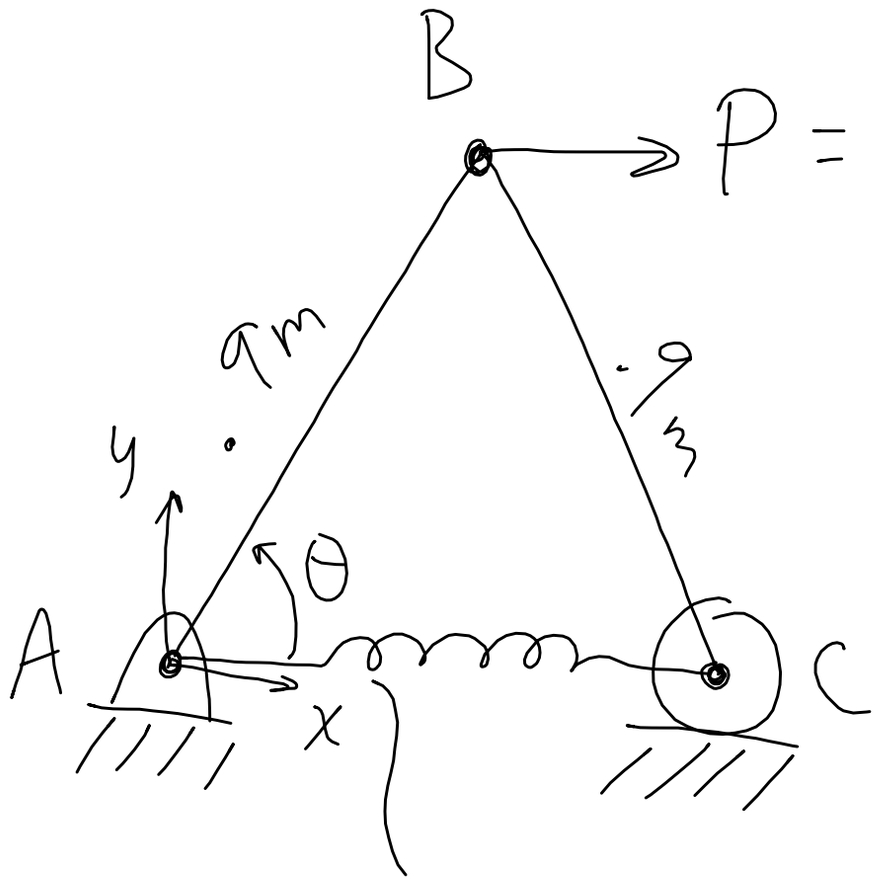


Spring is unstretched when $\theta = 60^\circ$

$\theta = ?$ for equil

$20\ kN/m$

$x_B = .9\cos\theta$

$\delta x_B = -.9\sin\theta\,\delta\theta$

$x_C = 1.8\cos\theta$

$\delta x_C = -1.8\sin\theta\,\delta\theta$

$\delta W_s = -ks\,\delta s$

So what is S?

$$S = X_c - X_c(\theta = 60^\circ)$$

$$= X_c - .9$$

$$= 1.8\cos\theta - .9$$

$$\delta S = -1.8\sin\theta \cdot \delta\theta$$

$$\delta W_{total} = \delta W_P + \delta W_S = 0$$

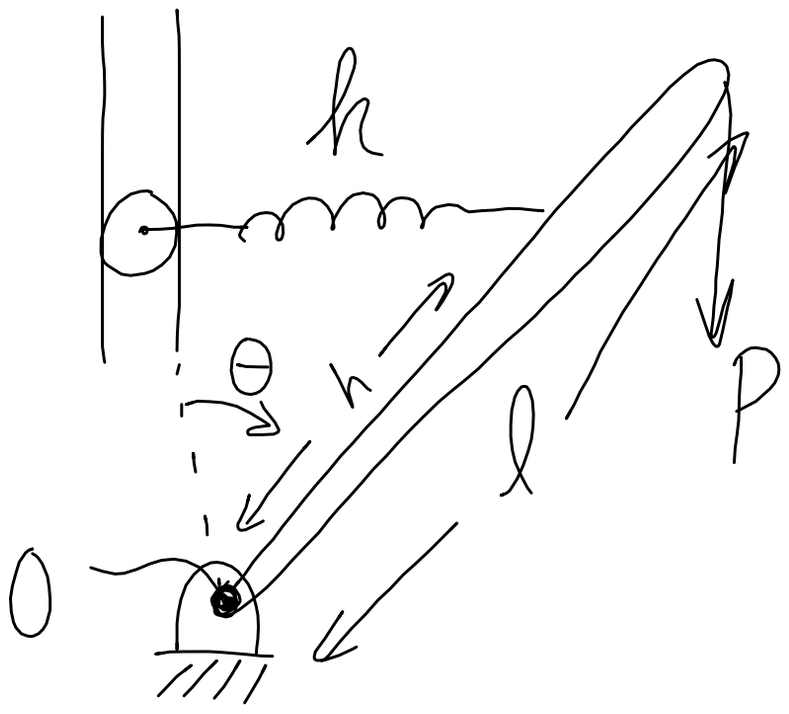
$$P\delta x_B - k_S\delta_S = 0$$

$$(6)(-.9\sin\theta\,\delta\theta) - 20(1.8\cos\theta - .9)(-1.8\sin\theta\,\delta\theta) = 0$$

$$-5.4 = -20(1.8\cos\theta - .9)(1.8)$$

$$\frac{5.4}{(20)(1.8)} = 1.8\cos\theta - .9$$

$$\theta = 54.3^\circ$$



Find P for equil @ any θ

Spring is unstretched @ θ = 0

$y_p = l\cos\theta \quad \delta y_p = -l\sin\theta\,\delta\theta$

$s = h\sin\theta \quad \delta s = h\cos\theta\,\delta\theta$

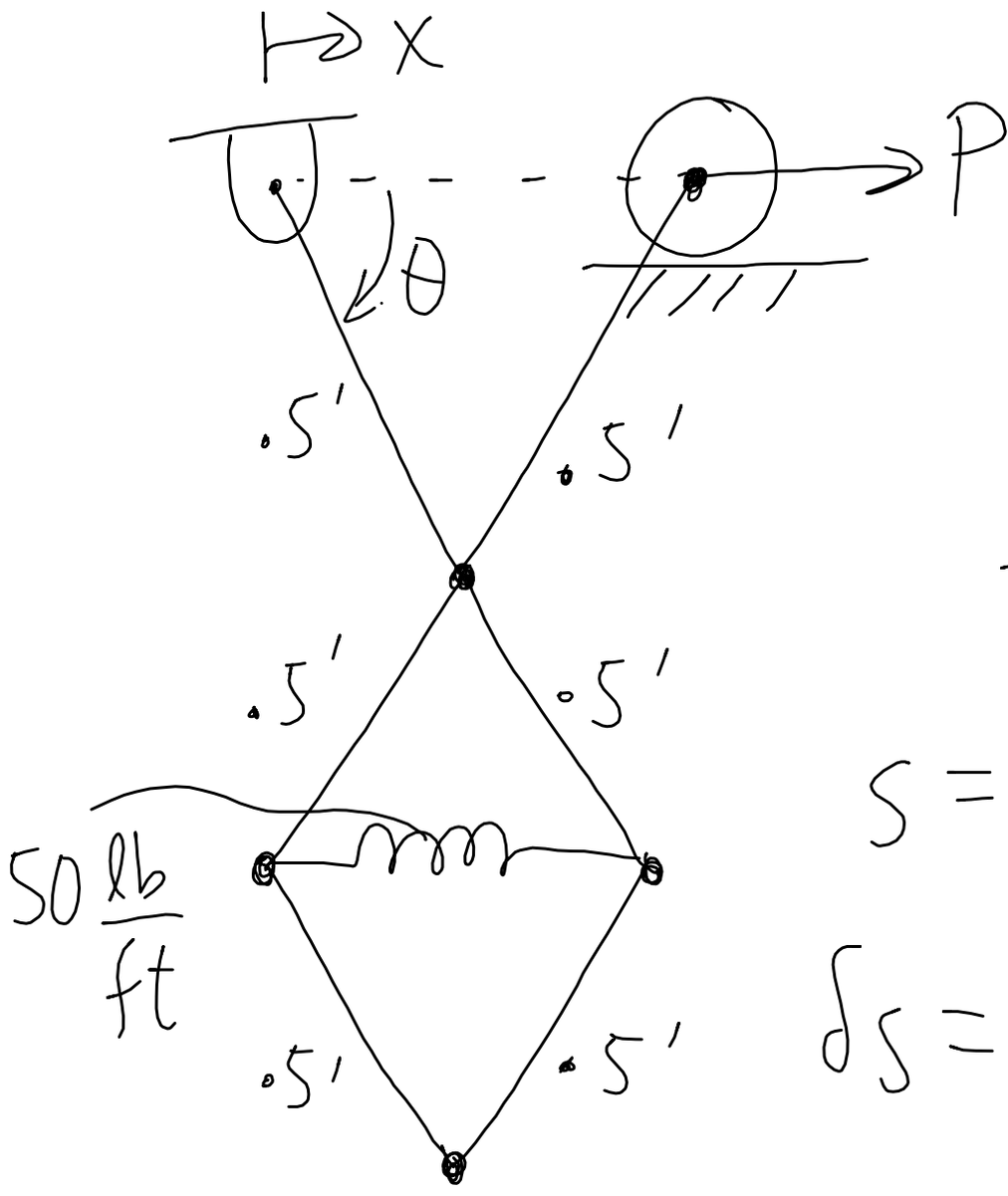
$$\delta W_{total} = \delta W_p + \delta W_s = 0$$

$$-P\delta y_p - hs\,\delta s = 0$$

$$-P(-l\sin\theta\,\delta\theta) - h(h\sin\theta)(h\cos\theta\,\delta\theta) = 0$$

$$Pl = hh^2\cos\theta$$

$$P = \frac{hh^2}{l}\cos\theta$$



If $s=0$ @ $\theta=45°$

Find P for equil @ $\theta=30°$

$x_p = \cos\theta \quad \delta x_p = -\sin\theta\,\delta\theta$

$s = \cos\theta - \frac{\sqrt{2}}{2}$

$\delta s = -\sin\theta\,\delta\theta$

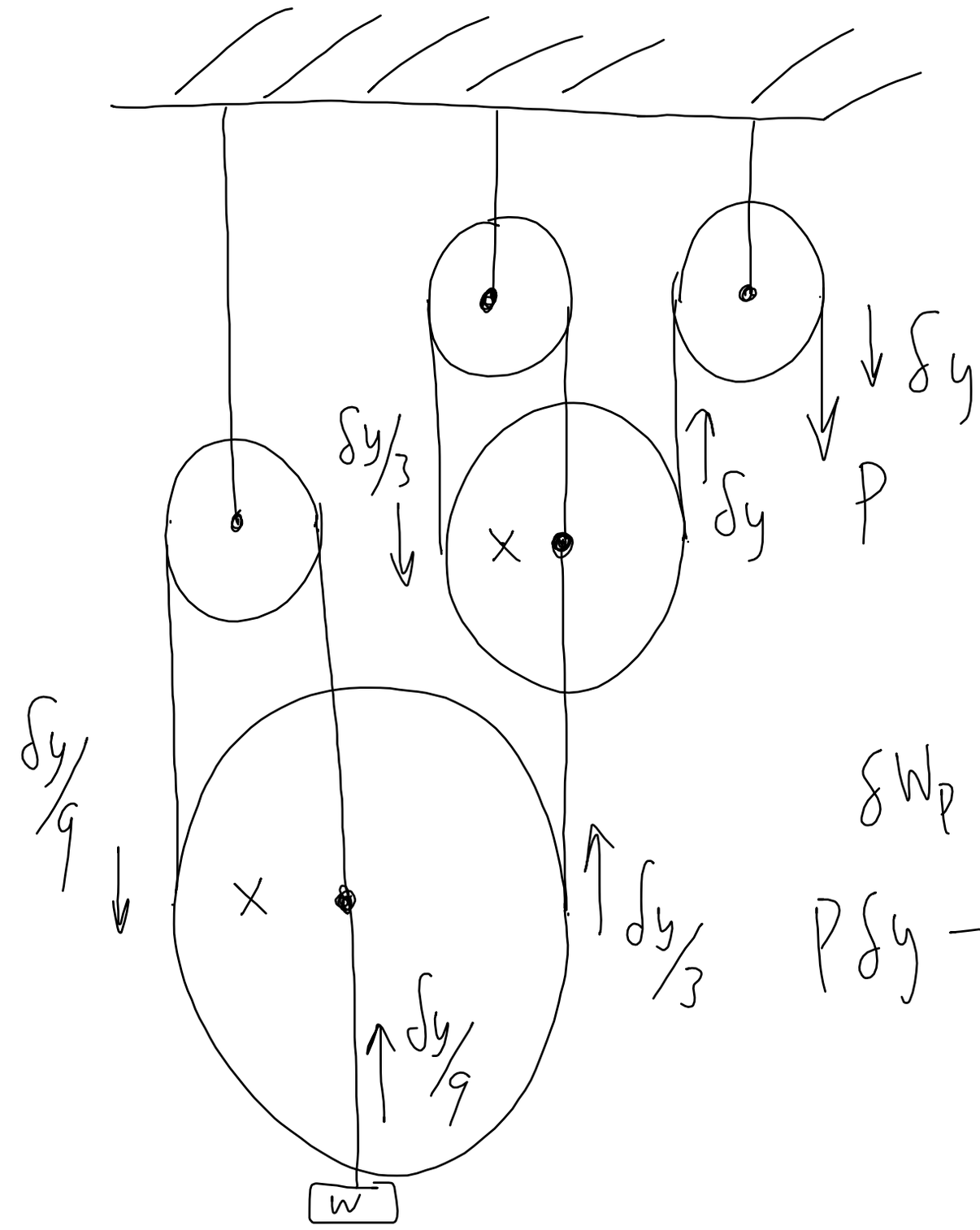
$$\delta W_{total} = \delta W_p + \delta W_s = 0$$

$$P\,\delta x_p - k_s \delta s = 0$$

$$P(-\cancel{\sin\theta}\,\cancel{\delta\theta}) - k\left(\cos\theta - \frac{1}{\sqrt{2}}\right)(-\cancel{\sin\theta}\,\cancel{\delta\theta}) = 0$$

$$P = k\left(\cos\theta - \frac{1}{\sqrt{2}}\right)$$

$$= 50\left[\frac{\sqrt{3}}{2} - \frac{\sqrt{2}}{2}\right] = 25\left(\sqrt{3}-\sqrt{2}\right) = 7.95\,lbs$$



$$P = \frac{W}{9}$$

$$\delta W_P + \delta W_{grav} = 0$$

$$P\delta y - W\frac{\delta y}{9} = 0$$