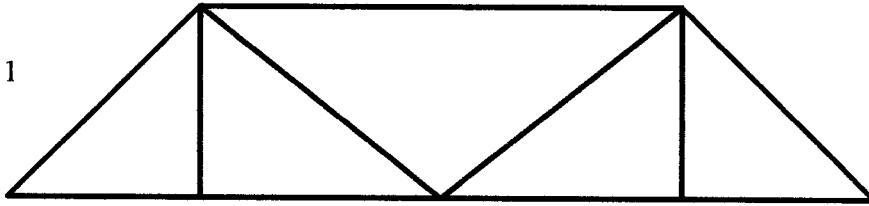


# Structural Stability Formula

$$K = 2J - R$$

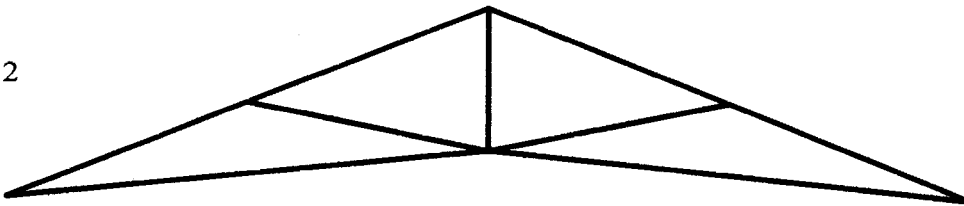
**K** = The unknown to be solved  
**J** = # of joints  
**M** = # of members  
**R** = 3 (the # of sides on a triangle)

Figure 1



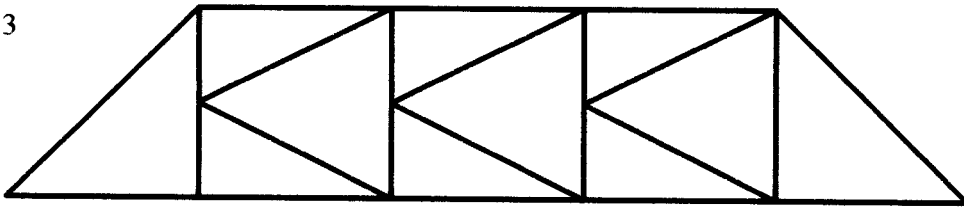
J = \_\_\_\_\_  
 M = \_\_\_\_\_

Figure 2



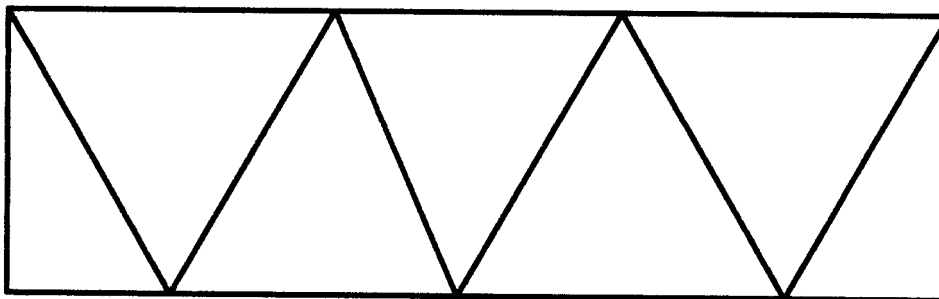
J = \_\_\_\_\_  
 M = \_\_\_\_\_

Figure 3



J = \_\_\_\_\_  
 M = \_\_\_\_\_

Figure 4



J = \_\_\_\_\_  
 M = \_\_\_\_\_

## Stability Formula Results

**M = K** stable design

**M < K** design is not stable

**M > K** design is indeterminate

1. Figure 1

$$K = 2J - R$$

$$J = \underline{\hspace{2cm}}$$

$$K = 2(\underline{\hspace{1cm}}) - \underline{\hspace{1cm}}$$

$$M = \underline{\hspace{2cm}}$$

$$K = \underline{\hspace{1cm}} - \underline{\hspace{1cm}}$$

$$K = \underline{\hspace{2cm}}$$

Results:

$$M \underline{\hspace{1cm}} K \underline{\hspace{2cm}}$$

2. Figure 2

$$K = 2J - R$$

$$J = \underline{\hspace{2cm}}$$

$$K = 2(\underline{\hspace{1cm}}) - \underline{\hspace{1cm}}$$

$$M = \underline{\hspace{2cm}}$$

$$K = \underline{\hspace{1cm}} - \underline{\hspace{1cm}}$$

$$K = \underline{\hspace{2cm}}$$

Results:

$$M \underline{\hspace{1cm}} K \underline{\hspace{2cm}}$$

3. Figure 3

$$K = 2J - R$$

$$J = \underline{\hspace{2cm}}$$

$$K = 2(\underline{\hspace{1cm}}) - \underline{\hspace{1cm}}$$

$$M = \underline{\hspace{2cm}}$$

$$K = \underline{\hspace{1cm}} - \underline{\hspace{1cm}}$$

$$K = \underline{\hspace{2cm}}$$

Results:

$$M \underline{\hspace{1cm}} K \underline{\hspace{2cm}}$$

4. Figure 4

$$K = 2J - R$$

$$J = \underline{\hspace{2cm}}$$

$$K = 2(\underline{\hspace{1cm}}) - \underline{\hspace{1cm}}$$

$$M = \underline{\hspace{2cm}}$$

$$K = \underline{\hspace{1cm}} - \underline{\hspace{1cm}}$$

$$K = \underline{\hspace{2cm}}$$

Results:

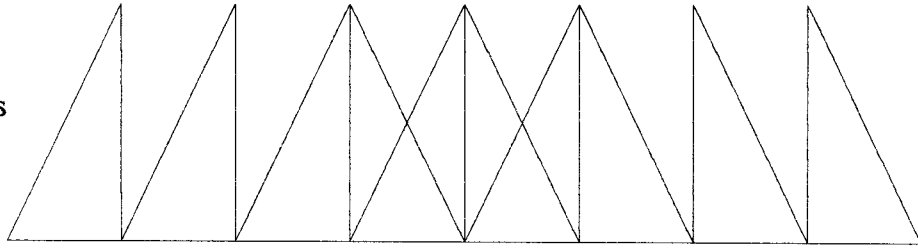
$$M \underline{\hspace{1cm}} K \underline{\hspace{2cm}}$$

# Structural Stability Formula

$$K=2J-R$$

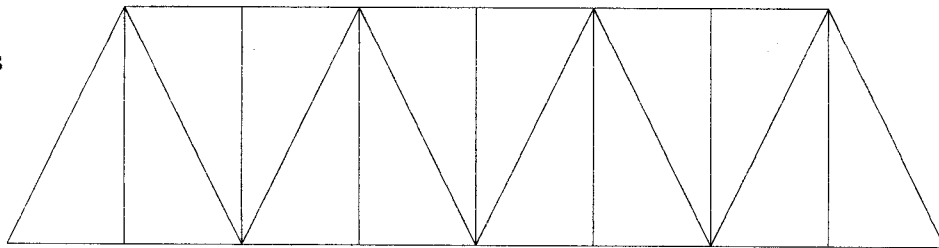
**K=** The unknown to be solved  
**J=** # of joints  
**M=** # of members  
**R=** 3 (the # of sides on a triangle)

Figure 1  
Howe truss



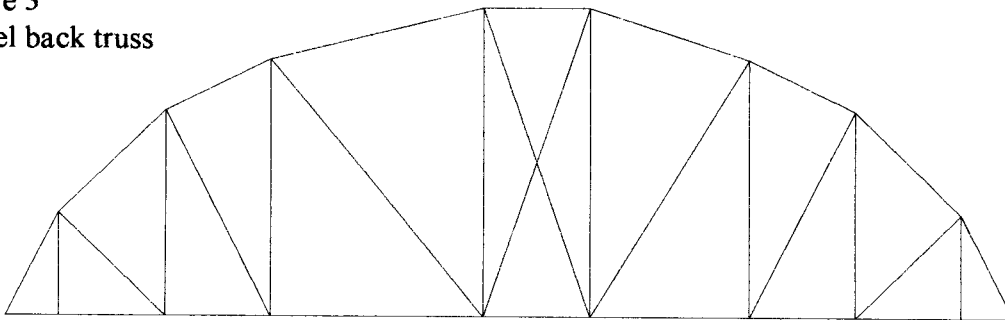
J= \_\_\_\_\_  
M= \_\_\_\_\_

Figure 2  
Warren truss



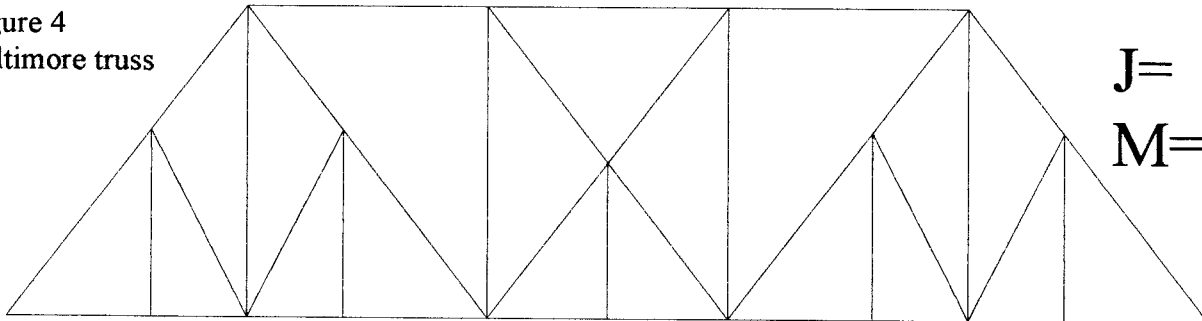
J= \_\_\_\_\_  
M= \_\_\_\_\_

Figure 3  
Camel back truss



J= \_\_\_\_\_  
M= \_\_\_\_\_

Figure 4  
Baltimore truss



J= \_\_\_\_\_  
M= \_\_\_\_\_

## Stability Formula Results

**M = K** stable design

**M < K** design is not stable

**M > K** design is indeterminate

1. Figure 1

$$K = 2J - R$$

$$J = \underline{\hspace{2cm}}$$

$$K = 2(\underline{\hspace{1cm}}) - \underline{\hspace{1cm}}$$

$$M = \underline{\hspace{2cm}}$$

$$K = \underline{\hspace{1cm}} - \underline{\hspace{1cm}}$$

$$K = \underline{\hspace{3cm}}$$

Results:

$$M \underline{\hspace{1cm}} K \underline{\hspace{3cm}}$$

2. Figure 2

$$K = 2J - R$$

$$J = \underline{\hspace{2cm}}$$

$$K = 2(\underline{\hspace{1cm}}) - \underline{\hspace{1cm}}$$

$$M = \underline{\hspace{2cm}}$$

$$K = \underline{\hspace{1cm}} - \underline{\hspace{1cm}}$$

$$K = \underline{\hspace{3cm}}$$

Results:

$$M \underline{\hspace{1cm}} K \underline{\hspace{3cm}}$$

3. Figure 3

$$K = 2J - R$$

$$J = \underline{\hspace{2cm}}$$

$$K = 2(\underline{\hspace{1cm}}) - \underline{\hspace{1cm}}$$

$$M = \underline{\hspace{2cm}}$$

$$K = \underline{\hspace{1cm}} - \underline{\hspace{1cm}}$$

$$K = \underline{\hspace{3cm}}$$

Results:

$$M \underline{\hspace{1cm}} K \underline{\hspace{3cm}}$$

4. Figure 4

$$K = 2J - R$$

$$J = \underline{\hspace{2cm}}$$

$$K = 2(\underline{\hspace{1cm}}) - \underline{\hspace{1cm}}$$

$$M = \underline{\hspace{2cm}}$$

$$K = \underline{\hspace{1cm}} - \underline{\hspace{1cm}}$$

$$K = \underline{\hspace{3cm}}$$

Results:

$$M \underline{\hspace{1cm}} K \underline{\hspace{3cm}}$$

# Structural Stability

## Formula

$$K=2J-R$$

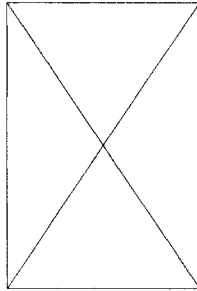
**K= The unknown to be solved**

**J= # of joints**

**M= # of members**

**R= 3 (the # of sides on a triangle)**

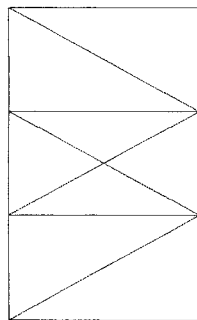
Figure 1



$$J = \underline{\hspace{2cm}}$$

$$M = \underline{\hspace{2cm}}$$

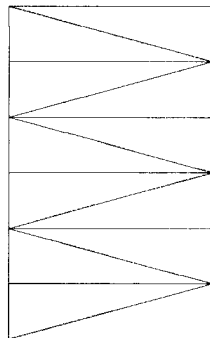
Figure 2



$$J = \underline{\hspace{2cm}}$$

$$M = \underline{\hspace{2cm}}$$

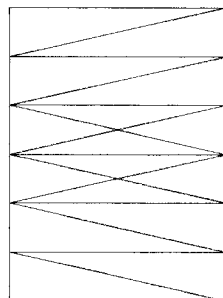
Figure 3



$$J = \underline{\hspace{2cm}}$$

$$M = \underline{\hspace{2cm}}$$

Figure 4



$$J = \underline{\hspace{2cm}}$$

$$M = \underline{\hspace{2cm}}$$

### Stability Formula Results

**M = K stable design**

**M < K design is not stable**

**M > K design is indeterminate**

1. Figure 1

$$K = 2J - R$$

$$J = \underline{\hspace{2cm}}$$

$$K = 2(\underline{\hspace{1cm}}) - \underline{\hspace{1cm}}$$

$$M = \underline{\hspace{2cm}}$$

$$K = \underline{\hspace{1cm}} - \underline{\hspace{1cm}}$$

$$K = \underline{\hspace{3cm}}$$

Results:

$$M \underline{\hspace{1cm}} K \underline{\hspace{3cm}}$$

2. Figure 2

$$K = 2J - R$$

$$J = \underline{\hspace{2cm}}$$

$$K = 2(\underline{\hspace{1cm}}) - \underline{\hspace{1cm}}$$

$$M = \underline{\hspace{2cm}}$$

$$K = \underline{\hspace{1cm}} - \underline{\hspace{1cm}}$$

$$K = \underline{\hspace{3cm}}$$

Results:

$$M \underline{\hspace{1cm}} K \underline{\hspace{3cm}}$$

3. Figure 3

$$K = 2J - R$$

$$J = \underline{\hspace{2cm}}$$

$$K = 2(\underline{\hspace{1cm}}) - \underline{\hspace{1cm}}$$

$$M = \underline{\hspace{2cm}}$$

$$K = \underline{\hspace{1cm}} - \underline{\hspace{1cm}}$$

$$K = \underline{\hspace{3cm}}$$

Results:

$$M \underline{\hspace{1cm}} K \underline{\hspace{3cm}}$$

4. Figure 4

$$K = 2J - R$$

$$J = \underline{\hspace{2cm}}$$

$$K = 2(\underline{\hspace{1cm}}) - \underline{\hspace{1cm}}$$

$$M = \underline{\hspace{2cm}}$$

$$K = \underline{\hspace{1cm}} - \underline{\hspace{1cm}}$$

$$K = \underline{\hspace{3cm}}$$

Results:

$$M \underline{\hspace{1cm}} K \underline{\hspace{3cm}}$$