

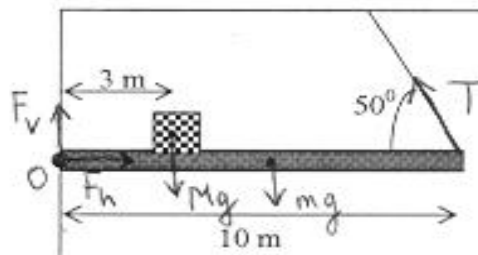
Physics 101Rec
Quiz # 13a

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Name: Key Id: _____ Sect: _____

The figure shows a uniform horizontal beam of length 10 m and mass 25 kg that is pivoted at the wall, with its far end supported by a cable that makes an angle of 50° with the horizontal.

(a) If a load of mass 60 kg is placed at 3.0 m from the pivot, what is the tension in the cable?



$$\tau_o = 0 \Rightarrow T(10)\sin 50^\circ - Mg(5)\sin 90^\circ - mg(3)\sin 90^\circ = 0$$

$$\Rightarrow T = \frac{(3M + 5m)g}{10 \sin 50^\circ} = \boxed{390 \text{ N}}$$

(b) What is the magnitude of the force at the pivot point?

$$F_y = 0 \Rightarrow F_v + T \sin 50^\circ - Mg - mg = 0$$

$$\Rightarrow F_v = 534 \text{ N}$$

$$F_x = 0 \Rightarrow F_h - T \cos 50^\circ = 0 \quad F_h = T \cos 50^\circ = 251 \text{ N}$$

$$\Rightarrow F = \sqrt{F_v^2 + F_h^2} = \boxed{590 \text{ N}}$$