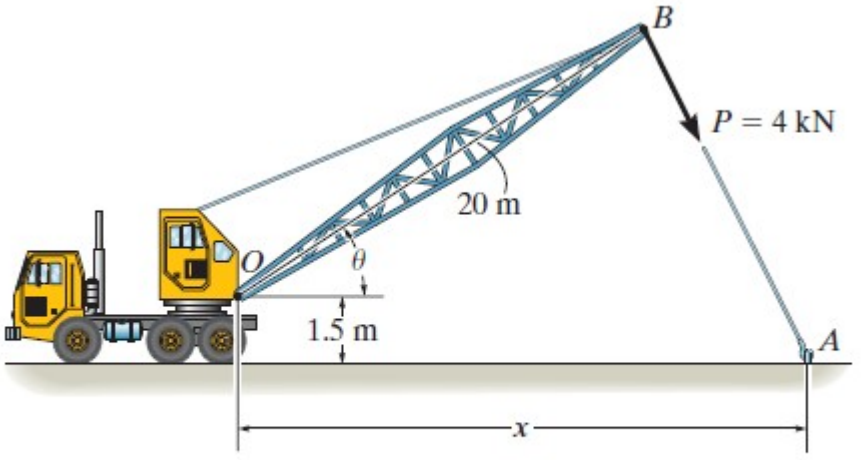
2º) Lista de exercício

A carga P = 4kN é aplicada na lança de 20m se x = 25, determine ângulo Tetha para obter o maio valor de momento no ponto O.



Maximum moment, $OB \perp BA$

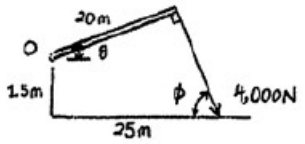
$\curvearrowright +(M_O)_{max} = 4000(20) = 80\,000\ \text{N}\cdot\text{m} = 80.0\ \text{kN}\cdot\text{m}$ **Ans**

$4000 \sin\phi(25) - 4000 \cos\phi(1.5) = 80\,000$

$25\sin\phi - 1.5\cos\phi = 20$

$\phi = 56.43°$

$\theta = 90° - 56.43° = 33.6°$ **Ans**



Also,

$(1.5)^2 + z^2 = y^2$

$2.25 + z^2 = y^2$

Similar triangles

$$\frac{20+y}{z} = \frac{25+z}{y}$$

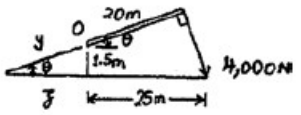
$20y + y^2 = 25z + z^2$

$20(\sqrt{2.25 + z^2}) + 2.25 + z^2 = 25z + z^2$

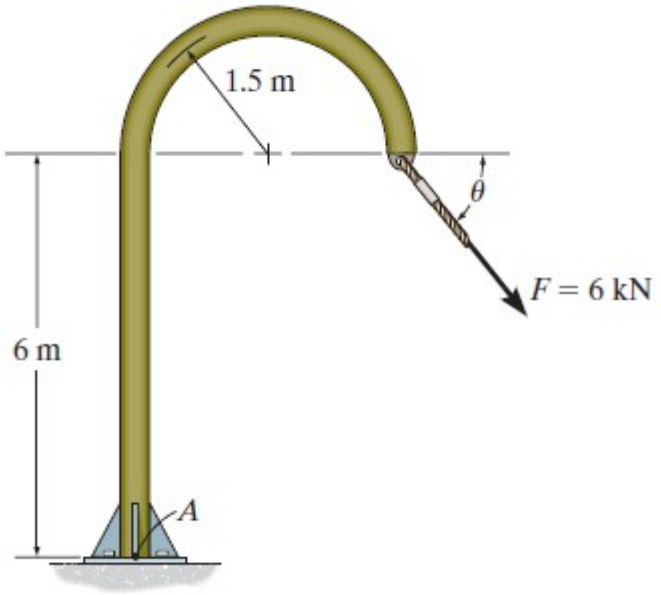
$z = 2.259\ \text{m}$

$y = 2.712\ \text{m}$

$\theta = \cos^{-1}\left(\frac{2.259}{2.712}\right) = 33.6°$ **Ans**



Determine o momento produzido pela F no ponto A em termos do ângulo



Moment Function: Resolving force **F** into horizontal and vertical components, Fig. *a*, and applying the principle of moments,

$$\zeta + M_A = -6\cos\theta(6) - 6\sin\theta(3)$$
$$= -(36\cos\theta + 18\sin\theta)\ \text{kN}\cdot\text{m}$$
$$= (36\cos\theta + 18\sin\theta)\ \text{kN}\cdot\text{m}\ \text{(clockwise)}$$

The maximum moment occurs when $\frac{dM_A}{d\theta} = 0$.

$$\frac{dM_A}{d\theta} = -36\sin\theta + 18\cos\theta = 0$$
$$\theta = 26.6°$$

The maximum moment of **F** about point *A* is given by

$$(M_A)_{\max} = 36\cos 26.57° + 18\sin 26.57° = 40.2\ \text{kN}\cdot\text{m}$$

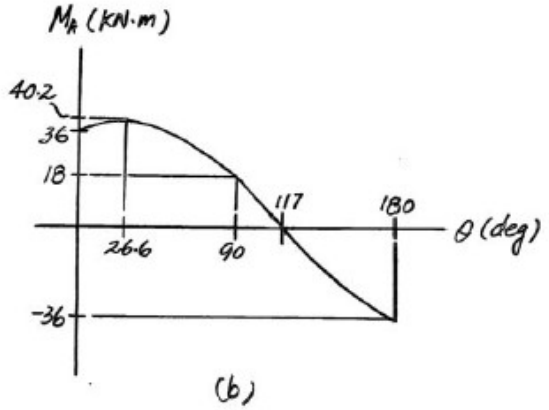
Also,

$$M_A|_{\theta=0°} = 36\cos 0° + 18\sin 0° = 36\ \text{kN}\cdot\text{m}$$
$$M_A|_{\theta=90°} = 36\cos 90° + 18\sin 90° = 18\ \text{kN}\cdot\text{m}$$
$$M_A|_{\theta=180°} = 36\cos 180° + 18\sin 180° = -36\ \text{kN}\cdot\text{m}$$

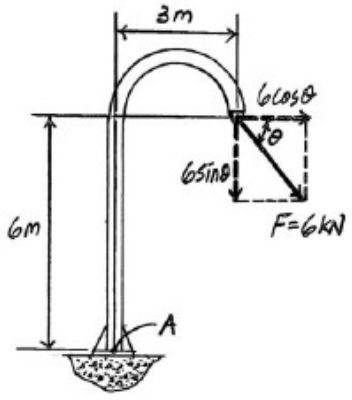
When $M_A = 0$,

$$0 = 36\cos\theta + 18\sin\theta \qquad \theta = 117°$$

The plot of M_A versus θ is shown in Fig. *b*.

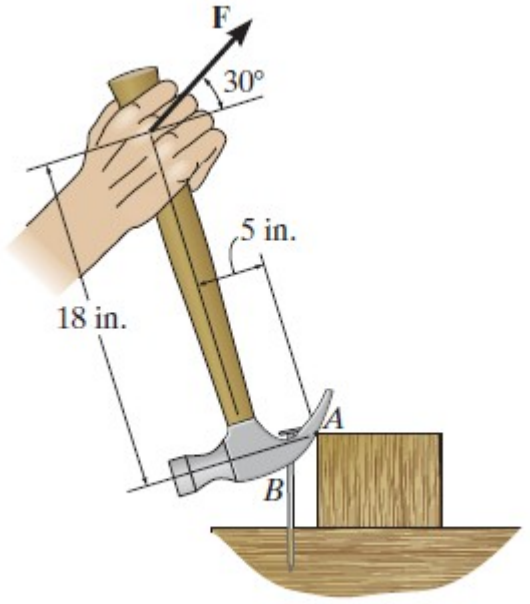


(b)



(a)

O martelo esta sujeito a força de 20 N, determine o momento no ponto A

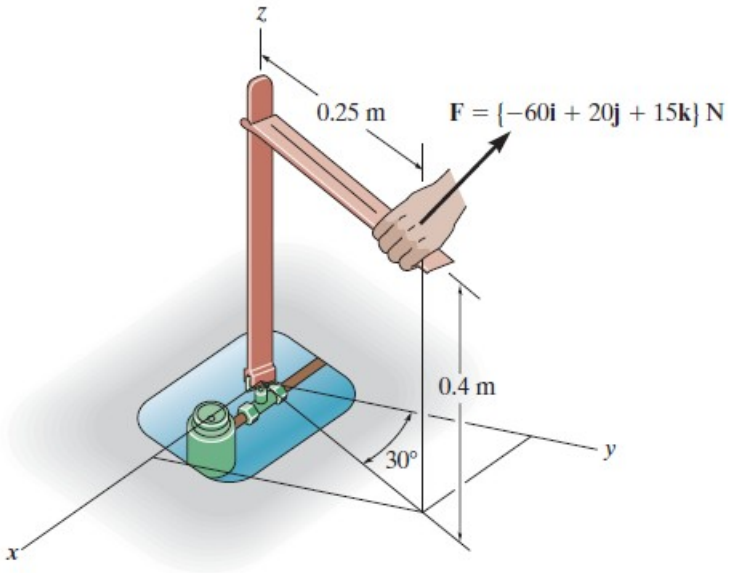


Resolving the 20 - lb force into components parallel and perpendicular to the hammer, Fig. *a*, and applying the principle of moments,

$$\zeta + M_A = -20\cos 30°(18) - 20\sin 30°(5)$$
$$= -361.77 \text{ lb}\cdot\text{in} = 362 \text{ lb}\cdot\text{in} \quad \text{(clockwise)}$$

Ans.

A ferramenta é usada na vávula de gas, por causa do difícil acesso, determine Os momentos gerados



$$\mathbf{u} = \mathbf{k}$$

$$\mathbf{r} = 0.25 \sin 30^\circ \mathbf{i} + 0.25 \cos 30^\circ \mathbf{j}$$

$$= 0.125\,\mathbf{i} + 0.2165\,\mathbf{j}$$

$$M_t = \begin{vmatrix} 0 & 0 & 1 \\ 0.125 & 0.2165 & 0 \\ -60 & 20 & 15 \end{vmatrix} = 15.5\ \text{N} \cdot \text{m} \qquad \text{Ans}$$