Answer on Question #64945, Physics | Mechanics Relativity

Question: At the equator, the radius of the Earth is approximately 6370 km. A jet flies at a very low altitude at a constant speed of v = 282 m/s. Upon landing, the jet can produce an average deceleration of a = 19.5 m/s2.

a) How long will it take the jet, in seconds, to circle the earth at the equator?

b) What is the numeric value for the minimum landing distance, d (in meters), this jet needs to come to rest?

Solution:

R=6370km=6370*1000m;

v= 282m/s;

a_{max}=19.5m/s;

a) $L = 2\pi R; t = \frac{L}{v} = \frac{2*3.1416*6370*1000}{282} = 141929s = 1.42 * 10^5 s$

b) $S_{min} = \frac{v^2}{2*a_{max}} = \frac{282^2}{2*19.5} = 2039.1m = 2.039km$

Answer:

a) $1.42 * 10^5 s$

b) $2039.1m = 2.039km$