

Answer on Question #62665-Physics-Other

In commercial aviation, a holding pattern is a horizontal path (usually circular) flown by an airplane while waiting for clearance to land. Suppose that a Boeing 747 commercial airliner with a mass of 275,000 kg is in a holding pattern of radius 2.76 km while flying at a speed of 296 km/h. What is the magnitude of the net force on the Boeing 747?

Solution

The centripetal force and weight are perpendicular to each other. Thus the net force is

$$F_{net} = \sqrt{(mg)^2 + \left(\frac{mv^2}{r}\right)^2} = m \sqrt{(g)^2 + \left(\frac{v^2}{r}\right)^2} = 275000 \sqrt{(9.81)^2 + \left(\frac{(296)^2}{2760}\right)^2} = 2.76 \cdot 10^6 N.$$

Answer: $2.76 \cdot 10^6 N$.