Name_____

Date_____Period_____

**AP Physics Unit 9 – Worksheet 4**

1. 2 600 rev/min is equivalent to which of the following?
   a. 2600 rad/s
   b. 43.3 rad/s
   c. 273 rad/s
   d. 60 rad/s
2. A grindstone spinning at the rate of 8.3 rev/s has what approximate angular speed?
   a. 3.2 rad/s
   b. 26 rad/s
   c. 52 rad/s
   d. 81 rad/s
3. A 0.12-m-radius grinding wheel takes 5.5 s to speed up from 2.0 rad/s to 11.0 rad/s. What is the wheel's average angular acceleration?
   a. 9.6 rad/s$^2$
   b. 4.8 rad/s$^2$
   c. 1.6 rad/s$^2$
   d. 0.33 rad/s$^2$
4. A spool of thread has an average radius of 1.00 cm. If the spool contains 62.8 m of thread, how many turns of thread are on the spool?
   a. 100
   b. 1 000
   c. 3 140
   d. 62 800
5. A ceiling fan is turned on and reaches an angular speed of 120 rev/min in 20 s. It is then turned off and coasts to a stop in an additional 40 s. The ratio of the average angular acceleration for the first 20 s to that for the last 40 s is which of the following?
   a. 2
   b. 0.5
   c. –0.5
   d. –2
6. A 0.30-m-radius automobile tire rotates how many rad after starting from rest and accelerating at a constant 2.0 rad/s$^2$ over a 5.0-s interval?
   a. 12.5 rad
   b. 25 rad
   c. 2.0 rad
   d. 0.50 rad
7. A fan blade, initially at rest, rotates with a constant acceleration of 0.025 rad/s$^2$. What is its angular speed at the instant it goes through an angular displacement of 4.2 rad?
   a. 0.025 rad/s
   b. 0.11 rad/s
   c. 0.46 rad/s
   d. 1.2 rad/s
8. A fan blade, initially at rest, rotates with a constant acceleration of 0.025 rad/s$^2$. What is the time interval required for it to reach a 4.2-rad displacement after starting from rest?
   a. 1.8 s
   b. 2.0 s
   c. 16 s
   d. 18 s

9. A ceiling fan is turned on and reaches an angular speed of 120 rev/min in 20 s. It is then turned off and coasts to a stop in 40 s. In the one minute of rotation, through how many revolutions did the fan turn?

a. 20
b. 60
c. 0
d. 600

10. Starting from rest, a wheel undergoes constant angular acceleration for a period of time *T*. At what time after the start of rotation does the wheel reach an angular speed equal to its average angular speed for this interval?

a. 0.25 *T*
b. 0.50 *T*
c. 0.67 *T*
d. 0.71 *T*

11. Starting from rest, a wheel undergoes constant angular acceleration for a period of time *T*. At which of the following times does the average angular acceleration equal the instantaneous angular acceleration?

a. 0.50 T
b. 0.67 T
c. 0.71 T
d. all of the above

12. A Ferris wheel starts at rest and builds up to a final angular speed of 0.70 rad/s while rotating through an angular displacement of 4.9 rad. What is its average angular acceleration?

a. 0.10 rad/s$^2$
b. 0.05 rad/s$^2$
c. 1.8 rad/s$^2$
d. 0.60 rad/s$^2$

13. A Ferris wheel, rotating initially at an angular speed of 0.50 rad/s, accelerates over a 7.0-s interval at a rate of 0.040 rad/s$^2$. What is its angular speed after this 7-s interval?

a. 0.20 rad/s
b. 0.30 rad/s
c. 0.46 rad/s
d. 0.78 rad/s

14. A Ferris wheel, rotating initially at an angular speed of 0.500 rad/s, accelerates over a 7.00-s interval at a rate of 0.040 0 rad/s$^2$. What angular displacement does the Ferris wheel undergo in this 7-s interval?

a. 4.48 rad
b. 2.50 rad
c. 3.00 rad
d. 0.500 rad

15. A ventilation fan has blades 0.25 m in radius rotating at 20 rpm. What is the tangential speed of each blade tip?

a. 0.02 m/s
b. 0.52 m/s
c. 5.0 m/s
d. 20 m/s

16. A 0.30-m-radius automobile tire accelerates from rest at a constant 2.0 rad/s$^2$ over a 5.0-s interval. What is the tangential component of acceleration for a point on the outer edge of the tire during the 5-s interval?

a. 33 m/s$^2$
b. 6.7 m/s$^2$
c. 0.60 m/s$^2$
d. 0.30 m/s$^2$

17. A point on the rim of a 0.30-m-radius rotating wheel has a tangential speed of 4.0 m/s. What is the tangential speed of a point 0.20 m from the center of the same wheel?

a. 1.0 m/s
b. 1.3 m/s
c. 2.7 m/s
d. 8.0 m/s

18. A 0.15-m-radius grinding wheel starts at rest and develops an angular speed of 12.0 rad/s in 4.0 s. What is the average tangential acceleration of a point on the wheel's edge?

a. 0.45 $m/s^2$
b. 6.8 $m/s^2$
c. 28 $m/s^2$
d. 14 $m/s^2$

19. The end of the cutting cord on a gas-powered weed cutter is 0.15 m in length. If the motor rotates at the rate of 20 rev/s, what is the tangential speed of the end of the cord?

a. 628 m/s
b. 25 m/s
c. 19 m/s
d. 63 m/s

20. A bucket in an old well is hoisted upward by a rope which winds up on a cylinder having a radius of 0.050 m. How many rev/s must the cylinder turn if the bucket is raised at a speed of 0.15 m/s?

a. 3.0 rev/s
b. 1.5 rev/s
c. 0.48 rev/s
d. 0.24 rev/s

21. Consider a point on a bicycle wheel as the wheel makes exactly four complete revolutions about a fixed axis. Compare the linear and angular displacement of the point.

a. Both are zero.
b. Only the angular displacement is zero.
c. Only the linear displacement is zero.
d. Neither is zero.

22. Consider a point on a bicycle wheel as the wheel turns about a fixed axis, neither speeding up nor slowing down. Compare the linear and angular velocities of the point.

a. Both are constant.
b. Only the angular velocity is constant.
c. Only the linear velocity is constant.
d. Neither is constant.

23. Consider a point on a bicycle wheel as the wheel turns about a fixed axis, neither speeding up nor slowing down. Compare the linear and angular accelerations of the point.

a. Both are zero.
b. Only the angular acceleration is zero.
c. Only the linear acceleration is zero.
d. Neither is zero.