Extra Practice problems for Unit 8 Circular motion and Gravity

1. A 0.150 kg ball on the end of a 1.10 m long cord (negligible mass) is swung in a vertical circle. A) Determine the minimum speed the ball must have at the top of its arc so that the ball continues moving in a circle. B) Calculate the tension in the cord at the bottom of the arc, assuming the ball is moving at twice the speed of part A).
2. A) Determine the tension in a string attached to a 0.150 kg ball if a person makes the ball revolve in a horizontal circle of radius 0.600 m making 2.00 revolutions per second. B) Calculate the centripetal acceleration experienced by the ball.
3. Suppose the coefficient of static friction between the road and tires on a car is 0.60. A) What speed will put the car on the verge of sliding out as it round a level curve of 30.5 m radius? B) What angle would the road bed need to be banked at to allow the driver to drive at the speed of part A) as if the road were frictionless?
4. Determine the gravitational field strength on the surface of Mars.
5. At what height does a satellite need to be placed in orbit around Mars to be in a geosynchronous orbit?

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| **Planet** | **Day Length** |
| Mercury | 1,408 hours |
| Venus | 5,832 hours |
| Earth | 24 hours |
| Mars | 25 hours |
| Jupiter | 10 hours |
| Saturn | 11 hours |
| Uranus | 17 hours |
| Neptune | 16 hours |

1. What is the period of orbital motion for Mars if we assume that it is in a circular orbit around the sun? (will be different than the table)
2. Two stars are orbiting one another in a circular orbit with a radius of R. The mass of one star is twice the mass of the other. Determine an expression for the period of the orbit in terms of R.