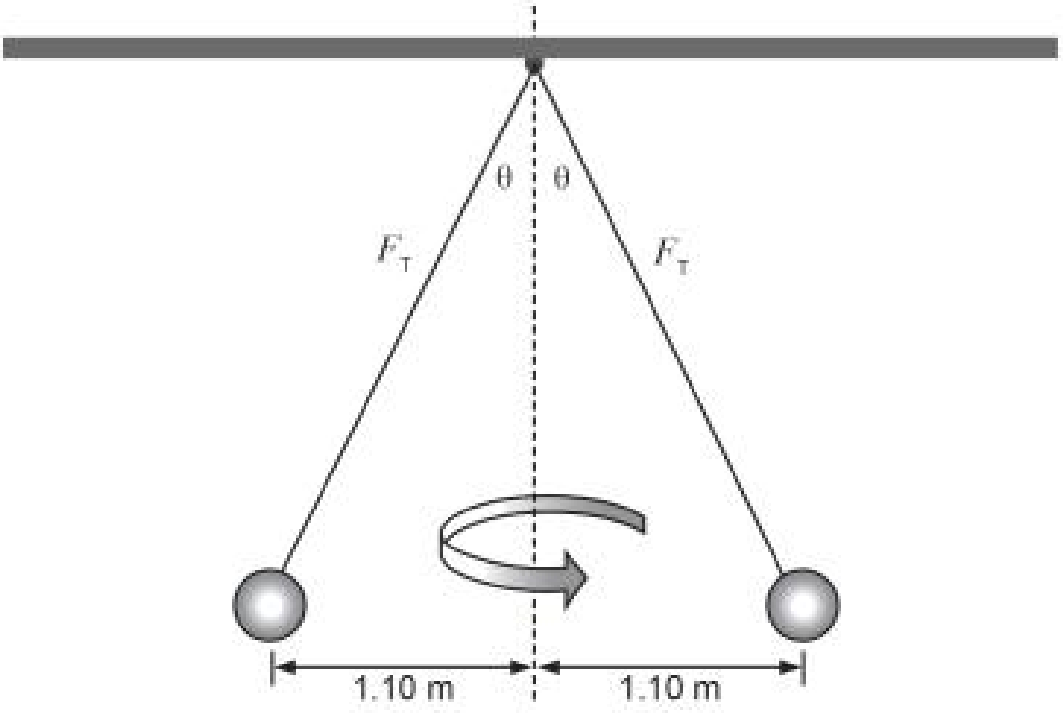
Question 20 **(13 marks)**

Two identical, electrically-charged spherical balls tied to the ends of cords of negligible mass revolve freely in a horizontal plane as shown in the diagram below. The electric charge on each ball is 7.00×10^{-6} C. The radius of the circle of motion is 1.10 m. The period (T) of revolution is 2.50 s and the mass of each ball is 0.200 kg. (Ignore the interference by any magnetic field interaction, including Earth's magnetic field.)



(a) On the ball below complete a labelled, free body diagram of the force(s) acting on one of the balls. (3 marks)

(b) Show by calculation that the magnitude of the velocity of each ball is 2.76 m s^{-1}. (1 mark)

(c) Determine the angle (θ) and the tension (F_T) of one of the cords. (6 marks)

Answer _____ N at an angle of _____

(d) In completing the calculations for part (c), why it is reasonable to consider the gravitational attraction between the two spheres to be negligible? Use a formula to support your answer. (3 marks)

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