

Answer on Question #44134-Physics-Mechanics-Kinematics-Dynamics

A uniform rod of length 30 cm having a mass of 3.0 kg. The strings are pulled by constant forces of 20 N and 32 N. Find the force exerted by 20 cm part of the rod on the 10 cm part. All the surfaces are smooth and the strings and pulleys are light. Force of 20 N acts on 10 cm part and 32 N on 20 cm

Solution

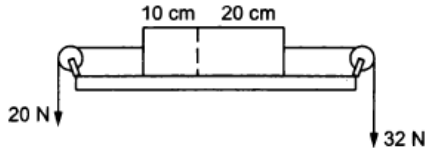


Figure 5-E8

Clearly the 10 cm part of the rod has mass 1 kg and the 20 cm part 2kg. Since both parts move together, let their acceleration due to the two force be a . If F be the force exerted by the 20 cm part on 10 cm part then from the motions of 10 cm and 20 cm parts we get

$$F - 20 = a$$

$$-F + 32 = 2a.$$

So

$$F = \frac{72}{3} = 24 \text{ N}.$$

Answer: 24 N.