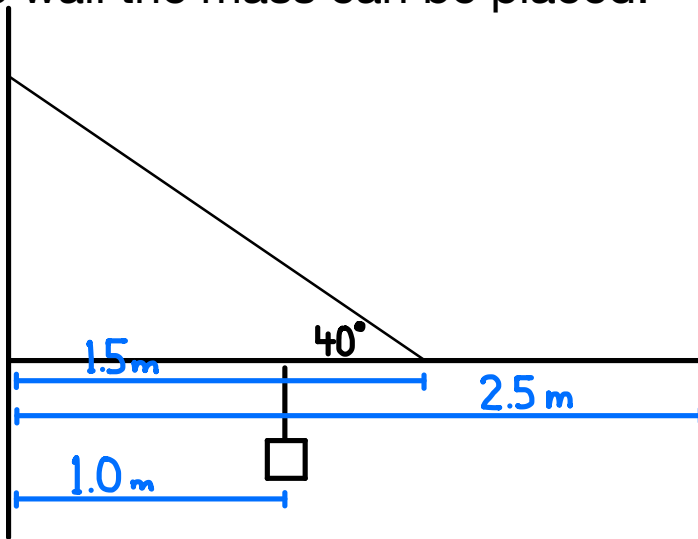


A 10 kg beam is supported by a wire. Hanging from the beam is a 12 kg mass.

a) Determine the tension in the wire.

b) If the maximum tension the wire can withstand without breaking is 300 N, determine the maximum distance from the wall the mass can be placed.



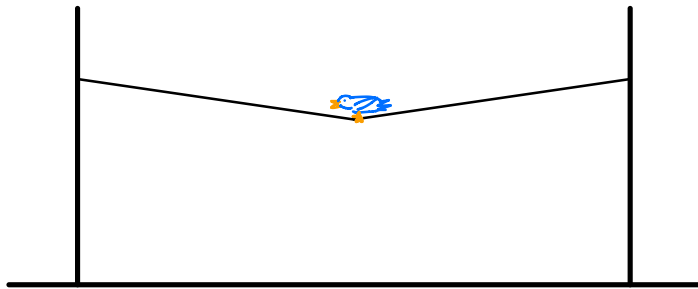
a) 249 N

b) 1.42 m

A 300 g bird lands on the centre of a clothesline between two poles 8.0 m apart.

a) If the clothesline sags 15 cm, what is the tension in the clothesline?

b) The same bird causes a different clothesline (poles still 8.0 m apart) to sag more? Is the tension greater, less or the same in this clothesline?

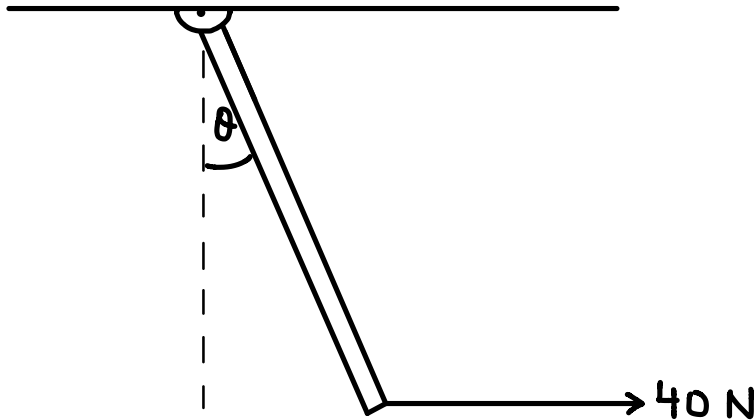


a) 39.2 N

b) less

A uniform 16 kg rod is hinged to the ceiling. A horizontal force of 40 N is exerted at the bottom end of the rod.

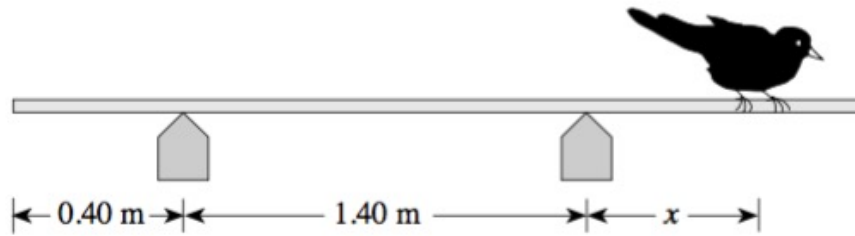
- Determine the angle the rod is displaced from the vertical.
- Determine the force the hinge exerts on the rod.



a) 27.0°

b) 162 N

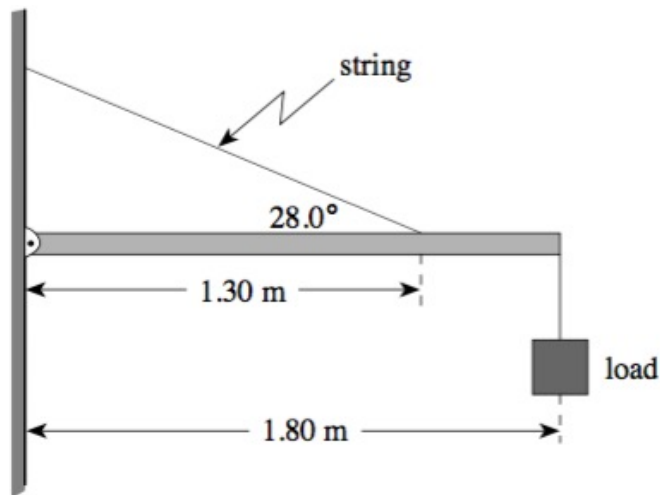
A 0.75 kg board of length 2.60 m initially rests on two supports as shown.



- What maximum distance, x , from the right-hand support can a 1.20 kg bird walk before the board begins to leave the left-hand support?
- What force does the right-hand support exert on the board at that instant?

a) 0.313 m
b) 19.1 N

The diagram shows a uniform 25 kg beam. The load has a mass of 60. kg.



- a) Determine the tension in the string.
- b) If the load is moved closer to the wall, the tension in the string will
- stay the same.
 - increase.
 - decrease.

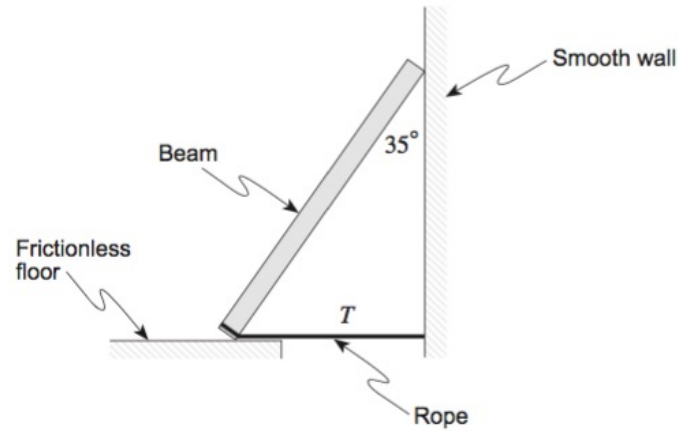
Using principles of physics, explain your answer.

a) 5350 N

b) DECREASE

- TORQUE IS DIRECTLY PROPORTIONAL TO DISPLACEMENT FROM THE FULCRUM.
- IF THE LOAD IS MOVED CLOSER TO THE WALL, THE DISTANCE TO THE FULCRUM IS DECREASED WHICH RESULTS IN A DECREASED TORQUE.
- FOR THE BEAM TO REMAIN IN STATIC EQUILIBRIUM, THE NET TORQUE MUST BE ZERO.
- THE ONLY FORCE WHICH PROVIDES AN OPPOSING TORQUE IS THE FORCE OF TENSION SO THIS FORCE MUST DECREASE.

A 24 kg beam of length 2.4 m leans against a smooth wall. A horizontal rope tied to the wall and the beam holds the beam on a frictionless floor as shown. What is the tension in the rope?



82.3 N