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:**

\[
\begin{align*}
R &= 6370 \text{ km} = 6370 \times 1000 \text{ m}; \\
v &= 282 \text{ m/s}; \\
a_{\text{max}} &= 19.5 \text{ m/s}^2;
\end{align*}
\]

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

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

**Answer:**

a) \( 1.42 \times 10^5 \text{ s} \)

b) \( 2039.1 \text{ m} = 2.039 \text{ km} \)

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