

The Doomsday Method

1. Introduction

Are you ready to become a mental math wizard? If so, you're in the right place! The Doomsday Method is a simple but powerful technique for calculating the weekday for any given date. It's like a secret code that only a select few know how to crack - but with our guide, you'll be one of the chosen few!

The Doomsday Method was invented by mathematician John Horton Conway in the 1970s. He was fascinated by mental math and wanted to find a way to easily calculate the day of the week for any date. After some tinkering, he came up with the Doomsday Method, which he believed was so easy that anyone could learn it with a little practice. And he was right!

In this guide, we'll take you by the hand and guide you step-by-step through the secrets of the Doomsday Method. We'll show you what to memorize, how to do the mental calculations, and how to apply them to every possible date. And with plenty of practice along the way, you'll soon become a Doomsday Method master.

So come on in and join the fun! With the Doomsday Method in your mental toolkit, you'll be unstoppable. Imagine impressing your friends and family by telling them what day of the week their birthday falls on - without even looking at a calendar! Get ready to become a mental math wizard!



2. Basic Principles

The Doomsdays:

The following days belong to the Doomsdays. They are special because, for any given year, the doomsdays will always share the same weekday. For example in the year 2023, all of the following dates are Tuesdays.

Doomsdays

The pairs

→ 4.4, 6.6, 8.8, 10.10 & 12.12

"I work 9 to 5 in a 7/11"

→ 5.9, 9.5, 7.11 & 11.7

Special days

→ 3.1 (4.1 in a leap year)

→ 28.2 (29.2 in a leap year)

→ 4.7 (Independence day)

→ 31.10 (Halloween)

→ 26.12 (Boxing day)

Weekday Conversion

Sunday	→	Noneday	(0)
Monday	→	Oneday	(1)
Tuesday	→	Twosday	(2)
Wednesday	→	Threesday	(3)
Thursday	→	Foursday	(4)
Friday	→	Fivesday	(5)
Saturday	→	Sixaday	(6)

Translate weekdays to numbers:

According to Conway's doomsday method, each of the seven weekdays will be translated into a number. We do this in order to calculate with them.

Centuries pattern

By assigning every century an anchor day, we enable ourselves to deal with any date. As the calendar repeats itself every 400 years, we can detect a pattern. Remember the pattern for the anchor days: Sunday, Friday, Wednesday, and Tuesday.

Centuries Pattern

...
1700: Sunday
1800: Friday
1900: Wednesday
2000: Tuesday
2100: Sunday
2200: Friday
2300: Wednesday
2400: Tuesday
...

Key years:

Also, note that there can be another pattern detected within any century. This pattern repeats every 28 years, while every 28-year cycle shares the same Doomsday sequence. This means, that when we are looking for the doomsday of the year 2056, we can consider it to be 2000.

Key Years

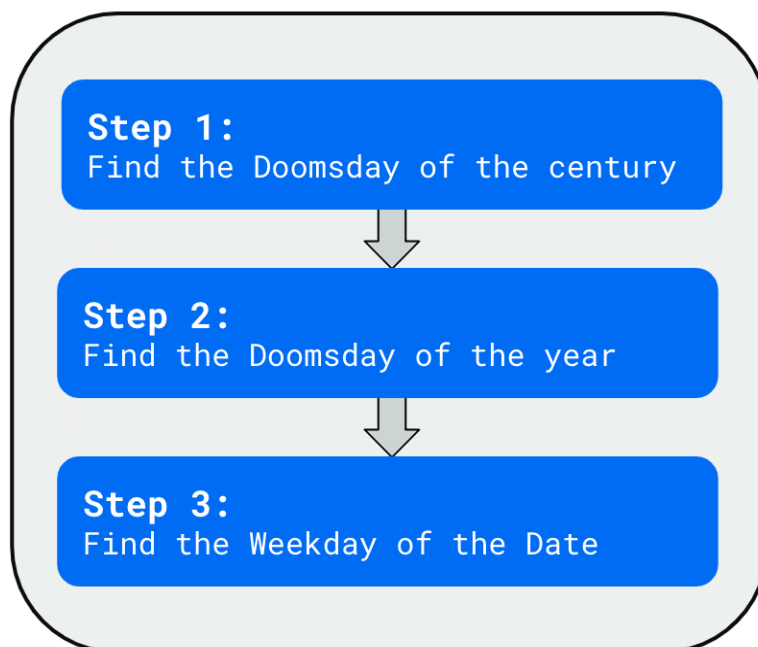
xx00, xx28, xx56, xx84



3. Walkthrough with Example

In this step-by-step guide we'll guide you through each stage with a practical example, using the memorable date of **11.04.2020** to honor the legendary mathematician John Conway.

First, we'll uncover the key to unlocking the Doomsday method by finding the Doomsday of the current century. With this knowledge, we'll be ready to take on the challenge of finding the doomsday of any year. And finally, we'll show you how to determine the exact weekday of any date by adjusting from the nearest doomsday.




Step 1: Find the Doomsday of the century


i Remember the Centuries Pattern

To find the Doomsday of the century, we need to remember the pattern for the Doomsday of the centuries that repeats every 400 years*.


*This pattern is based on the fact that there are 365 days in a year, but it actually takes about 365.24 days for the Earth to make one complete orbit around the Sun. This extra time adds up, so we need to adjust our calendar every four years with a leap year and skip leap years that are divisible by 100 (unless they are also divisible by 400).

 In our Example, the Doomsday for the century 2000 is a Tuesday (Twosday), which converts to a 2.

Step 2: Find the Doomsday of the year

 Add the number of years and leap years to the doomsday

This step is all about figuring out the Doomsday of the year we are looking for. To do this, we need to add the number of years and the number of leap years in the century to the result of step 1.


 For our example 11.04.2020, this would look as follows:


Result of Step 1: 2

Years in the century: 20

Leap Years in the century: $20 / 4 = 5$ (we can ignore any fractions here)

Result: $2 + 20 + 5 = 27$

 Now we want to convert this result to a weekday. As after seven days, the weekdays will repeat, all the seven steps can be ignored. In other words, we can calculate $\text{Result} \% 7^*$.

 In our case, this will be $27 \% 7 = 6$. From this, we can conclude that the Doomsday of the year 2020 is a Saturday.

Bonus tip: If you're dealing with a really old year in the century and the numbers are getting unwieldy, remember that the pattern of Doomsdays repeats every 28 years.


So for years ending in 00, 28, 56, and 84, the Doomsday will always be the same. For example, instead of calculating the Doomsday for the year 2060 like this:


$$2 \text{ (for Tuesday)} + 60 + (60 / 4) = 77,$$

you can start from the year 2056 and simply add 4 (the number of years between 2056 and 2060) and the one leap year in that period to get the same Doomsday:

$$2 \text{ (for Tuesday)} + 4 + (4 / 4) = 7.$$

Step 3: Find the Final Weekday of the Date

 Now that we know the Doomsday of the year, we can work out the final weekday of our date. To do this, we need to find the Doomsday that is closest to our date and adjust from there.

 In our example, we already know that the Doomsday for the year 2020 is a Saturday. The closest Doomsday to 11.04 is 04.04, which therefore know is also a Saturday.

To find the final weekday of our date, we can simply add seven days from the Doomsday to our date, what takes us from 04.04 to 11.04, which means that the final weekday of our date is also a Saturday.

If we would be looking for the weekday of 22.04.2020, we could add the difference of the two dates ($22 - 4 = 18$) to the Doomsday (Saturday = 6) and calculate the remainder of the division by seven:

$$(18 + 6) \% 7 = 3 \rightarrow \text{Wednesday.}$$

*The remainder operator is a mathematical tool used to calculate what's left over after dividing one number by another. For example, 10 divided by 3 equals 3 with a remainder of 1, so $10 \% 3$ would give you a result of 1.