Worksheet 5.1

1) 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.

(6.0×10^3 N)

2) 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?

(9.0 m/s^2)

3) 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? (6.2×10^3 N)

4) 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? (18 m/s)

5) 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?

(3.18×10^7 m/s)

6) 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?

(0.89)

7) 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? (3.3×10^3 N)

8) 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? (8.62 m/s)

9) 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? (28 m/s)

b) if the coefficient of friction is 0.40? (18 m/s)