Rotation Homework Problems:
p. 156: #1, 5, 8, 14, 17, 18

Problems taken from the school's old textbook:
Giancoli, D. (1980). *Physics*, 2nd Ed. Englewood Cliffs, NJ: Prentice Hall.

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1. What are the following angles in radians:
   a) 30^o?
   b) 90^o?
   c) 420^o?

5. A 20-cm-diameter grinding wheel rotates at 2000 rpm. Calculate its angular velocity in rad/s.

8. A fan reaches its rated speed of 33 rpm in 2.8 s after being turne on. What was the angular acceleration, assuming that it was uniform?

14. A 40-cm diameter wheel accelerates uniformly from 80 rpm to 300 rpm in 3.6 seconds. Assume the axis of rotation is fixed and the wheel is just spinning. Determine
   a) its angular acceleration.
   b) the radial and tangential components of the linear acceleration of a point on the edge of the wheel 2.0 seconds after it started accelerating. (Hint: what acceleration have we talked about that points into the center of circular motion? What acceleration have you learned about that is always tangent to the object's circular path?)

17. A pulley in a car reaches its rated speed of 33 rpm after making 1.5 revolutions. What was its angular acceleration, assuming that it was constant?

18. Two rubber wheels are mounted next to one another so their circular edges touch. The first wheel, of radius R_1 = 3.0 cm, accelerates at a rate 0.88 rad/s^2 and drives the second wheel, of radius R_2 = 5.0 cm, by contact (without slipping).
   a) Starting from rest, how long does it take the second wheel to reach an angular speed of 33 rpm?
   b) What was the angular acceleration of the second wheel?

ANSWERS:

1a. 0.524 radians (while I will show units of radians for clarity, remember that radians are really unitless)
1b. 1.571 radians
1c. 7.330 radians
5. 209.4 rad/s
8. 1.24 rad/s^2
14a. 6.4 rad/s^2
14b. a_c = centripetal acceleration = 89.7 m/s^2; a_t = tangential acceleration = 1.28 m/s^2
17. 0.634 rad/s^2
18a. 6.55 sec
18b. 0.528 rad/s^2 (you need to find this first before finding part (a); tricky/evil of me eh . . . .?)