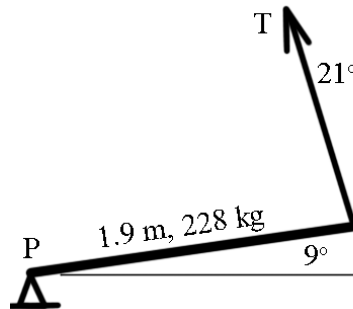Question #75736, Physics / Other

A 228 kg uniform, beam is hinged at one end and at the other is supported by a cable that is at 21 degrees to the vertical. The beam is 1.9 m long and is at 9 degrees above the horizontal. Calculate the tension in the cable (in N).

Solution

$$\sum M_P = 0;$$

$$-mg\frac{L\cos 9°}{2} + T\cos(21-9)° = 0$$

$$T = \frac{mgL\cos 9°}{2\cos 12°} = \frac{228 \times 9.81 \times 1.9 \times \cos 9°}{2\cos 12°} = 2,146 \, \text{N}$$

Answer: 2,146 N