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MAGIC CALENDAR III: From (0001 – 4000)

DHAIRYA R. BHATIA*

Tolani College of Arts and Science Adipur - Kutch, Gujarat, India.

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ABSTRACT

To find the day of the year from the given date.

Keywords: *Odd days, Modulus 7, Quotient (Q), Remainder 1 (R_1), and Remainder 2 (R_2).*

INTRODUCTION

A calendar is a system of organizing days for social, religious, commercial or administrative purpose. This is done by giving names to period of time typically days, weeks, months, and years. But to find out the day of the week from the given date is a quite long method. Few mathematicians have given some shortcut methods which are quite good so here is one more method to find the day of the week from the given date.

RESULT

We only find out the number of odd days from the given date and for a given day we find the 1st date of that month and year afterwards we consider the below given table,

Number of odd days (Required day)	Day we consider
0	Sunday
1	Monday
2	Tuesday
3	Wednesday
4	Thursday
5	Friday
6	Saturday

METHOD

We divide the given date into 4 parts,
A = Date
B = Month
C = Year
D = Value for particular years of interval.
Required day (X) = (A+B+C+D) mod7

- Take the value of **A** as it is given.

- For the value of **B** if the **Year is Leap** we follow the below given table,

Corresponding Author: Dhairya R. Bhatia*
Tolani College of Arts and Science Adipur - Kutch, Gujarat, India.

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

- For the value of **B** if the **Year is Non-Leap** we follow the below given table,

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

- For the value of **C** we divide the last two digits of the given year by 5 and note down the quotient (Q) and the remainder (R_1 as R_1th term) then divide the quotient (Q) by 8 and note down the remainder 2 (R_2) then follow the below given table,

	R_2	0	1	2	3	4	5	6	7
	R_1 th term								
	0	4	3	2	1	0	0	6	5
	1	5	4	3	2	2	1	0	6
C	2	6	5	4	4	3	2	1	1
	3	0	6	6	5	4	3	3	2
	4	1	1	0	6	5	5	4	3

- For the value of **D** we follow the below given table as per the given year.

Intervals of years.	**D**
0001-0040,0701-0740,1401-1440,2101-2140,2501-2540,2901-2940,3301-3340,3701-3740,141-180,0841-0880,1541-1580,0281-0300,0981-1000,1681-1700,1881-1900,2281-2300,2681-2700,3081-3100,3481-3500,3881-3900.	0
0101-0140,0801-0840,1501-1540,0241-0280,0941-0980,1641-1680,1841-1880,2241-2280,2641-2680,3041-3080,3441-3480,3841-3880,0381-0400,1081-1100.	6
0201-0240,0901-0940,1601-1640,1801-1840,2201-2240,2601-2640,3001-3040,3401-3440,3801-3840,0341-3380,1041-1080,0481-0500,1181-1200,1981-2000,2381-2400,2781-2800,3181-3200,3581-3600,3981-4000,1741-1752.	5
0301-0340,1001-1040,0441-0480,1141-1180,1941-1980,2341-2380,2741-2780,3141-3180,3541-3580,3941-3980,0581-0600,1281-1300,2081-2100,2481-2500,2881-2900,3281-3300,3681-3700,1701-1740.	4
0401-0440,1101-1040,1901-1940,2301-2340,2701-2740,3101-3140,3501-3540,3901-3940,0541-0580,1241-1280,2041-2080,2441-2480,2841-2880,3241-3280,3641-3680,0681-3700,1381-1400.	3
0081-0100,0781-0800,1481-1500,2181-2200,2581-2600,2981-3000,3381-3400,3781-3800,0501-0540,1201-1240,2001-2040,2401-2440,2801-2840,3201-3240,3601-3640,0641-0680,1341-1380,1781-1800.	2
0041-0080,0741-0780,1441-1480,2141-2180,2541-2580,2941-2980,3341-3380,3741-3780,0181-200,0881-0900,1581-1600,0601-0640,1301-1340,1753-1780.	1

Example 1:

- 20^{th} October, 2004

Solution:

Here we divide the date into 4 parts, A, B, C and D,
So the required day
X = (A+B+C+D) mod7

Here,
A = 20
B = 1 (From the table of months of leap year)

For C,
Taking the last two digits of the year and dividing them by 5, we get,

04/5 = (0*5) + 4

So, Q = 0, R_1 = 4 [4^{th} Term]

Then,
Dividing quotient (Q) by 8 and note down its remainder (R_2)

0/8 = (0*8) + 0

So, R_2 = 0

Thus from R_1 = 4 and R_2 = 0, we get **C** as 1,
C = 1

Now for **D**, we already have a table and the year 2004 belongs to the interval (2001-2040) for which the value of D is 2.
D = 2

Thus we found our all the variables A, B, C and D.

So the required day,
X = (A+B+C+D) mod7
= (20+1+1+2) mod7
= (24) mod7
= 3
= Wednesday (from table of days)
Thus the required day is Wednesday.

Example 2:

- 1^{st} March, 1997

We divide the date into 4 parts A, B, C and D.

Here,
A = 1
B = 3 (From the table of months for non-leap year)

For **C,**
We divide the last two digits of the year by 5 so we get,
97/5 = (19*5) + 2
Quotient (Q) = 19
Remainder 1(R_1) = 2 (i.e. 2^{nd} term)

Now we divide the quotient (Q) by 8 so we get,
19/8
Remainder 2 (R_2) = 3

As per the table the value of C is 2 [R_2 = 3 and R_1 = 2]
C = 2

And for value of **D** we have year as 1997 which is in the interval 1981-2000 for which the value of D is 5
D = 5

Thus we found all the variables A, B, C and D.

Therefore required day X is,

X = (A+B+C+D) mod7
= (1+3+4+5) mod7
= (13) mod7
= 6
= Saturday. (From the table of days)

Thus the required day is Saturday.

CONCLUSION

Using the above method it is quite easier to find the day of the week from the given date in the interval of years from (0001-4000).

REFERENCE

1. Magic-Calendar (IJMA-8390)
2. www.timeanddate.com

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