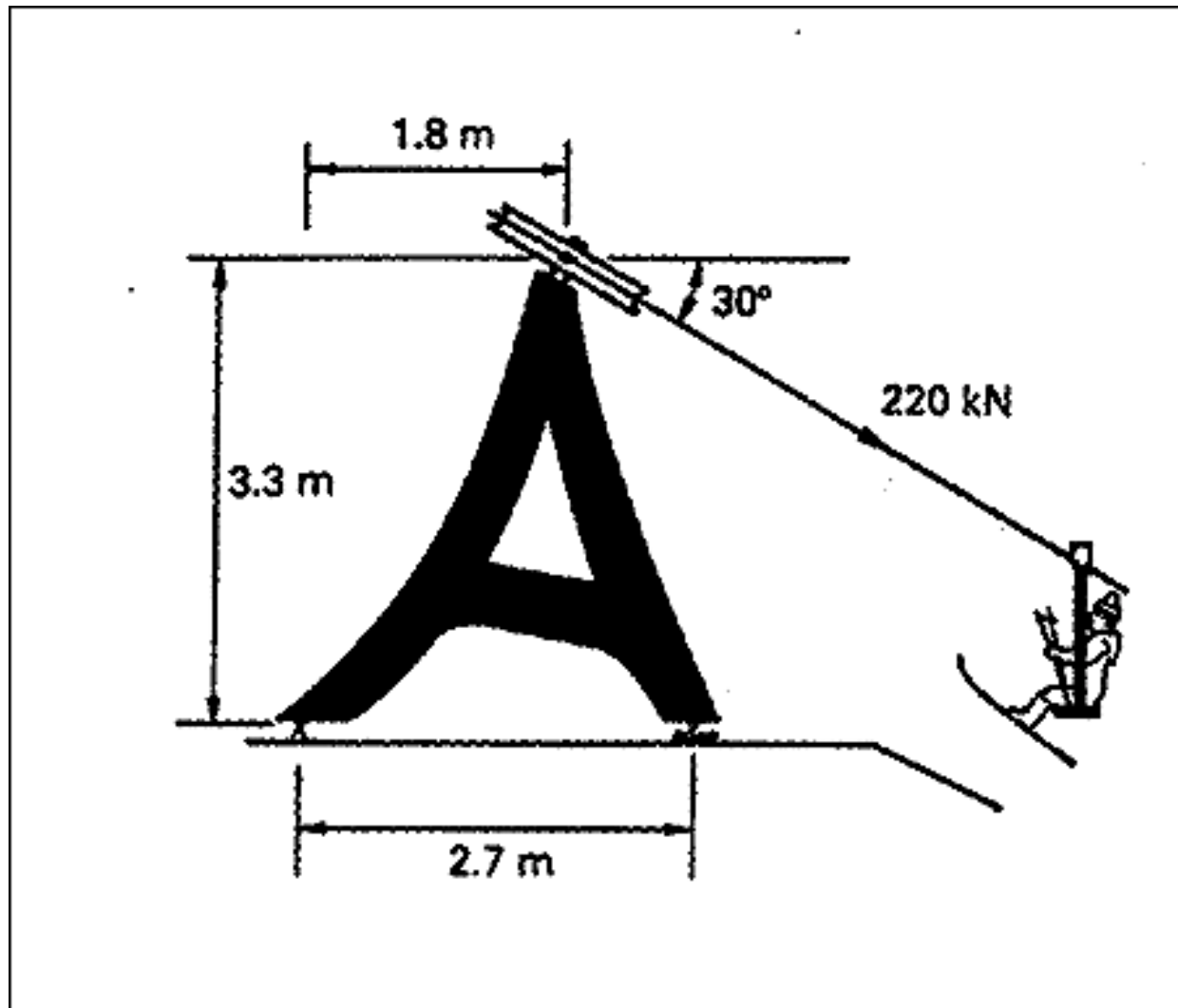


# Crane Counterweight





# Equilibrium of Ski Lift Tower



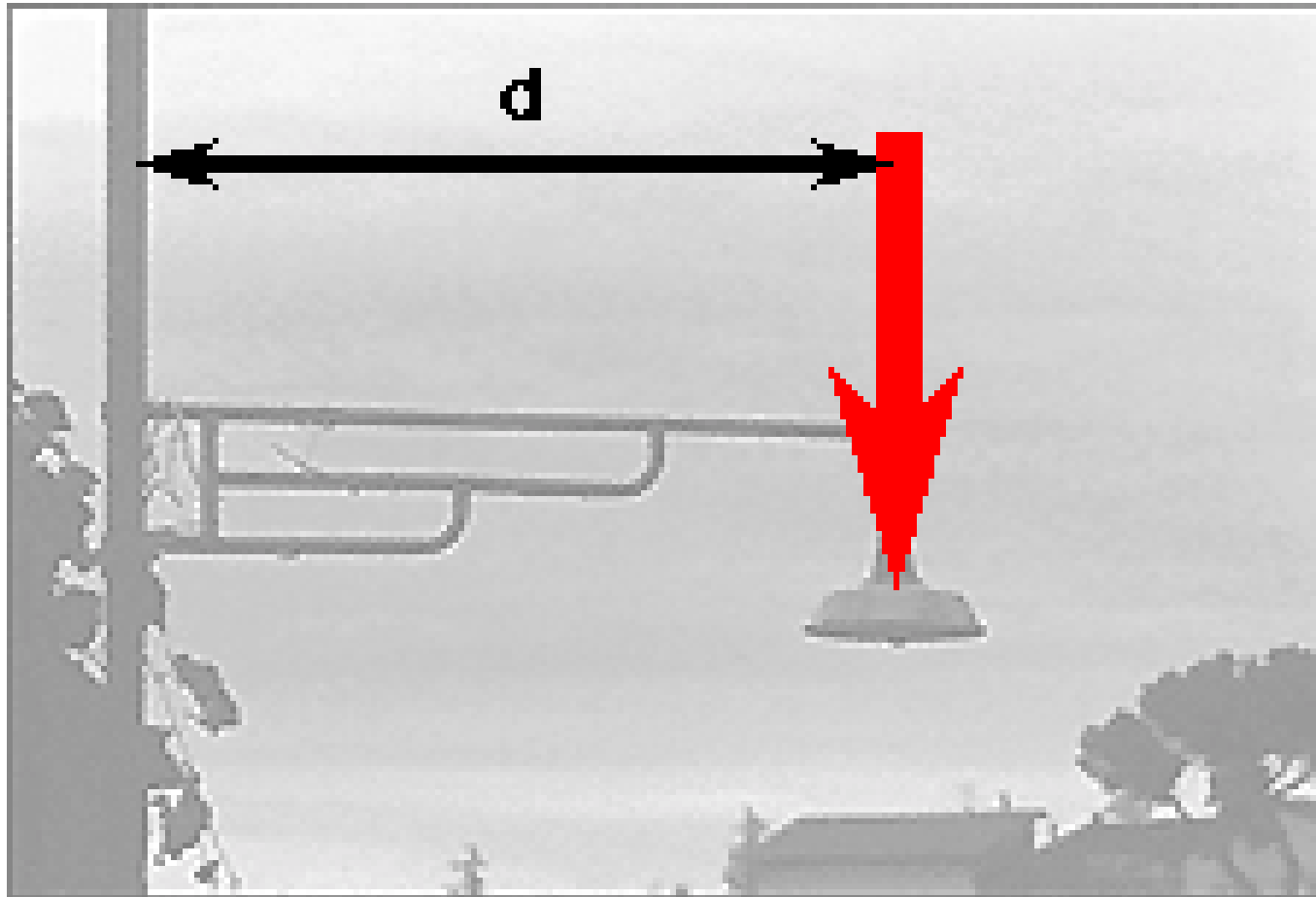
# Eiffel Tower



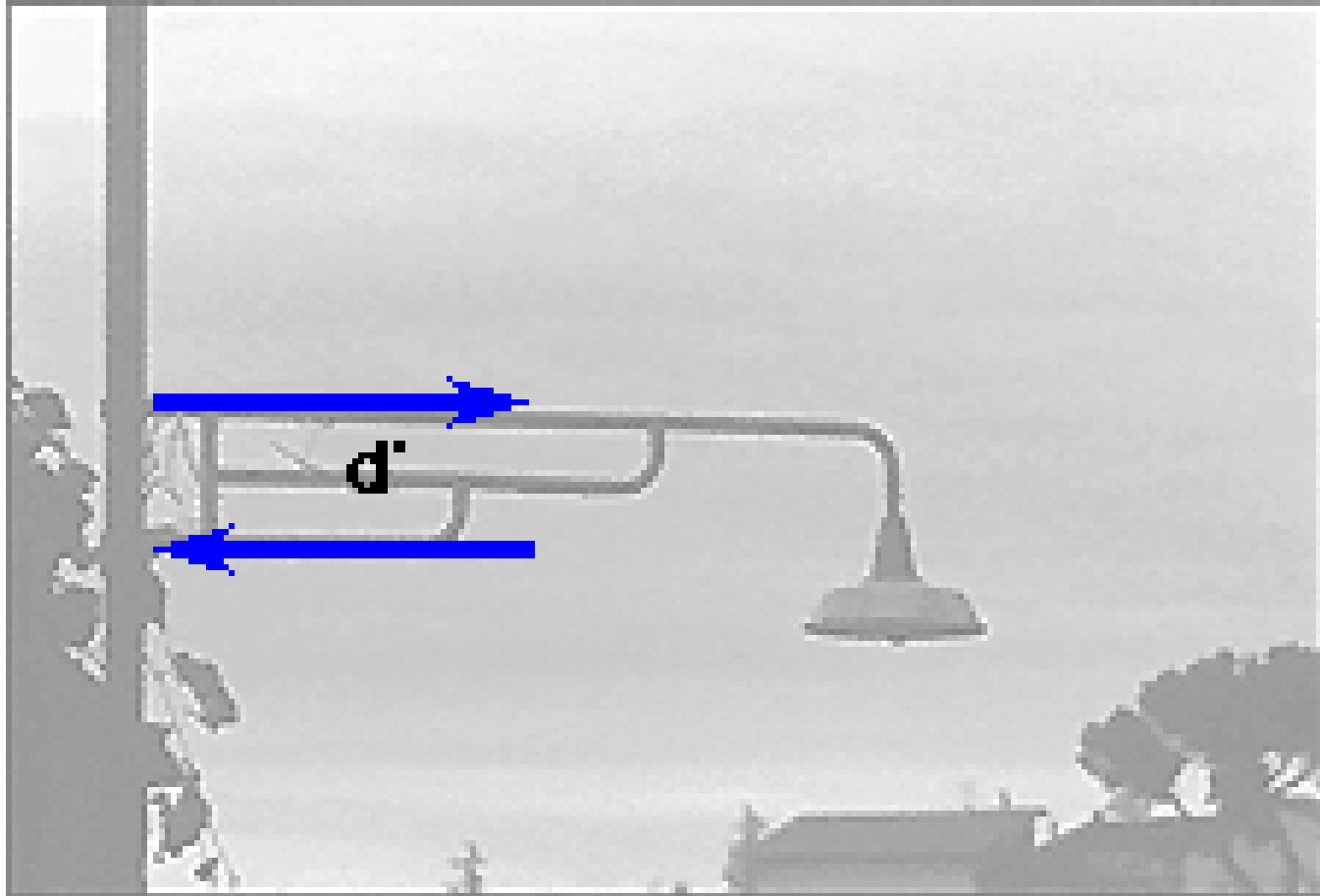
# Cantilevered Streetlight



# Weight of Lamp



# Reactions at Supports



# Trusses

- **Rotational Equilibrium**
  - *Sum of the moments must equal zero.*
  - **Use to calculate reactions at supports and to find internal forces**
- **Trusses are an efficient way to carry loads with minimal material**
- **Look for examples of moment equilibrium around you**

