

Planet Holloway - Websheet 7.4

AP Physics C - Chapter 7 Rotation and Centripetal Force

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. An 82 kg egomaniacal physics teacher spins a 12 kg bicycle wheel with a radius of 45 cm from rest to 42 rad/s in 6s. What is the average angular acceleration of the wheel.?
2. If the wheel above has a moment of inertia given by mr^2 , then what torque was applied to the wheel during the 6s?.
3. Mr. H turns on his fan and the three blades (25 cm each) experience a ccw angular acceleration of 3 rad/s/s. What is the angular displacement after the first 20 seconds. ?
4. At the end of the day when Mr. H turns off his fan, he notices that it takes 45 seconds to come to rest. If the running speed of the fan is 240 rad/s, then what is the average angular deceleration? And how many revolutions did the fan rotate through?
5. A fan with a moment of inertia of $0.8 \text{ kg}\cdot\text{m}^2$ has a net torque of 2 m-N applied to it. How many rotations does the fan go through in 7 seconds if it starts from rest?
6. Some fun loving high school physics students head to the local playground for fun with physics. Two climb aboard a 5 m diameter merry-go-round, while another accelerates the device at 4 rad/s/s for 7 seconds. What is the linear speed of one student holding on at the edge of the merry-go-round at the end of 7s?
7. Westlake is located 34.2° N latitude. What is the centripetal acceleration experienced at this location? (Hint: we circle on the Earth once every 24 hours and we are not on the equator).

1. 7 rad/s/s

2. 17.0 m-N

3. 600 rad

4. (-) 5.33 rad/s/s; 860 revolutions

5. 9.75 revolutions

6. 70 m/s

7. 0.028 m/s/s