

Uniform Circular motion

- 1) What is the centripetal acceleration of the Moon towards the Earth? (Hint: you might need to look a few things up!)
- 2) Calculate the centripetal force acting on a 925 kg car as it rounds an unbanked curve with a radius of 75 m at a speed of 22 m/s.
- 3) A small plane makes a complete circle with a radius of 3282 m in 2.0 min. What is the centripetal acceleration of the plane?
- 4) A car with a mass of 833 kg rounds an unbanked curve in the road at a speed of 28.0 m/s. If the radius of the curve is 105 m, what is the average centripetal force exerted on the car?
- 5) An amusement park ride has a radius of 2.8 m. If the time of one revolution of a rider is 0.98 s, what is the speed of the rider?
- 6) An electron ($m=9.11 \times 10^{-31}$ kg) moves in a circle whose radius is 2.00×10^{-2} m. If the force acting on the electron is 4.60×10^{-14} N, what is its speed?
- 7) A 925 kg car rounds an unbanked curve at a speed of 25 m/s. If the radius of the curve is 72 m, what is the minimum coefficient of friction between the car and the road required so that the car does not skid?
- 8) A 2.7×10^3 kg satellite orbits the Earth at a distance of 1.8×10^7 m from the Earth's centre at a speed of 4.7×10^3 m/s. What force does the Earth exert on the satellite?
- 9) A string can withstand a force of 135 N before breaking. A 2.0 kg mass is tied to the string and whirled in a horizontal circle with a radius of 1.10 m. What is the maximum speed that the mass can be whirled at before the string breaks?
- 10) A 932 kg car is traveling around an unbanked turn with a radius of 82 m. What is the maximum speed that this car can round this curve before skidding:
 - a) if the coefficient of friction is 0.95?
 - b) if the coefficient of friction is 0.40?
- 11) A motocross rider at the peak of his jump has a speed such that his centripetal acceleration is equal to g . As a result, he does not feel any supporting force from the seat of his bike, which is also accelerating at rate g . Therefore, he feels if there is no force of gravity on him, a condition described as apparent weightlessness. If the radius of the approximately circular jump is 75.0 m, what is the speed of the bike?