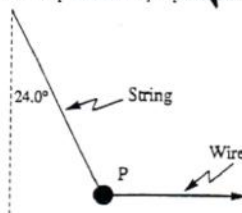


Extra Static Equilibrium Problems

June-28-10
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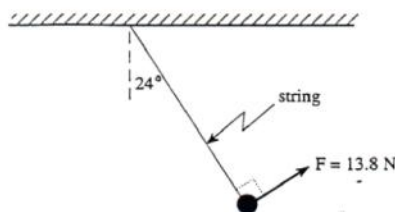
Extra Static Equilibrium Problems

1. A 4.60 kg mass P is held in equilibrium by a pendulum string, a horizontal wire, and gravity.

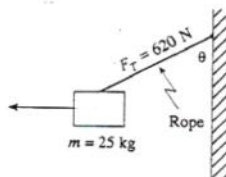


What is the tension in the pendulum string?

2. A mass suspended by a string is held 24° from vertical by a force of 13.8 N as shown. Find the mass.

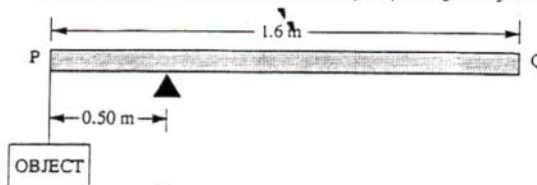


3. A 25 kg block is pulled by a horizontal force. The supporting rope can withstand a maximum tension force of 620 N.



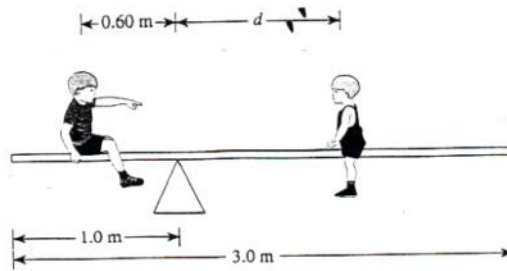
To what maximum angle, θ , can the block be pulled without the rope breaking?

4. A uniform beam has a mass of 3.5 kg. Its length is 1.6 m and a pivot is placed 0.50 m from end P, as shown in the diagram below. The beam is balanced by suspending an object at P.



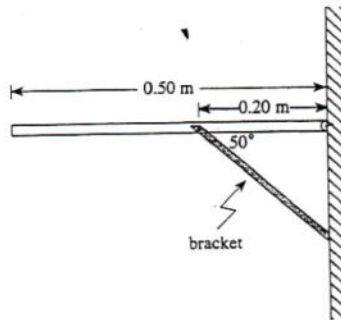
What is the mass of the object?

5. A 3.0 m uniform beam of mass 15 kg is pivoted 1.0 m from the end as shown below.



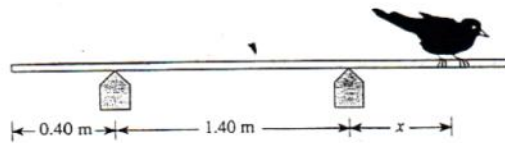
A 35 kg child sits 0.60 m from the pivot. How far, d , from the pivot, must a 20 kg child sit in order for the beam to be in equilibrium?

6. A uniform 3.0 kg shelf of width 0.50 m is supported by a bracket, as shown in the diagram below.



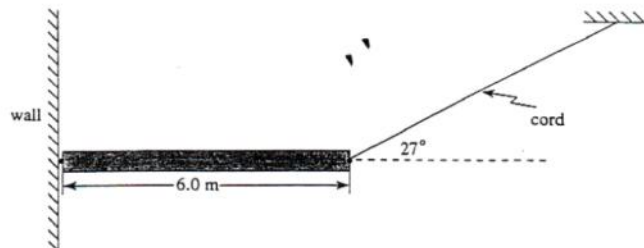
What force does the bracket exert on the shelf?

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



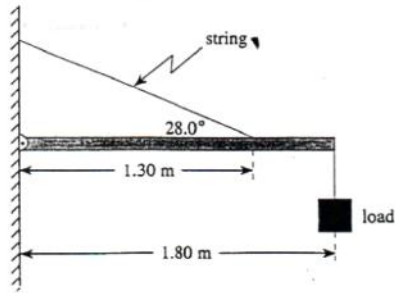
What maximum distance, x , from the right-hand support can a 1.20 kg bird walk before the board begins to leave the left-hand support?

8. A uniform 25 kg bar, 6.0 m long, is suspended by a cord as shown.

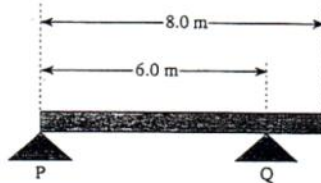


What is the tension in the cord?

9. The diagram shows a horizontal beam of negligible mass. The wall exerts a 42.0 N horizontal force on the lever. Find the weight of the load.

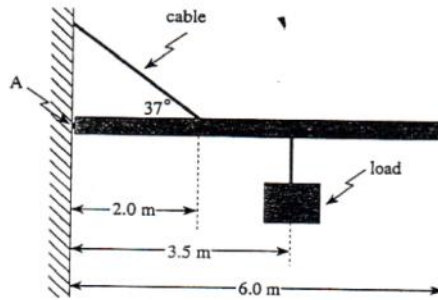


10. A uniform beam of mass 25 kg rests on supports P and Q, as shown in the diagram below.



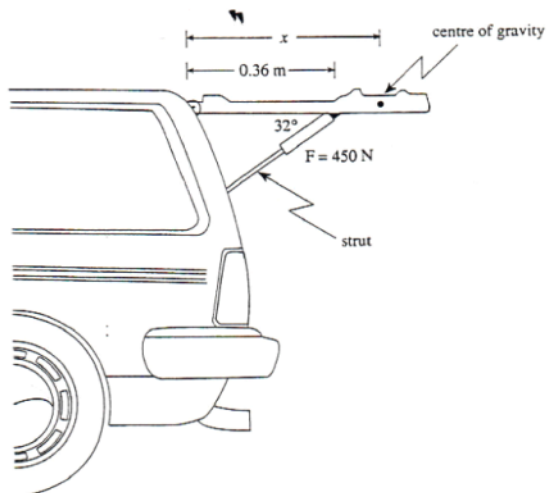
What force is exerted by support Q on the beam?

11. A uniform beam 6.0 m long, and with a mass of 75 kg, is hinged at A. The supporting cable keeps the beam horizontal.



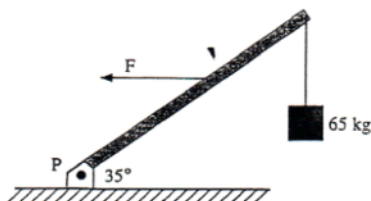
If the maximum tension the cable can withstand is 2.4×10^3 N, what is the maximum mass of the load?

12. The diagram shows the rear door of a station wagon supported horizontally by a strut. The mass of the door is 18 kg and the compression force in the strut is 450 N.



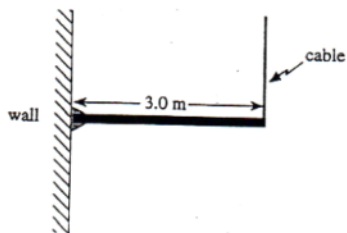
- a) Draw and label a free body diagram showing the forces acting on the door. (2 marks)
- b) At what distance, x , from the hinge is the centre of gravity of the door located?

13. A uniform beam of negligible mass, hinged at P, supports a 65 kg mass as shown in the diagram below.



What horizontally directed force F , applied at the centre of the beam, is needed to achieve equilibrium?

14. The diagram below shows a uniform horizontal beam hinged at the wall and supported by a vertical cable.



If the tension in the cable is 26 N what is the weight of the beam?