Torque Practice #1

      

      

1. A force of 20 N is applied perpendicular to the end of a bar of length 0.5 m. Calculate the torque produced by the force. ***10 Nm***
2. A child of mass 20 kg is located 2.5 m from the fulcrum or pivot point of a seesaw. Where must a child of mass 30 kg sit on the seesaw in order to provide balance? ***1.67 m***
3. Two girls are sitting on the same side of a see-saw. One girl is 28 kg and sitting 2.4 m away from the middle. The other girl is 35 kg and 2.6 m away from the middle. Their dad can balance them out if he sits 2.0 m away from the middle on the other side. What is their dad’s mass? ***79.1 kg***
4. A fulcrum is placed under the center of a 5 m long rod. If a 125 N mass is attached at one end of the rod, where should a 200 N force be placed in order for the rod to remain in rotational equilibrium. ***1.56 m***
5. A 6 m long massless beam is placed on a fulcrum. If a 20 kg child sits on one end, and a 15 kg child sits on the other, where should the fulcrum be placed so that rotational equilibrium is assured. ***2.57 m from the 20 kg end***
6. What is the net torque about the center of a 1.8 m long massless rod when a 5 kg mass is attached to the left end, and a 3 kg mass is attached to the other? ***17.64 Nm***
7. A 200 N force is applied at an angle of 45˚ above the horizontal to a 4 m long horizontal beam. What torque does this force exert on the beam? ***565.7 Nm***
8. A 10 kg uniform plank of length L is pivoted about its center. A 4 kg mass is to be placed on the right end. How far from the pivot point must a 6 kg mass be placed to keep the plank in equilibrium? ***L/3 from the pivot point***
9. A 25 kg, 6 m long rod is attached at one end. Determine the torque associated with the rod due to its own weight if it were released from the other end. ***735 Nm***
10. From the previous question, a fulcrum is now placed 2 m from one end of the rod. Determine the torque associated with the rod due to its own weight if it were released. ***245 Nm***
11. A boy and a girl have masses of 45 kg and 32 kg respectively. Both are balanced on opposite ends of a 5.0 m long wooden plank with a mass of 16 kg. At what point along the plank does the pivot point have to be? ***2.15 m from the 45 kg end***
12. A uniform rod of mass 12 kg and length 6 m is pivoted at one end to a wall and is partially supported by a guy wire attached at the free end, making a 30° angle with the horizontal. A 20 kg mass is suspended by a rope wrapped around the rod, 4 m from the wall. Determine the force of tension in the wire. ***379 N***