



Problem of the Week

Problem B

The Time of Your Life!

Problem

As you answer these questions, recall that there are 365 days in a year (except for a leap year), 24 hours in a day, 60 minutes in each hour, and 60 seconds in each minute.

- The oldest human ever to have lived, according to the Guinness Book of Records, was 122 years and 164 days old at the time of her death. Jeanne Louise Calment (France) was born on February 21, 1875, and died at a nursing home in Arles, in southern France, on August 4, 1997. How many minutes was this person alive (assuming she was born and died at midnight on the given dates)?
- If you were born on January 1, 2005, how many years old would you be when you celebrate the billionth second that you have been alive?



Jeanne Louise Calment 1996
Source: Wikipedia

Solution

- To determine how many minutes Jeanne Louise Calment was alive, we must convert her age of 122 years and 164 days to minutes. Since leap years occur every four years, we shall assume there are 365.25 days in a year, on average. Thus the total number of days is

$$164 \text{ days} + 122 \text{ years} = 164 + (122 \times 365.25) = 44\,724.5 \text{ days.}$$





Since there are $60 \times 24 = 1\,440$ minutes in each 24 hour day, we see that she was alive for a total of

$$44\,724.5 \times 1\,440 = 64\,403\,280 \text{ minutes.}$$

NOTE: If, instead of using the average number of days in a year, you count the number of leap years (31) and non-leap years (91) that Jeanne Louise was alive, you will get a very slightly different answer, namely 64 404 000 minutes. It is an interesting class discussion to think about why this answer is slightly larger.

b) We need to figure out how many years there are in one billion seconds.

Working upwards in the size of the time unit, we have:

$$1\,000\,000\,000 \text{ seconds equals } 1\,000\,000\,000 \div 60 = 16\,666\,666 \frac{2}{3} \text{ minutes;}$$

$$16\,666\,666 \frac{2}{3} \text{ minutes equals } 16\,666\,666 \frac{2}{3} \div 60 \approx 277\,777.778 \text{ hours;}$$

$$277\,777.778 \text{ hours equals } 277\,777.778 \div 24 \approx 11\,574.074 \text{ days;}$$

$$11\,574.074 \text{ days equals } 11\,574.074 \div 365.25 \approx 31.7 \text{ years.}$$

Thus you will be more than 31 years old when you celebrate your billionth second of life.

EXTENSION: How long have YOU been alive?

- How many whole number years?
- How many whole number days (don't forget leap years)?
- How many whole number hours (assuming you were born at midnight on your birthday)?
- How many minutes?
- How many seconds?

