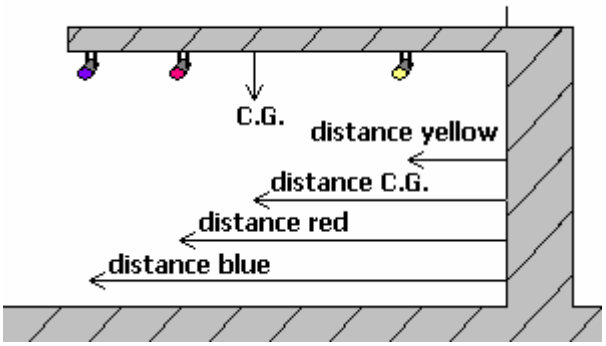
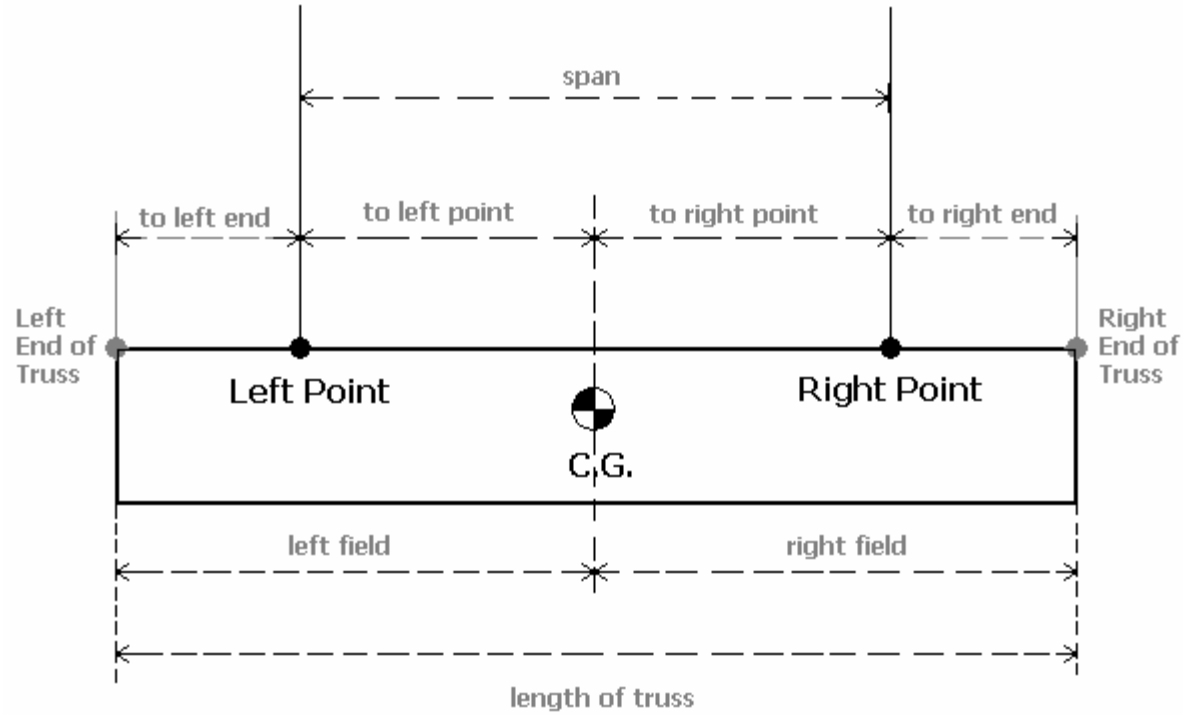


$$C.G._{Distance} = \frac{blue_{Weigth} \cdot blue_{Distance} + red_{Weigth} \cdot red_{Distance} + yellow_{Weigth} \cdot yellow_{Distance} + \ldots}{blue_{Weigth} + red_{Weigth} + yellow_{Weigth} + \ldots}$$

$$C.G._{Weigth} = blue_{Weigth} + red_{Weigth} + yellow_{Weigth} + \ldots$$



$$LPW = \frac{trpl}{span} C.G._{Weigth} \quad , \quad RPW = C.G._{Weigth} - LPW \quad ; \quad RPW = \frac{tlpl}{span} C.G._{Weigth} \quad , \quad LPW = C.G._{Weigth} - RPW$$

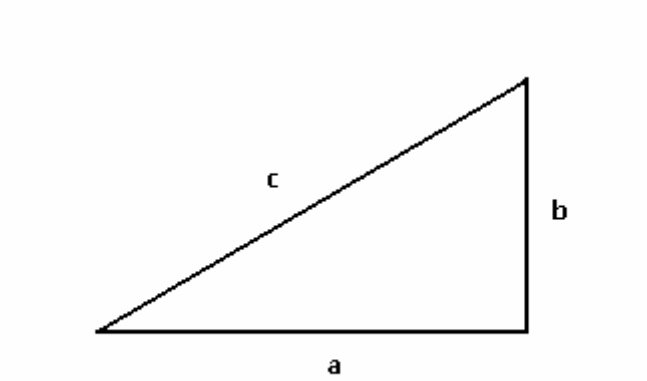
Lengths

length of truss = loft
left field length = lfl
right field length = rfl
to left end length = tlel
to left point length = tlpl
to right point length = trpl
to right end length = trel

Weights

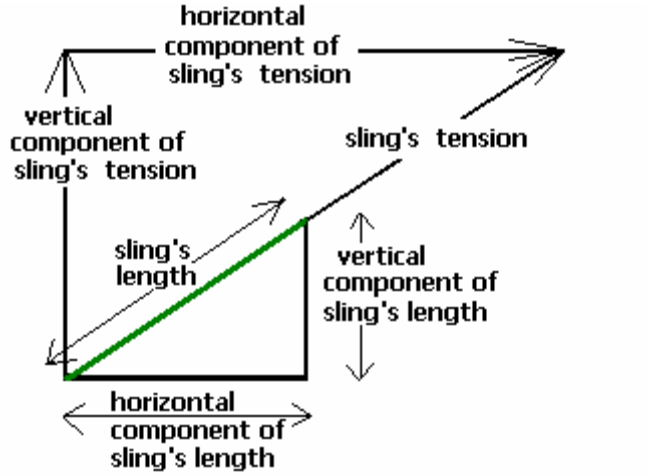
Left Point Weight = LPW
Right Point Weight = RPW
Weight C.G. = $C.G._{weigth}$

Pythagorean Triangle



$$c^2 = a^2 + b^2$$
$$c = \sqrt{a^2 + b^2}$$
$$a = \sqrt{c^2 - b^2}$$
$$b = \sqrt{c^2 - a^2}$$

Forces like Triangle



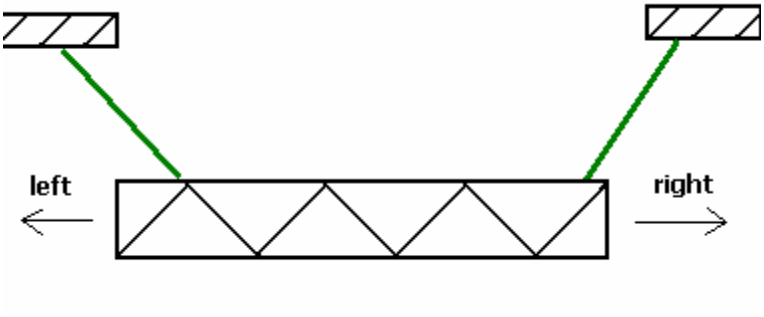
$$\frac{sling's\_length}{horizontal\_component\_of\_sling's\_length} = \frac{sling's\_tension}{horizontale\_component\_of\_sling's\_tension}$$

$$\frac{horizontal\_component\_of\_sling's\_length}{vertical\_component\_of\_sling's\_length} = \frac{horizontal\_component\_of\_sling's\_tension}{vertical\_component\_of\_sling's\_tension}$$

$$\frac{vertical\_component\_of\_sling's\_length}{sling's\_length} = \frac{vertical\_component\_of\_sling's\_tension}{sling's\_tension}$$

$$\vdots$$

Object at rest



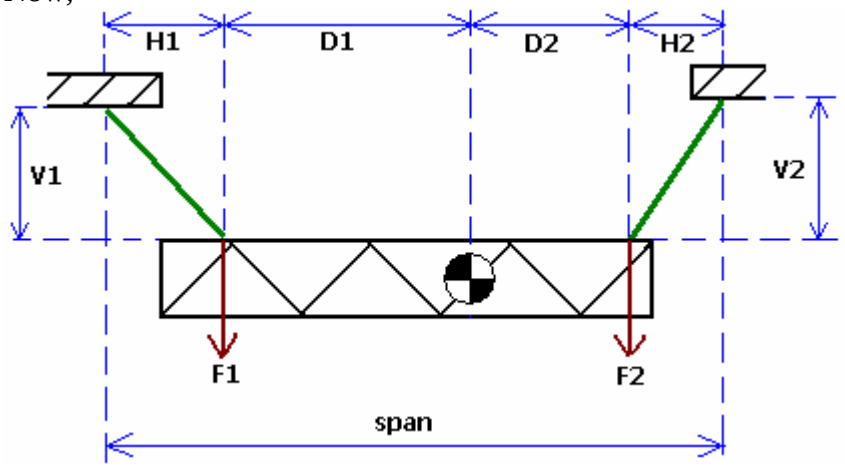
Horizontal components of slings on both sides are equal, but in opposite directions, so they cancel each other and the truss is at rest.

$$horizontal\_component\_of\_left\_sling's\_tension = horizontal\_component\_of\_right\_sling's\_tension$$

So,

$$\frac{horizontal\_component\_of\_left\_sling's\_length}{vertical\_component\_of\_left\_sling's\_length} \cdot LPW = \frac{horizontal\_component\_of\_right\_sling's\_length}{vertical\_component\_of\_right\_sling's\_length} \cdot RPW$$

Now,



$$span = D_1 + D_2 + H_1 + H_2$$

$$\frac{H_1}{V_1} \cdot F_1 = \frac{H_2}{V_2} F_2 \quad \left| \cdot V_1 \right.$$

$$\frac{H_1}{V_1} \cdot F_1 = \frac{H_2}{V_2} F_2 \quad \left| \cdot V_2 \right.$$

$$H_1 \cdot F_1 = \frac{H_2 \cdot F_2 \cdot V_1}{V_2} \quad \left| \div F_1 \right.$$

$$\frac{H_1 \cdot F_1 \cdot V_2}{V_1} = H_2 \cdot F_2 \quad \left| \div F_2 \right.$$

$$H_1 = \frac{H_2 \cdot F_2 \cdot V_1}{V_2 \cdot F_1}$$

$$\frac{H_1 \cdot F_1 \cdot V_2}{V_1 \cdot F_2} = H_2$$

Horizontal component of left sling's length

$$span = D_1 + D_2 + H_1 + H_2$$

$$H_1 = span - D_1 - D_2 - H_2 \qquad \text{since: } H_2 = \frac{H_1 \cdot F_1 \cdot V_2}{V_1 \cdot F_2}$$

$$H_1 = span - D_1 - D_2 - \frac{H_1 \cdot F_1 \cdot V_2}{V_1 \cdot F_2} \quad \left| \cdot (V_1 \cdot F_2) \right.$$

$$H_1 \cdot (V_1 \cdot F_2) = span \cdot (V_1 \cdot F_2) - D_1 \cdot (V_1 \cdot F_2) - D_2 \cdot (V_1 \cdot F_2) - (H_1 \cdot F_1 \cdot V_2)$$

$$H_1 \cdot (V_1 \cdot F_2) + H_1 \cdot (F_1 \cdot V_2) = (V_1 \cdot F_2) \cdot (span - D_1. - D_2)$$

$$H_1 \cdot (V_1 \cdot F_2 + F_1 \cdot V_2) = (V_1 \cdot F_2) \cdot (span - D_1 - D_2) \quad \left| \div (V_1 \cdot F_2 + F_1 \cdot V_2) \right.$$

$$H_1 = \frac{(V_1 \cdot F_2) \cdot (span - D_1 - D_2)}{(V_1 \cdot F_2 + F_1 \cdot V_2)}$$

$$H_1 = \frac{(V_1 \cdot F_2) \cdot (span - D_1 - D_2)}{(V_1 \cdot F_2) \cdot \left(1 + \frac{F_1 \cdot V_2}{V_1 \cdot F_2}\right)} \qquad H_1 = \frac{span - D_1 - D_2}{1 + \frac{F_1 \cdot V_2}{V_1 \cdot F_2}}$$

and

$$H_1 = \frac{span - D_1 - D_2}{1 + \frac{F_1 \cdot V_2}{V_1 \cdot F_2}}, \qquad \text{since: } F_1 = \frac{D_2 (F_1 + F_2)}{D_1 + D_2} \qquad \text{and: } F_2 = \frac{D_1 (F_1 + F_2)}{D_1 + D_2},$$

$$H_1 = \frac{span - D_1 - D_2}{1 + \frac{\frac{D_2 (F_1 + F_2)}{D_1 + D_2} \cdot V_2}{V_1 \cdot \frac{D_1 (F_1 + F_2)}{D_1 + D_2}}} \qquad H_1 = \frac{span - D_1 - D_2}{1 + \frac{D_2 \cdot V_2 (F_1 + F_2) \cdot (D_1 + D_2)}{D_1 \cdot V_1 (F_1 + F_2) \cdot (D_1 + D_2)}}$$

$$H_1 = \frac{span - D_1 - D_2}{1 + \frac{D_2 \cdot V_2}{D_1 \cdot V_1}} \qquad H_1 = \frac{span - D_1 - D_2}{\frac{D_1 \cdot V_1 + D_2 \cdot V_2}{D_1 \cdot V_1}} \qquad H_1 = \frac{span - D_1 - D_2}{D_1 \cdot V_1 + D_2 \cdot V_2} \cdot (D_1 \cdot V_1)$$

Horizontal component of right sling's length

$$span = D_1 + D_2 + H_1 + H_2$$

$$H_2 = span - D_1 - D_2 - H_1 \qquad \text{since: } H_1 = \frac{H_2 \cdot F_2 \cdot V_1}{V_2 \cdot F_1}$$

$$H_2 = span - D_1 - D_2 - \frac{H_2 \cdot F_2 \cdot V_1}{V_2 \cdot F_1} \quad \left| \cdot (V_2 \cdot F_1) \right.$$

$$H_2 \cdot (V_2 \cdot F_1) = span \cdot (V_2 \cdot F_1) - D_1 \cdot (V_2 \cdot F_1) - D_2 \cdot (V_2 \cdot F_1) - (H_2 \cdot F_2 \cdot V_1)$$

$$H_2 \cdot (V_2 \cdot F_1 + F_2 \cdot V_1) = (V_2 \cdot F_1) \cdot (span - D_1 - D_2) \quad \left| \div (V_2 \cdot F_1 + F_2 \cdot V_1) \right.$$

$$H_2 = \frac{(V_2 \cdot F_1) \cdot (span - D_1 - D_2)}{(V_2 \cdot F_1 + F_2 \cdot V_1)}$$

$$H_2 = \frac{(V_2 \cdot F_1) \cdot (span - D_1 - D_2)}{(V_2 \cdot F_1) \cdot \left(1 + \frac{F_2 \cdot V_1}{V_2 \cdot F_1}\right)} \qquad H_2 = \frac{span - D_1 - D_2}{1 + \frac{F_2 \cdot V_1}{V_2 \cdot F_1}}$$

and

$$H_2 = \frac{span - D_1 - D_2}{1 + \frac{F_2 \cdot V_1}{V_2 \cdot F_1}}, \qquad \text{since: } F_1 = \frac{D_2 (F_1 + F_2)}{D_1 + D_2} \qquad \text{and: } F_2 = \frac{D_1 (F_1 + F_2)}{D_1 + D_2}$$

$$H_2 = \frac{span - D_1 - D_2}{1 + \frac{\frac{D_1 (F_1 + F_2)}{D_1 + D_2} \cdot V_1}{V_2 \cdot \frac{D_2 (F_1 + F_2)}{D_1 + D_2}}} \qquad H_2 = \frac{span - D_1 - D_2}{1 + \frac{D_1 \cdot V_1 (F_1 + F_2) \cdot (D_1 + D_2)}{D_2 \cdot V_2 (F_1 + F_2) \cdot (D_1 + D_2)}}$$

$$H_2 = \frac{span - D_1 - D_2}{1 + \frac{D_1 \cdot V_1}{D_2 \cdot V_2}} \qquad H_2 = \frac{span - D_1 - D_2}{\frac{D_2 \cdot V_2 + D_1 \cdot V_1}{D_2 \cdot V_2}} \qquad H_2 = \frac{span - D_1 - D_2}{D_2 \cdot V_2 + D_1 \cdot V_1} \cdot (D_2 \cdot V_2)$$

To right point (D1)

$$span = D_1 + D_2 + H_1 + H_2$$

$$D_1 = span - D_2 - H_1 - H_2, \qquad \text{since: } H_1 = \frac{span - D_1 - D_2}{D_1 \cdot V_1 + D_2 \cdot V_2} \cdot (D_1 \cdot V_1)$$

$$D_1 = span - D_2 - \frac{span - D_1 - D_2}{D_1 \cdot V_1 + D_2 \cdot V_2} \cdot (D_1 \cdot V_1) - H_2 \quad \left| \cdot (D_1 \cdot V_1 + D_2 \cdot V_2) \right.$$

$$D_1 \cdot (D_1 \cdot V_1 + D_2 \cdot V_2) = span \cdot (D_1 \cdot V_1 + D_2 \cdot V_2) - D_2 \cdot (D_1 \cdot V_1 + D_2 \cdot V_2) - (span - D_1 - D_2) \cdot (D_1 \cdot V_1) - H_2 \cdot (D_1 \cdot V_1 + D_2 \cdot V_2)$$

$$D_1^2 \cdot V_1 + D_1 \cdot D_2 \cdot V_2 = span \cdot D_1 \cdot V_1 + span \cdot D_2 \cdot V_2 - D_2 \cdot D_1 \cdot V_1 - D_2^2 \cdot V_2 - span \cdot D_1 \cdot V_1 + D_1^2 \cdot V_1 + D_2 \cdot D_1 \cdot V_1 - \\ - H_2 \cdot D_1 \cdot V_1 - H_2 \cdot D_2 \cdot V_2$$

$$D_1 \cdot D_2 \cdot V_2 + H_2 \cdot D_1 \cdot V_1 = span \cdot D_2 \cdot V_2 - D_2^2 \cdot V_2 - H_2 \cdot D_2 \cdot V_2$$

$$D_1 \cdot (D_2 \cdot V_2 + H_2 \cdot V_1) = (D_2 \cdot V_2) \cdot (span - D_2 - H_2) \quad \left| \div (D_2 \cdot V_2 + H_2 \cdot V_1) \right.$$

$$D_1 = \frac{(D_2 \cdot V_2) \cdot (span - D_2 - H_2)}{D_2 \cdot V_2 + H_2 \cdot V_1} \qquad D_1 = \frac{span - D_2 - H_2}{D_2 \cdot V_2 + H_2 \cdot V_1} \cdot (D_2 \cdot V_2)$$

To left point (D2)

$$span = D_1 + D_2 + H_1 + H_2$$

$$D_2 = span - D_1 - H_1 - H_2, \qquad \text{since: } H_2 = \frac{span - D_1 - D_2}{D_2 \cdot V_2 + D_1 \cdot V_1} \cdot (D_2 \cdot V_2)$$

$$D_2 = span - D_1 - H_1 - \frac{span - D_1 - D_2}{D_2 \cdot V_2 + D_1 \cdot V_1} \cdot (D_2 \cdot V_2) \quad \left| \cdot (D_2 \cdot V_2 + D_1 \cdot V_1) \right.$$

$$D_2 \cdot (D_2 \cdot V_2 + D_1 \cdot V_1) = span \cdot (D_2 \cdot V_2 + D_1 \cdot V_1) - D_1 \cdot (D_2 \cdot V_2 + D_1 \cdot V_1) - H_1 \cdot (D_2 \cdot V_2 + D_1 \cdot V_1) - (span - D_1 - D_2) \cdot (D_2 \cdot V_2)$$

$$D_2^2 \cdot V_2 + D_2 \cdot D_1 \cdot V_1 = span \cdot D_2 \cdot V_2 + span \cdot D_1 \cdot V_1 - D_1 \cdot D_2 \cdot V_2 - D_1^2 \cdot V_1 - H_1 \cdot D_2 \cdot V_2 - H_1 \cdot D_1 \cdot V_1 - \\ - span \cdot D_2 \cdot V_2 + D_1 \cdot D_2 \cdot V_2 + D_2^2 \cdot V_2$$

$$D_2 \cdot D_1 \cdot V_1 + H_1 \cdot D_2 \cdot V_2 = span \cdot D_1 \cdot V_1 - D_1^2 \cdot V_1 - H_1 \cdot D_1 \cdot V_1$$

$$D_2 \cdot (D_1 \cdot V_1 + H_1 \cdot V_2) = (D_1 \cdot V_1) \cdot (span - D_1 - H_1) \quad \left| \cdot (D_1 \cdot V_1 + H_1 \cdot V_2) \right.$$

$$D_2 = \frac{(D_1 \cdot V_1) \cdot (span - D_1 - H_1)}{D_1 \cdot V_1 + H_1 \cdot V_2} \qquad D_2 = \frac{span - D_1 - H_1}{D_1 \cdot V_1 + H_1 \cdot V_2} \cdot (D_1 \cdot V_1)$$