

Welcome to calendar math logic

This web page aims at giving out the logic behind the calendar math. Here there are 2 sections, which are basic calendar math and advanced calendar math. First we shall see the basic calendar math.

Basic Calendar math

This is the simple example where we get the day when year, month, date is given. Let us consider this year of example.

1) The 12 number code for this year (2003) is

Jan = 2 (2 is obtained as 7-first Sunday date) similarly others codes

Feb = 5

Mar = 5

Apr = 1

May = 3

Jun = 6

Jul = 1

Aug = 4

Sep = 0

Oct = 2

Nov = 5

Dec = 0

- 2) Consider 21st of Dec this year.
- 3) Add with code of that month ($21+0=21$).
- 4) Take mod of previous step with 7 ($21 \bmod 7 = 0$) ie. Reminder when $21/7$.
- 5) $0 \Rightarrow$ Sunday $1 \Rightarrow$ Monday $6 \Rightarrow$ Saturday.
- 6) There fore 21st of Dec is Sunday.

Note: mod is to find the reminder

If you really write a code for all the years from 1900 to 2020 you will find that the codes are repeating for every 6 or 11 years (if I am right).

One more interesting thing is that 1993 and 1999 have codes 400 351 362 402 where the years 1993 and 1999 are prime numbers.

Advanced Calendar math

What day of the week will May 12, 2034 be?

What day of the week was May 12, 1298?

Here's a neat algorithm that will tell you:

Note: all divisions, except where noted otherwise, are integer divisions, in which remainders are discarded.

Step 1#

First figure out the values for a, y, and m - variables to be plugged into a formula.

$a = (14 - \text{month})/12$ (month = 1 for Jan, 2 for Feb, etc)

$y = \text{year} - a$ (year = the 4 digit year)

$m = \text{month} + 12a - 2$

Step 2#

Next, plug the values of y and m into the following formula to calculate the day:

$$d = (\text{Date} + y + y/4 - y/100 + y/400 + 31m/12) \bmod 7$$

(**Note:** mod 7 means "modulo division." That is, take the remainder instead of the quotient as your answer. For example, $20 \bmod 3 = 2$, because the remainder is 2.)

The answer you get for d will correspond to a day of the week as such:

0 = Sunday.

1 = Monday.

2 = Tuesday.

3 = Wednesday.

4 = Thursday.

5 = Friday.

6 = Saturday.

Let's work an example.

What day of the week will April 5, 2020 fall on?

First figure out a , y , and m :

$a = (14 - 4)/12 = 0$ (remember, it's integer division so remainders are discarded.

4 represents the month of April since it's the fourth month of the year.)

$y = 2020 - 0 = 2020$

$m = 4 + 12(0) - 2 = 2$

Now plug y and m into the d formula to calculate the day:

$$d = (5 + 2020 + 2020/4 - 2020/100 + 2020/400 + 31(2)/12) \bmod 7$$

$$d = (5 + 2020 + 505 - 20 + 5 + 5) \bmod 7$$

$$d = 2520 \bmod 7$$

$$d = 0 \text{ (} 2520/7 = 360 \text{ with a remainder of 0)}$$

Recall from above that 0 = Sunday. So April 5, 2020 will be a Sunday.

Cool, huh? Remember, you can do this for dates in the past as well.

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