

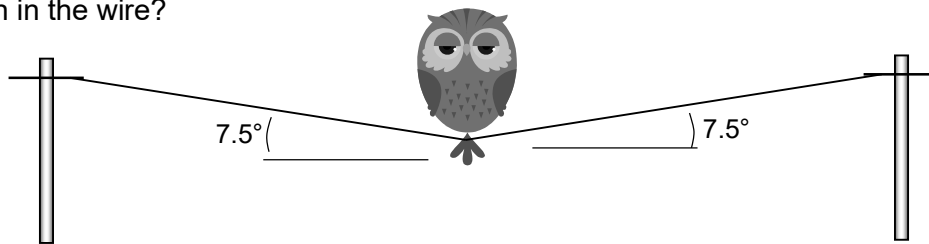
Module 6

Assignment #1

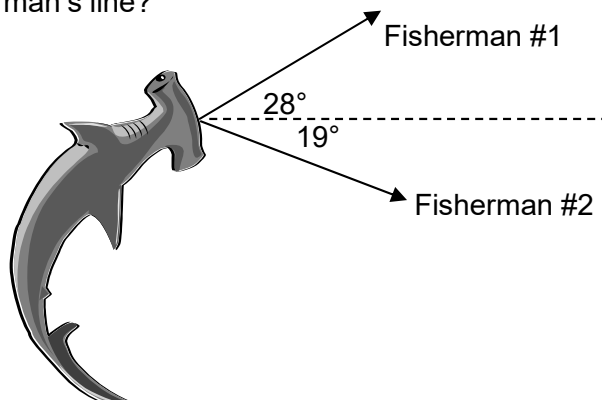
Physics

Read pages 177- 188.

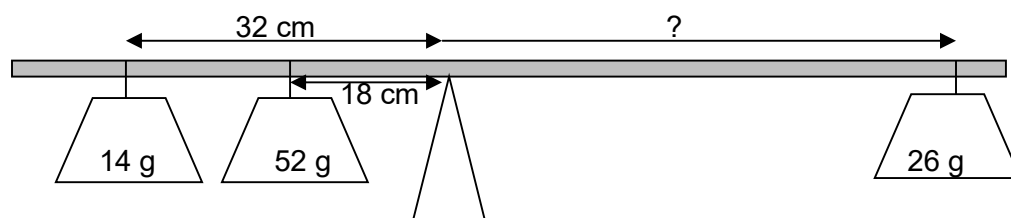
1. What is the difference between dynamic and static equilibrium?
2. For an object to be in equilibrium, all the forces acting on the object must have a net total of zero. How is it possible for an object to be moving, but also to be at equilibrium at the same time?
3. Suppose you were sitting in a car seat that could read the force with which your back pushed against the seat. When the car is at rest, the car seat reads 20 pounds, indicating you are leaning back in the seat. Assume that you don't adjust the way you are seating.
 - a. As the car started to accelerate, would the reading go up or down?
 - b. When the car reaches a constant speed, what will the seat read?
 - c. As the car slowed to a halt, would the seat read higher or lower than 20 pounds?
4. Your church purchased a large cross to hang at the front of the sanctuary. The mass of the cross is 180 kg. What is the tension in the cable used to hang the cross from the ceiling beam?
5. Jimbob fell over the edge of a cliff and his friend Cooter is pulling him back up using a rope. If Jimbob's mass is 42 kg and Cooter is pulling him up at a constant velocity of 0.5 m/s, what is the tension in the rope?
6. A very fat bird (80 kg) sits on a telephone line, causing it to sag as shown below. What is the tension in the wire?



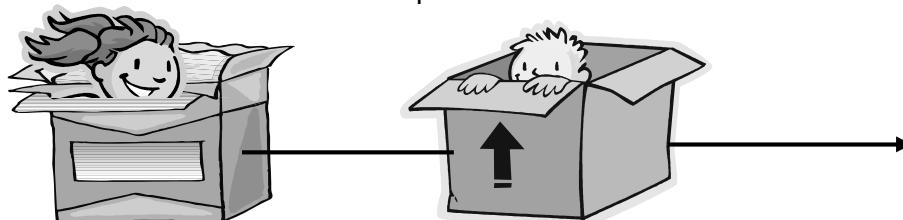
7. On a camping trip, you use a rope to hang your backpack from a tree branch to keep it safe from bears. The mass of the backpack is 32 kilograms. The angle of the rope on the left side is 20° from horizontal and the angle on the right side is 40° from horizontal. What is the tension in each rope?
8. A person who weighs 800 N steps onto a scale that is on the floor of an elevator. If the elevator accelerates upward at a rate of 5 m/s^2 , what will the scale read?
9. Honors: Two fishermen catch an enormous hammerhead shark. The fish pulls backwards with a force of 1500 N. The fishermen pull on their lines as shown below. What is the tension in each fisherman's line?



10. What is torque?
11. What are the metric units for measuring torque? What are the English units for torque?
12. You are trying to loosen a bolt with a wrench that is 6 inches long, but the bolt won't budge. Why would it be helpful if you used your other wrench that is 10 inches long?
13. Two children balance on a seesaw. The boy weighs 90 pounds and sits six feet from the fulcrum. His sister weighs 62 pounds. How far from the fulcrum must she sit to balance the seesaw?
14. The steering wheel of your car has a radius of 0.2 meters. If you pull on the wheel with a force of 216 N, how much torque are you exerting on the steering wheel?
15. Three masses are balanced on a meter stick, as shown below. How far from the fulcrum must the 26-g mass be placed to balance the stick?



16. When analyzing motion on a slanted plane, how does the vector that represents the weight need to be changed?
17. A young child is playing Schlitterbahn on his swing set slide. He takes a hose and pours water down the slide, virtually eliminating friction. If the mass of the child is 30 kg and the angle of the slide is 50° , what is the child's acceleration?
18. A 26-kg block slides down an inclined surface at an angle of 35° . If the coefficient of kinetic friction is 0.39, what is the block's acceleration?
19. You put your little sister and little brother in cardboard boxes and drag them across the yard. Your sister's box has a mass of 35 kg and your brother's box has a mass of 40 kg. The coefficient of kinetic friction is 0.42. If you pull with a force of 400 N, what is the acceleration of the boxes and the tension in the rope that connects them?



20. Honors: A block ($m = 40.0$ kg) is connected by a light string to a ball ($m = 50.0$ kg) that is hung on a frictionless pulley. The coefficient of static friction between the block and the incline is 0.44 and the coefficient of kinetic friction between them is 0.27. What is the acceleration of the system and what is the tension in the string?

