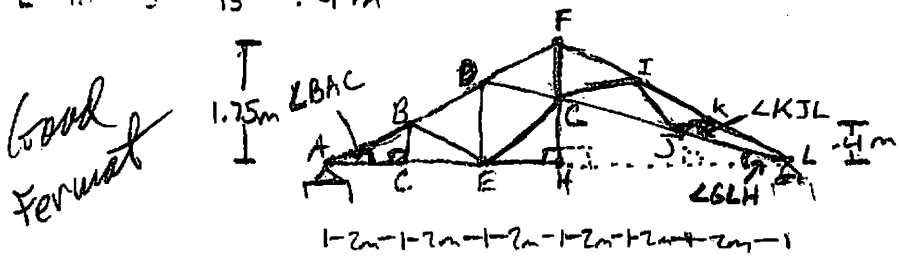
Problem 1.1

Examine the truss shown below and find the angles enclosing ∠BAC, ∠GLH, and ∠KJL. The distance from L to J is .4 m

Good format



Theory

Utilize the sine, cosine, and tangent formulas to solve for angles. All triangle's angles add to 180°. Supplementary angles equal to 180°.

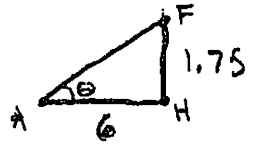
SOHCAHTOA

Assumptions

∠ACB, ∠EHG, ∠GHL = 90°

Solution

To solve for ∠BAC



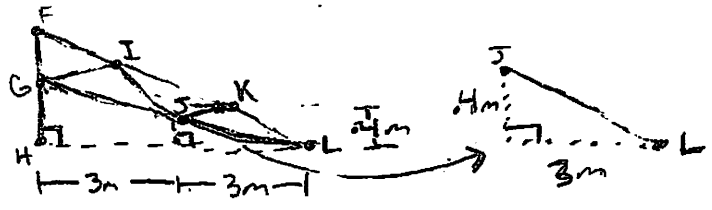
$\tan\theta = \frac{1.75}{6}$

$\theta = \tan^{-1}\left(\frac{1.75}{6}\right) = 16.3°$

(For this angle, all other angles and measurements are negligible)

$\boxed{\angle BAC = 16.3°}$

To solve for ∠GLH



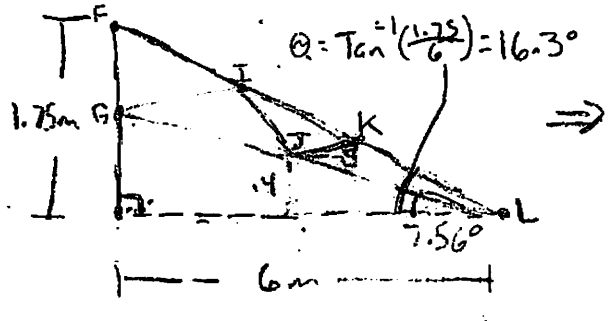
$\tan\theta = \frac{.4}{3}$

$\theta = \tan^{-1}(.4/3)$

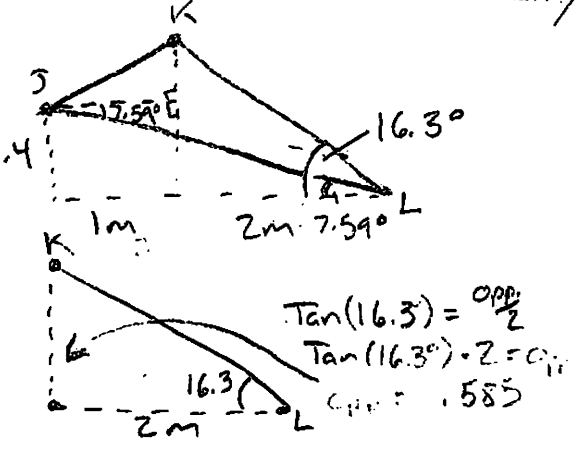
$\theta = 7.59°$

$\boxed{\angle GLH = 7.59°}$

To solve for ∠KJL



$\Rightarrow$



$\theta = \tan^{-1}\left(\frac{1.75}{6}\right) = 16.3°$

$\tan(16.3) = \frac{opp}{2}$

$\tan(16.3°) \cdot 2 = opp$

$opp = .585$

Your work is nicely formatted.

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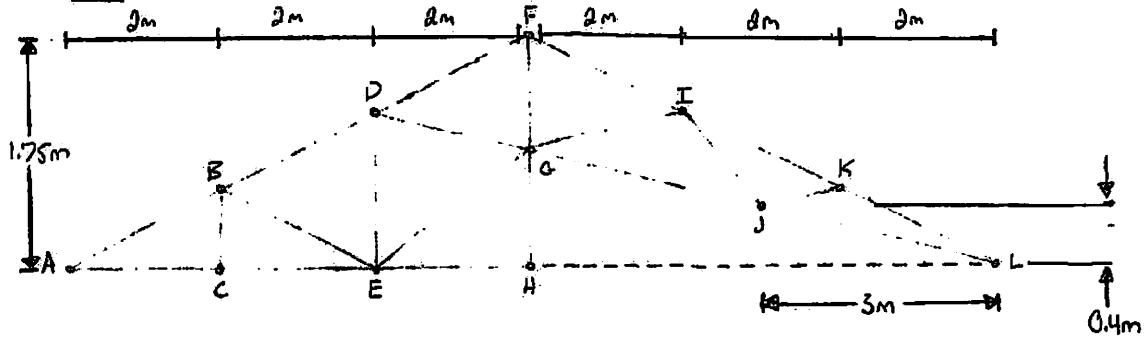
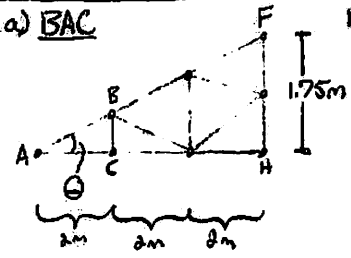
PROBLEM 1:

EXAMINE THE TRUSS SHOWN FIGURE 2 AND FIND THE ANGLES ENCLOSED BY BAC, GLH, AND KJL. THE VERTICAL DISTANCE FROM L TO J IS 0.4m.



SOLUTION:

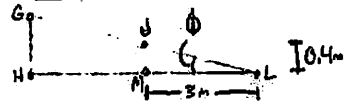
a) BAC



DUE TO SIMILAR TRIANGLES $\angle BAC = \angle FAH$.

$$\tan\theta = \frac{1.75m}{6m} \rightarrow \theta = \tan^{-1}\left(\frac{1.75m}{6m}\right) \rightarrow \boxed{\theta = 16.260^\circ}$$

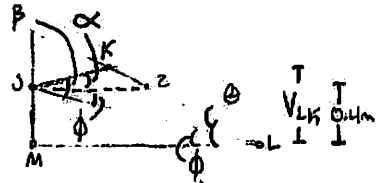
b) GLH



DUE TO SIMILAR TRIANGLES $\angle GLH = \angle JLM$.

$$\tan\phi = \frac{0.4m}{3m} \rightarrow \phi = \tan^{-1}\left(\frac{0.4m}{3m}\right) \rightarrow \boxed{\phi = 7.595^\circ}$$

c) KJL



CREATE A HORIZONTAL THAT CONNECTS POINT J TO LINE $\overline{KL}$. THIS MAKES $\angle zJL = \angle JLM$

$$\tan\theta = \frac{V_{LK}}{2} \rightarrow 2(\tan\theta) = V_{LK} \rightarrow 2(\tan(16.260)) = V_{LK} \rightarrow 2(0.292) = V_{LK} \rightarrow V_{LK} = 0.584$$

$$V_{LK} - 0.4m = V_{JK} \rightarrow 0.584 - 0.4 = 0.184 \quad H_{JK} = 1 \quad V_{JK} = 0.184$$

$$\tan\alpha = \frac{0.184m}{1m} \rightarrow \alpha = \tan^{-1}\left(\frac{0.184m}{1m}\right) \rightarrow \alpha = 10.426^\circ$$

$$\phi + \alpha = \beta \rightarrow 7.595^\circ + 10.426^\circ = 18.021^\circ \rightarrow \boxed{\beta = 18.021^\circ}$$

+10

PROBLEM 2:

EXAMINE THE LIFT SHOWN IN FIGURE 1 AND FIND THE ANGLE BETWEEN THE HYDRAULIC CYLINDER $\overline{BD}$ AND THE HORIZONTAL. LET $\theta = 30^\circ$.