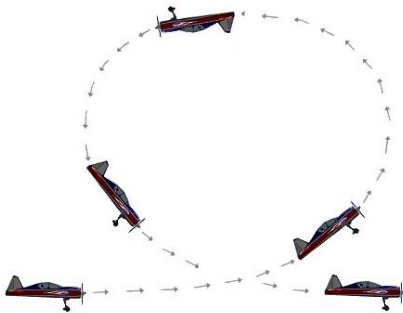
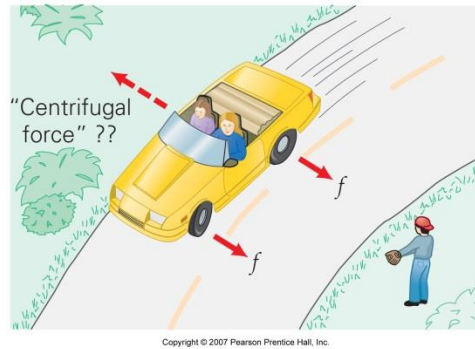


Name _____ Date _____ Period _____

Circular Motion Problem Set 2

1. A level curve on an interstate highway is a segment of a large circle and has a speed limit of 65 mi/hr. A cloverleaf exit which feeds directly into the interstate highway also a level, circular segment, but has a speed limit of only 30 mi/hr. Why the difference?
2. The spin cycle of a washing machine is used to extract water from recently washed clothes. Explain the physical principle(s) involved here.

3. When rounding a curve in a fast moving car, we experience a feeling of being thrown outward. It is sometimes said that this is because of an outward centrifugal (center fleeing) force. However, in terms of Newton's Laws, this is called a pseudo or false force because it doesn't really exist. Analyze the situation in the figure and show that this is the case. [Hint: Start with Newton's First Law]



- 4 A jet pilot puts an aircraft into a vertical loop with a radius of 2.0 km at a constant speed of 700 km/hr.

- a.) At the bottom of the loop, by what factor is the normal force on the pilot increased as compared to the value in level flight at the same speed?
- b.) What is this factor at the top of the loop?

5. Imagine that you swing a ball attached to the end of a string about your head at a constant speed in a horizontal circle with a radius of 1.50 m. If it takes 1.20 seconds for the object to make one revolution...

- a.) What is the magnitude of the tangential velocity of the object?
- b.) What centripetal acceleration are you imparting to the object via the string?
- c.) Is the string exactly horizontal?



6. A ball is swung at a uniform speed in a horizontal circle with a radius of 1.25 m. If the ball has a centripetal acceleration of 1.25 m/s^2 , what is its' orbital speed?
7. A race car goes around a level, circular track with a radius of 1.00 km at a speed of 120 km/hr. What is the centripetal acceleration of the car?
8. The Moon revolves around the Earth in 27.3 days in a nearly circular orbit with a radius of $3.80 \times 10^5 \text{ km}$. Assume that the Moon's motion is uniform. With what acceleration is it falling toward the Earth?
9. A car enters a circular curve with a radius of curvature of 0.400 km at a constant speed of 83.0 km/hr. If the friction between the road and the car's tires can supply a centripetal acceleration of 1.25 m/s^2 , does the car negotiate the curve smoothly? Justify your answer.
- 10 Compute the centripetal acceleration from a rotating earth on a person....
- a.) at the Equator.
 - b.) at a latitude of 40° N .
 - c.) at the North Pole.

