

Answer on Question #80405, Physics / Other

Because Earth's rotation is gradually slowing, the length of each day increases: The day at the end of 1.0 century is 1.0 ms longer than the day at the start of the century. In 34 centuries, what is the total of the daily increases in time (that is, the sum of the gain on the first day, the gain on the second day, etc.)?

Solution:

The last day of the 34 centuries is longer than the first day by

$$(34 \text{ century})(0.001 \text{ s/century}) = 0.034 \text{ s.}$$

The average day during the 34 centuries is

$$\frac{0 + 0.034}{2} = 0.017 \text{ s}$$

longer than the first day.

Since the increase occurs uniformly, the cumulative effect is

$$T = \left(\frac{0.017 \text{ s}}{1 \text{ day}}\right) \left(\frac{365.25 \text{ day}}{1 \text{ year}}\right) (3400 \text{ y}) = 21111 \text{ s} = 5.86 \text{ hr}$$

Answer: 21111 s = 5.86 hr

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