

1. The propeller on an airplane has a length of 223 cm and a mass of 26.8 kg. The desired rotation rate of the propeller is 2700 rpm. The engine provides a torque of $550 \text{ N} \cdot \text{m}$. How long does it take for the propeller to reach operating speed when the airplane's engine is started?

2. Superman pushes on the Earth. If he wishes to stop the rotation of the Earth in one hour, what force must he exert at the equator?

3. Consider again the situation in the previous problem. What power did Superman exert to accomplish his task?

4. Two children sit on the ends of a see-saw. The see-saw (without the children) has a mass of 17 kg. The distance between the children is 3 meters. Child “A” has a mass of 22 kg and child “B” has a mass of 31 kg. The pivot of the see-saw is halfway between them. They begin with child “B” in the air and child “A” on the ground. At this time, the see-saw makes an angle relative to the horizontal of 0.2 radians. What is the magnitude of the angular acceleration of the see-saw?

5. A Canada goose with a mass of 7 kg is flying at a speed of 5 m/s. It smacks into one of the blades of a wind turbine, which kills it instantly, resulting in goose goo becoming stuck to the blade. The turbine can be considered to be a solid disk with a diameter of 3 m and a mass of 13 kg. By how much will the rotational speed of the blade be changed by the impact?