

Chapter 11 Equilibrium and Elasticity

Example 1:

Two men are carrying a 6 m long, 40 kg plank by its ends. A 30 kg object sits 1.5 m from one of the ends. What load is each man carrying?

Example 2:

What is the magnitude of the minimum horizontal force that can be applied to the axle of a 100 kg, 40 cm radius lawn roller and roll it over a 10 cm tall curb?

Example 3:

A rope connects a 30 kg block to a block of unknown mass. The rope passes over a pulley at the top of a smooth 53° incline. The pulley's mass is 5 kg and its radius is 0.125 m. The 30 kg block rests on the incline and the unknown block hangs from the pulley. Calculate the mass of unknown block if the system is in static equilibrium.

Example 4:

A 10 kg sphere sits in a 60° wedge. If one side of the wedge is vertical find the normal forces if there is no friction.

Example 5:

When a crane lifts a 5000 kg load, the support cable that attaches to the center of the boom is horizontal and the boom makes a 53° angle with the horizon. If the boom of the crane is 30 m long and has a mass of 2000 kg what is the tension in the support cable?

Example 6:

A 20 kg sign hangs from a 6 kg, 2 m long horizontal beam. A cable runs from the outer end of the beam back to a point on the wall 1.5 m above the support point. The inner edge of the sign is 1 m from the wall; the outer edge is 2 m from the wall. What is the tension in the cable?

Example 7:

A 100 kg painter wishes to climb as far up a ladder as is possible before the ladder starts to slip. The 30 kg ladder is 10 m long and it makes a 60° angle with the horizon. The wall is smooth and the floor has a coefficient of friction of 0.2. How far along the ladder can the painter climb?