# Day of the Programmer





Editorial by _mfv_

Let's calculate the total number of days in months January, March, April, May, June, July and August without February because the number of days in February varies. The sum is $31+31+30+31+30+31+31=215$. The number of remaining days is $256-215=41$. Let's see what can remain when we subtract from it the number of days in February. The number of days in February is either $28$ or $29$ and there is one special case: February $1918$ contained $28$ (the usual number of days in a non-leap year) minus $13$ (the number of missed days as the $14^{th}$ was the first day of the month) equal to $15$ days. Subtracting these values we get $41-28=13$, $41-29=12$, $41-15=26$. All $3$ numbers are within the number of days of September. So the holiday is always in September and only day of the month changes.

Using this information we can get the day of September by subtracting from $256$ a number of days in all months from January to August where all values except February are constant. And the number of days for February we can get as following:

- for $1918$ it is $28-13$;
- for years before $1918$ it is either $28$ for a non-leap year or $29$ for a leap year, and a year is a leap when $y \bmod 4=0$;
- for years after $1918$ it is either $28$ for a non-leap year or $29$ for a leap year, and a year is a leap when ($y \bmod 4=0$ and $y \bmod 100 \neq 0$) or $y \bmod 400=0$.

**Alternate solution**

We know the date for $1918$ is $26.09.1918$. For all other years, if it's a leap year, the day of month is $12$ or for normal years, it's $13$. Excluding $1918$, the following two rules apply:

- Any leap year, the date will be $12.09.yyyy$.
- Any normal year, the date will be $13.09.yyyy$.

Set by _mfv_

Problem Setter's code:

```
#pragma GCC diagnostic ignored "-Wunused-result"

#include <cstdio>
#include <cassert>

int main() {
    int y;
    scanf("%d", &y);
    int daysInFebruary;
    if (y == 1918) {
        daysInFebruary = 28 - 13;
    } else if (y < 1918) {
        if (y % 4 == 0) {
            daysInFebruary = 29;
        } else {
            daysInFebruary = 28;
        }
    } else {
        if ((y % 4 == 0 && y % 100 != 0) || y % 400 == 0) {
            daysInFebruary = 29;
        } else {
            daysInFebruary = 28;
        }
    }
    int day = 256 - 31 - daysInFebruary - 31 - 30 - 31 - 30 - 31 - 31;
    assert(1 <= day && day <= 30);
    printf("%02d.%02d.%04d", day, 9, y);
    return 0;
}
```

STATISTICS

Difficulty: Easy
Time Complexity: $\mathcal{O}(1)$
Required Knowledge: Conditional statements
Publish Date: Feb 13 2017
Originally featured in Week of Code 29

NEED HELP?

View discussions
View top submissions

**Feedback**

Was this editorial helpful?

Yes No