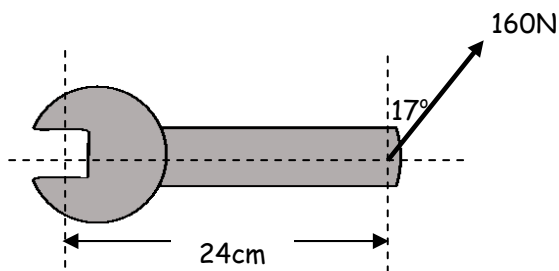


# TORQUE AND EQUILIBRIUM

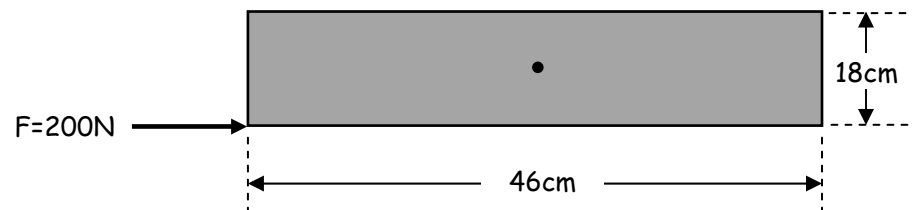
## In-Class Example Problems

### TORQUE:

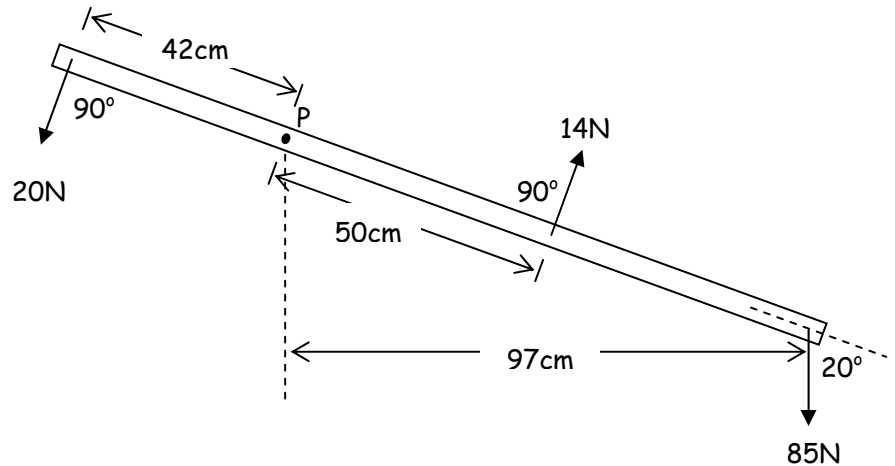
1. A force of 160N acts at the end of a wrench, at an angle that is 17degrees from being perpendicular to the length of the wrench. What torque is produced about an axis of rotation through a bolt's location, 24cm from where the torque is acting?



2. Use the given top-view diagram to calculate the torque caused by the given force, about an axis through the center of the object.

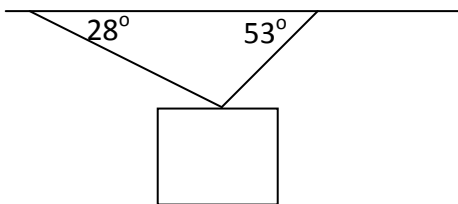


3. Three forces are acting on a lightweight object, as shown in the diagram. Find the net torque on the object about an axis perpendicular to the page and passing through point P.



### TRANSLATIONAL EQUIL.

4. A 100kg object is supported by cables as shown in the picture. Find the tension in each cable.



### STATIC EQUIL.

5. A man is standing on a scaffold supported by two vertical ropes, one on each end. The scaffold weighs 150 N and is 2m long. What is the tension in each rope when the 600N man stands 1m from the right end of the scaffold?

6. A fulcrum (pivot point) is placed 1.5 meters from the edge of a 4.0 m long wooden plank. The plank has a mass of 15 kg, which is uniformly distributed over its length. A weight is placed at the short end to balance it. What is the proper amount of weight needed to balance the plank?

7. A 300N uniform rectangular sign 4m wide is suspended from a horizontal, 5m-long rod, so that the sign's right edge is lined up with the rod's right end. The weight of the rod is 80N. The left end of the rod is supported by a hinge and the right end is supported by a thin cable making a  $20^\circ$  angle with the horizontal, as shown in the picture. Find the tension in the cable, and the horizontal and vertical components of force exerted on the left end of the rod by the hinge.

