Math 1316 – Trigonometry **Assignment 2** **Name** _____

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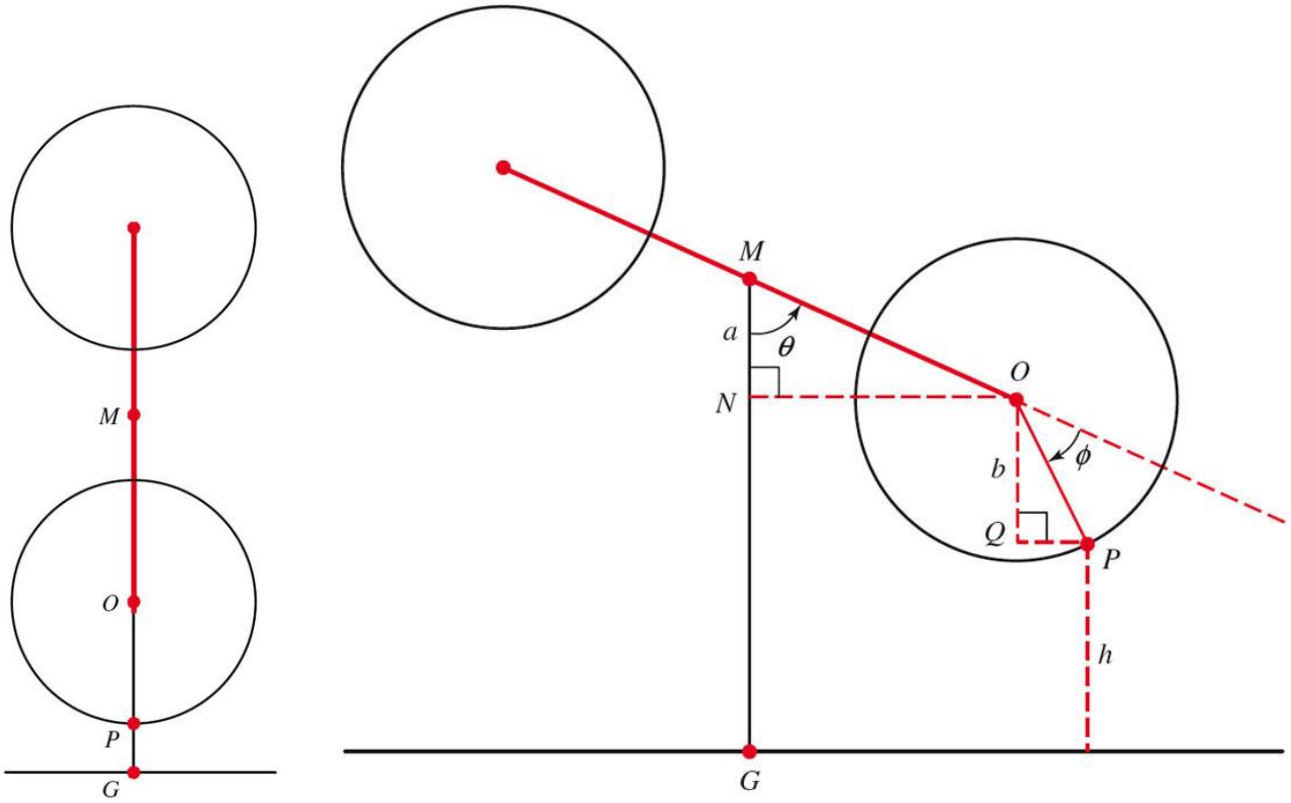
1. You will model a double Ferris wheel with a 50-foot arm that is spinning at a rate of 3 revolutions per minute in a counterclockwise direction. The center of the arm is 44 feet above the ground. The diameter of each wheel is 32 feet, and the wheels turn at a rate of 5 revolutions per minute in a clockwise direction. A diagram below is shown below. *M* is the midpoint of the arm; an *O* is the center of the lower wheel. Assume the rider is initially at point *P* on the wheel.



a) Determine the lengths of *MO*, *OP*, and *MG (left figure)*

b) Find angle *QOP* in terms of θ and ϕ.

c) Use right triangle trigonometry to find lengths a and b, and then the height of the rider h, in terms of θ and ϕ.

d) Let t be the number of minutes that have passed since the ride began. Use the angular velocity of the arm and wheel to find θ and ϕ in radians in terms of t.

e) Replace θ and ϕ in your part (***d***) to obtain the height h as a function of time t (in minutes)

2. An oil tanker strikes a sand bar that rips a hole in the hull of the ship. Oil begins leaking out of the tanks with the spilled oil performing a circle around the tanker. The radius of the circle increasing at rate of 2.2 *ft/hr*.

a) Write the area of the circle as a function of the time (***t***).

b) Write the radius of the circle as a function of time.

c) What is the radius of the circle after 3 hours.

d) Determine the area of the circle after 3 hours.

e) Compute the rate of change of the circle from 3 hours to 4 hours.

f) If the oil tanker is 200 yards from shore, when will the oil spill first reach the shore line (1 *yd* = 3 *ft*)

3. Apply the appropriate angle in radian (*no decimal* - ***use*** *fraction*) and degree (*no decimal* - ***use*** *minute*)