on supports one foot apart. Bearing in mind the principle of the equality of moments of rupture and resistance necessary for perfect equilibrium, as previously explained, the following application to beams differently circumstanced will cover the requirements of ordinary practice.

Beam loaded at one end, fastened at the other. Maximum moment of rupture occurs at point of support. The lever which produces this is the length of the beam, or \( l \).

\[ M_{\text{max}} = WL = R \quad \text{and} \quad W = \frac{R}{l} \]  
\[ \text{(2)} \]

Beam supported at one end, and uniformly loaded with \( w \) units per foot; \( wl \) will be therefore the total load, the centre of gravity of which is in the middle of beam, or leverage of action to produce mean moment of rupture is \( \frac{1}{2} l \).

\[ M_{\text{max}} = w\ell \times \frac{l}{2} = \frac{wl^2}{2} = R \quad \text{and} \quad w = \frac{2R}{l^2} \]  
\[ \text{(3)} \]

Beam loaded at centre with \( W \), and supported at both ends, length \( l \). Leverage of action \( \frac{1}{2} l \) for the reaction of either abutment, the fulcrum being immediately under the weight.

\[ M_{\text{max}} = \frac{1}{2} W \times \frac{1}{2} l = \frac{Wl}{4} = R \quad \text{and} \quad W = \frac{4R}{l^2} \]  
\[ \text{(4)} \]

Beam uniformly loaded with \( w \) per unit of length, giving \( w\ell \) for total load—supported at both ends. Maximum moment under centre gravity of load, lever \( \frac{1}{2} l \). Reaction of either abutment \( \frac{1}{2} \) the whole load.

\[ M_{\text{max}} = \frac{1}{2} w\ell \times \frac{1}{2} l \quad \text{less} \quad \frac{1}{2} \ w\ell \times \frac{1}{4} l = \frac{wl^2}{4} - \frac{wl^2}{8} = \frac{wl^2}{8} = R \quad \text{and} \]

\[ w = \frac{8R}{l^2} \]  
\[ \text{(5)} \]