Acc. Physics **Circular Motion Worksheet** **Name**_____
Hr._____

Please answer all questions in the space provided. Include all equations and units. Box your answers as well. Thanks!

1. A child moves with a speed of 1.80 m/s when 12.4 m from the center of a merry-go-round. Calculate the centripetal acceleration of the child. In what direction is the child accelerating?

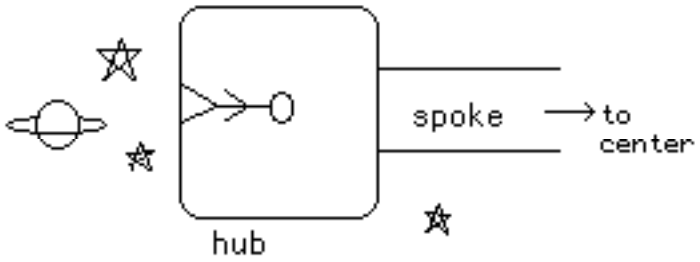
2. If the mass of the child in #1 is 25.0 kg, what is the centripetal force acting on the child? In what direction does the force act?

3. A horizontal force of 26.0 N is applied to a 0.60 kg stone to keep in rotating in a horizontal circle of radius 0.40 m. Calculate its speed. (We use a horizontal circle so we don't have to worry about the effect of gravity.)

4. Calculate the centripetal acceleration of a person on the equator of the earth. The radius of the earth is 6.38×10^6 m. Yes, you must determine how many seconds there are in a day.

5. The answer to #4 is a tiny fraction of the acceleration due to gravity, 9.8 m/s^2. If you multiply the mass of the person by the centripetal acceleration, you will have the weight that is lost simply due to the person's rotation on the earth. Assume the person has a mass of 100 kg. What will the person actually weigh on the equator (according to a bathroom scale) when you take the rotation of the earth into account?

6. If someday we are to live in space stations, we need to know how we would go about simulating gravity in the station. One very common idea is to build the station to look like a giant bicycle wheel with the people living inside the tire. The station would spin, holding the people on the inside wall of the outside of the tire (see below). If the centripetal acceleration of the station is to be equal to g, 9.8 m/s/s, what would the period of rotation be for such a space station? The radius of the station would be 1000 meters.



7. A ladybug sits halfway between the axis and the edge of a phonograph record. What will happen to its linear speed if (a) only the RPM (revolutions per minute) rate is doubled? (b) it only moves to the edge of the record? (c) Both a and b?

8. According to problem #5, you will weigh less on the equator than at any other place on earth due to the rotation of the earth. If the earth were to rotate faster, you would weigh even less. However on the space station (problem #6), the faster the space station rotates, the more you would weigh. Please offer an explanation to this seemingly paradoxical situation.