

Planet Holloway - **Websheet 8.1**

AP Physics C - Chapter 8 Torque

You may print this out and write on it or work on your own paper.

Show all work.

Assume: ($g_{\text{earth}} = 10 \text{ m/s/s}$), (ccw = counter clockwise)

1. A 4 m rod is pivoted about its left end. A force of 10 N is applied perpendicular to the rod at a distance of 1.4 m from the pivot creating a cw (clockwise) torque. Where should a 6 N force applied at 40 degrees to the rod be placed such that the rod remains in rotational equilibrium?
2. Two children sit on a seesaw that is 4 m long. If one child is 400 N and the other is 360 N, what is the net torque on the seesaw?
3. If in the above problem, the seesaw and children system have a moment of inertia of $450 \text{ kg}\cdot\text{m}^2$, what is the angular acceleration of the system?
4. If a bucket of mass 12 kg has a massless rope attached to it and that rope is wrapped around a cylinder at the top of the well with a radius of 20 cm and a moment of inertia of $4 \text{ kg}\cdot\text{m}^2$, what is the net torque the rope puts on the cylinder if the bucket accelerates up at 1.5 m/s/s ?
5. A bucket of water with a total mass of 18 kg is attached to a rope, which in turn, is wound around a 20 cm radius cylinder at the top of a well. (Sound familiar?) A crank with a turning radius of 30 cm is attached to the end of the cylinder. What is the minimum force directed perpendicular to the crank handle required to just raise the bucket? (Assume $a = 0$ because you will raise the bucket at a constant speed).
6. A uniform footbridge made completely of stale tortillas weighs 200 N and is 6 m long. There is a vertical support, a pier, under the left side of the bridge 20 cm from the edge and one on the right 50 cm from the right edge. What weight does the left pier support?

Answers:

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| 1. 3.63 m | 4. 30 m-N |
| 2. 80 m-N | 5. 120 N |
| 3. 0.18 rad/s/s | 6. 94.3 |