Answer on Question #69299 -Physics / Other

A $l = 3.1$ m long horizontal pole weighs $P = 38$ N. The left end of the pole is anchored to a wall while a $m = 97$ kg sign is attached to the right end. The system is supported by a massless wire attached to the pole at a point $d = 1.1$ m from the left end which makes a $\alpha = 47$ degree angle with the horizontal. The tension in the wire is ___ N.

Solution

The equilibrium condition

$$P\frac{l}{2} + mgl - Td\sin\alpha = 0.$$

So, the tension in the wire is

$$T = \frac{P\frac{l}{2} + mgl}{d\sin\alpha} = \frac{38\times 1.55 + 97\times 9.8\times 3.1}{1.1\times \sin 47^\circ} = 3736.2 \text{ N}$$

Answer: 3736.2 N