

## How to be a Human Calendar

Being able to determine the day of the week when given any date in history may seem like the feat of a savant, but in fact it is nothing more than a parlor trick. The only memorization required is 12 numbers and a simple formula (these 12 numbers can be derived but memorization is easier). The formula can (of course) be done in your head with nothing more than basic arithmetic. Here's how to do it:

The first step is memorizing the 12 numbers called "Month Codes" ranging between 0 and 6, which correspond to months. They are as follows:

### **Month Codes**

January	0
February	3
March	3
April	6
May	1
June	4
July	6
August	2
September	5
October	0
November	3
December	5

These are the only numbers that are nonobvious and require memorization. Actually they can be derived, and I will do so at the bottom of this document. For speed purposes though, I recommend memorizing them. The days of the week have "Day Codes" as well, but they are more obvious and don't require any tricks to remember. They are as follows:

### Day Codes

Sunday	1
Monday	2
Tuesday	3
Wednesday	4
Thursday	5
Friday	6
Saturday	0

The day codes are easier since they start at 1 on the first day of the week and are in numerical order. **The only thing to remember is that at Saturday the number rolls over to 0.**

Now for the formula into which these codes are entered:

*+Month Code*

*+Day of Month*

*+Last 2 digits of the year*

*+ Last 2 digits of the year divided by 4 (throw out the remainder)*

*-1 for January or February if it's a leap year*

*+1 for century adjust for dates in the 1900s*

*Divide this number by 7*

**The remainder is the day code**

Here are a few examples:

## October 15, 1937

Month code: **0**

Day of Month: **15**

Last 2 digits of year: **37**

Last 2 digits of year divided by 4 (throw out remainder):  $37/4 = 9$

No leap year

+1 for a date in the 1900s

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=62

7 will go into this 8 times with a **remainder of 6**

Therefore October 15, 1937 was on a **Friday**.

**Helpful Hint:** You may notice that as the number gets bigger, it can be difficult to divide the final result by 7 in your head. Instead, for each step whose result exceeds a value of 6, divide the answer by 7, and **keep only the remainder for the next addition**. Keep a running sum and anytime it exceeds 6, divide by 7 and keep only the remainder. (e.g. if you get to “19” reset your running sum to 5 since 7 evenly divides 14 and you have 5 left over) Using this tip, the previous example would have been:

Month code: **0**

Day of Month:  $15/7 = 1$  (14 with remainder of 1, so keep **1** and add it to the total)

Last 2 digits of year:  $37/7 = 2$  (35 with remainder of 2. Now we're up to **3**)

Last 2 digits of year divided by 4 (throw out remainder):  $37/4 = 9 = 2$  (1 remainder 2 so now we're up to **5**)

No leap year

+1 for a date in the 1900s

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=0+1+2+2+1= **6 = Friday**

Another example using shortcut

**February 21, 2012** (Leap year)

Month code: **3**

Day of Month: **21** -> **0** (evenly divides by 7 so this step is **0**)

Last 2 digits of year: **12** -> **5** (at this time the running sum is **8**, so reset it to **1**)

Last 2 digits of year divided by 4 (throw out remainder): **12/4** -> **3**

**-1** leap year

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= 4-1= **3**

Thus February 21, 2012 was on a **Tuesday**

Below is a list of recent leap years:

1904, 1908, 1912, 1916, 1920, 1924, 1928, 1932, 1936, 1940, 1944, 1948,  
1952, 1956, 1960, 1964, 1968, 1972, 1976, 1980, 1984, 1988, 1992, 1996,  
2000, 2004, 2008, 2012, 2016, 2020

### Deriving Month Codes

The month codes can be calculated by starting with 0 in January and then each subsequent month's code is the base-7 running total of the number of days over 28 that all previous months have (confused yet?) This is done best by example.

**January = 0** We start at 0

**February = 3** January has 31 days which is 3 days beyond 28, so the running total so far is 3 (we don't count the month we're currently on)

**March = 3** Since February has 28 days exactly, we don't add to our total.

**April = 6** Since March has 31 days, we add 3 to our total of 3 giving 6.

**May = 1** Since April has 30 days, 2 over 28, we add 2 to our total of 6.

Since this is a base-7 total, we reset to 0 when we reach 7. We now have 1.

**June = 4** Since May has 31 days, we add 3 to our current total of 1 and get 4.

...and so on. This takes considerably longer than just remembering the values but if you get stuck it's a way to recall them.