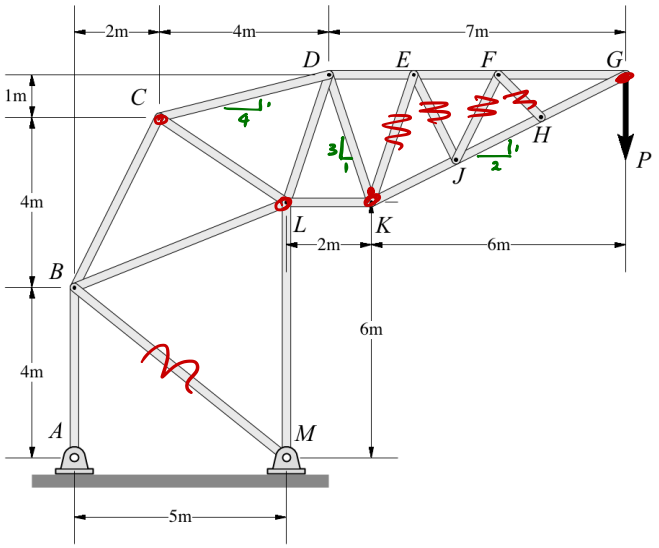
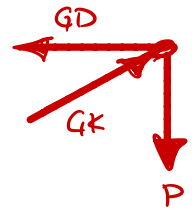
Example 1

Identify all zero force members in the truss shown, then find the forces in members *CD*, *DL*, and *LK* using the method of joints, knowing that $P = 5$ kN. For each member, indicate tension or compression.



JOINT G



$\Sigma F_y = 0$

$GK_y = P$

$GK\left(\frac{1}{\sqrt{5}}\right) = P$

$GK = \sqrt{5}P$ (C)

$\Sigma F_x = 0$

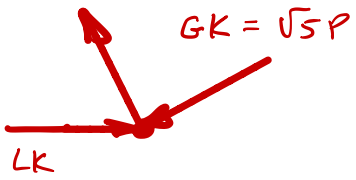
$GD = GK_x$

$GD = GK\frac{2}{\sqrt{5}}$

$GD = \frac{2}{\sqrt{5}}\sqrt{5}P$

$GD = 2P$ (T)

JOINT K



$\Sigma F_y = 0$

$DK_y = GK_y$

$\frac{3}{\sqrt{10}}DK = \frac{1}{\sqrt{5}}GK = \frac{1}{\sqrt{5}}\cdot\sqrt{5}P$

$DK = \frac{\sqrt{10}}{3}P$ (T)

$\Sigma F_x = 0$

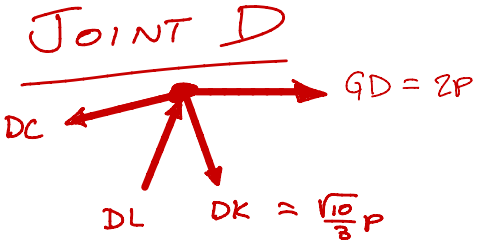
$LK = DK_x + GK_x$

$= \frac{1}{\sqrt{10}}DK + \frac{2}{\sqrt{5}}GK$

$= \frac{1}{\sqrt{10}}\left(\frac{\sqrt{10}}{3}P\right) + \frac{2}{\sqrt{5}}\left(\sqrt{5}P\right)$

$LK = \frac{7}{3}P$ (C)

JOINT D



① $\Sigma F_x = 0$: $GD + \frac{1}{\sqrt{10}}DK + \frac{1}{\sqrt{10}}DL - \frac{4}{\sqrt{17}}DC = 0$

② $\Sigma F_y = 0$: $-\frac{3}{\sqrt{10}}DK + \frac{3}{\sqrt{10}}DL - \frac{1}{\sqrt{17}}DC = 0$

SOLVE ① + ② SIMULTANEOUSLY FOR DL & DC TO GET

$DC = \frac{8\sqrt{17}}{11}P$ (T)

$DL = \frac{19\sqrt{10}}{33}P$ (C)