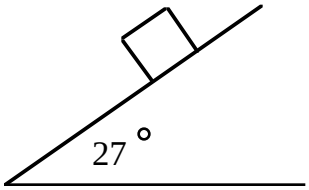
Phys12 Equilibrium : Test - 30

1) Give the two conditions necessary for static equilibrium.

2) A spherical object has the following forces acting on it through its center of mass : [5,7], [-3,8], and [-7,-4]. Find the force necessary to maintain equilibrium. Give the ordered pair. (units are in newtons)

3) A 45 kg box rests on a 27° incline. Friction keeps the box from moving. See the diagram below. Answer the following questions.



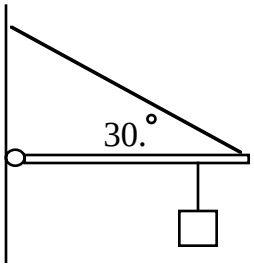
a) Draw the free body diagram.

b) The weight of the box is _____ .

c) The normal force is _____ .

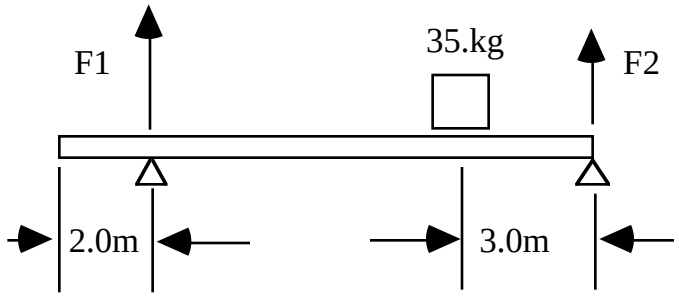
d) The force of friction is _____ .

4)a) A 0.50 m long beam (of negligible mass) is supported horizontally by a wire attached to the wall as shown. The beam supports a 7.0 kg mass that is positioned 0.10 m from the end of the beam as shown. Find the magnitude of the tension force in the wire.

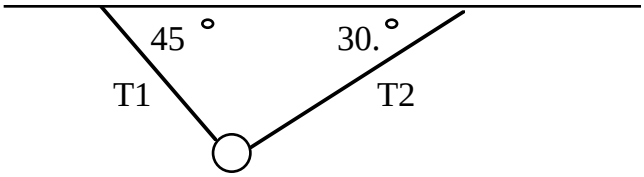


b) If the wire breaks, find the initial torque on the beam.

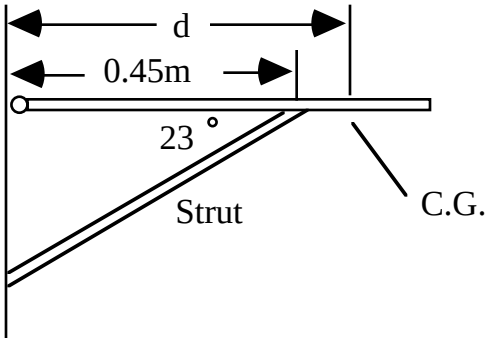
5) A 150 kg beam has a length of 12.0 m. It is supported at the two points shown. A 35. kg mass sits on the beam. Find the two forces F_1 and F_2.



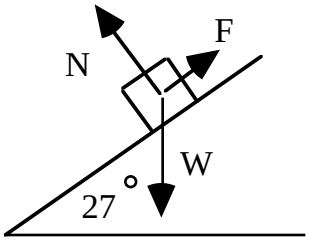
6) A mass of 5.0 kg is suspended by two wires as shown. Find the magnitudes of the two tensions, T_1 and T_2.



7) A 22 kg beam is supported by the strut. The beam has a center of gravity (C.G.) that is not at its center. The force exerted by the strut is 590N. See the diagram below. Find the distance d.



Answers : 1) ∑ forces = zero and ∑ torques = zero, 2) [5,-11]N, 3)a)



b) 440 N [down], c) 390 N [direction shown], d) 2.0×10^2 N [direction shown], 4)a) 110 N, b) 27 Nm [clockwise], 5) F1 = 980N, F2 = 830N, 6) T1 = 44 N, T2 = 36 N, 7) 0.48 m.