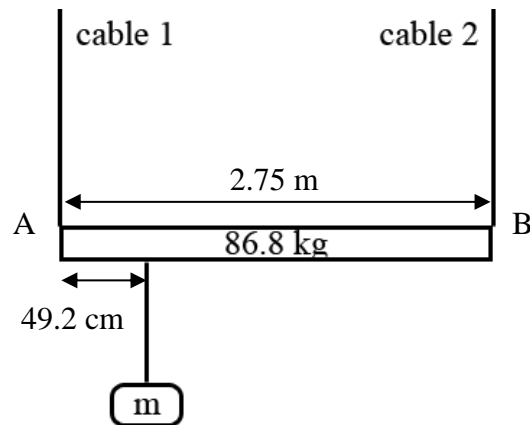Question #78467, Physics / Other

A 2.75 m lighting rig with mass 86.8 kg is hung over a stage by a vertical cable at each end. Each cable can withstand 1092 N before breaking. You want to suspend a prop 49.2 cm from one end. What is the maximum mass prop (in kg) you can hang before a cable breaks?

Solution

The cable that is closer to the prop carries higher load, hence it would be the first to break.

The equation of rotational equilibrium:

$$\sum M_B = 0;$$

$$T_1 \times 2.75 - m \times g \times (2.75 - 0.492) - 86.8 \times 0.5 \times 2.75 = 0;$$

Plugging the value of the maximum tension of the cable.

$$1092 \times 2.75 - m \times 9.81 \times (2.75 - 0.492) - 86.8 \times 0.5 \times 2.75 = 0$$

Solving for m:

m = 130.2 kg

Answer: 130.2 kg

Answer provided by https://www.AssignmentExpert.com