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Aptitude Made Simple

Calendar

Various competitive examinations ask questions regularly based on Calendar. Calendar is the thing by which our day starts. If someone asks you what is today's date and day you will check your mobile or laptop or sometime watch if it has capability to see date and day.

How you would feel if you can calculate **day of any date of any century** irrespective of it is Past or Present or Future date???

Yes. If you go through below details and examples, able to memorize just 4 to 5 numbers and dates, you can definitely achieve this.

Initial focus would be on understanding calculation of day of Any date and once you get familiar, **you would be able to calculate day orally within 1 minute.**

Before proceeding to calculation we should know below terms thoroughly:

1) Leap year and Non-Leap (Normal) year
2) Odd days meaning
3) Which month contains 31 days or 30 days.

1) Leap Year: Look at year and see it is coming under which condition

Condition 1: Any year in which **last 2 digits** are not 00

➔ If year is completely divisible by 4 then it is Leap Year.

Condition 2: Any year in which **last 2 digits** are 00

➔ If year is completely divisible by 400 then it is Leap Year.

Parameters	Normal Year(NonLeap Year)	Leap Year
Number of days	365	366
Number of Odd days	**1** [when you divide 365 by 7 then remainder is 1]	**2** [when you divide 366 by 7 then remainder is 2]
Date difference	February 28 days only	February 29 days

Let us look at few examples and make sure that we can identify Leap year or Non Leap Year.

Year	Divisible by 4	Divisible by 400	Leap / Non-Leap Year
20**21**	No	Not required as last 2 digit **21**	Non Leap/ Normal Year
19**76**	Yes	Not required as last 2 digit **76**	Leap Year
19**00**	Yes	Not divisible by 400 and contains **00** at last 2 digits	Non Leap/ Normal Year
16**00**	Yes	Yes and contains last 2 digits **00**	Leap Year
20**28**	Yes	Not required as last 2 digit **28**	Leap Year

2) Odd days meaning

We know each week contains 7 days.

Each normal year has 1 odd day.

Normal year contains 365 days. If we calculate 365/7

$$\frac{365}{7}$$, Quotient = 52 and Remainder = 1

This means that our normal year has complete 52 weeks and 1 odd day

Normal Year 1 Odd day.

1 Odd day means [getting next day]:

   If 10th January 2021 has Monday

   → Then 10th January 2022 will have Tuesday [Monday + 1 = Tuesday]

   If 7th June 2021 has Sunday

   → Then 7th January 2022 will have Monday [Sunday + 1 = Monday]

Leap year has 2 Odd days and

   If 10th January 2020 has Monday

   → Then 10th January 2021 will have Wednesday.

   If 5th June 2020 has Friday

   → Then 5th June 2021 will have Saturday not Sunday.

   Please Note here even though 2020 is leap year it is moving with 1 day only because this range [5th June 2020 to 5th June 2021 does not contain leap year February part.

   If 10th June 2019 has Monday

→ Then 10th June 2020 will have Wednesday [Monday + 2 = Wednesday]
→ This is because this range [10th June 2019 to 10th June 2020 contains leap year February part].

3) Which month contains 31 days or 30 days?

Most of the students get confused which month contains 30 or 31. February month any one able to remember as it is different from all months. So if you try to remember 30 days month so we can remember all 12 months days properly.

Simple Trick:
Imagine 4 people which you know [look for people whom you are close] and they have their birthday in April, June, September, November and taking 1 from each moth assume them as they are single family and create 1 picture of it.

Now at any point you look for calendar problem you would know which are 30 days , 28/29 days and remaining all months with 31.

You can try another trick but just remember these 4 months with 30 days.

31 Days Month	30 Days Month	Others (28 or 29)
January	April	February (Leap -29)
March	June	February (Non-Leap -28)
May	September	
July	November	
August		
October		
December		

Steps required for solving Calendar Problems

[Step 1] – Identify odd days in century

Table 1: Century Odd days

Time period from start of calendar	Number of Odd days
100 Years	5
200 Years	3
300 Years	1
400 Years	0

Table 2: Yearly Odd days [Step 2]

Year	Number of Odd days
1 Normal Year	1
1 Leap Year	2

Table 3: Year distribution with day number Step3

We have divided entire year into 4 equal part to make calculations simple and orally

Trick written in bracket to memorize you can use your own technique.

Normal year if you remember just 1 day to be reduced if date is post 28 Feb

N th day of the year	Normal/Non Leap Year	Leap Year
1	1 January [Year start]	1 January
90	31 March [March ending]	30 March
180	29 June	28 June
270	**27** September	26 September
360	26 December [Boxing day]	25 December

Let us take 5 different dates and calculate their day in detail and post that in just single row we will be able to calculate day.

Problem 1:

What was the day on 15th August 1947?

Solution:

Let us see how we will split and calculate odd days 1 by 1 to reach till 15th August 1947. [1947 = 1900 + 46 + Current year day for 15th August]

Step1: Calculate odd days till century [Century means nearest lower or equal century number]

1900 is nearest century number.

Odd days till 1900:

Year	Odd days
0001 to 0400	0 [as 400 years has 0 odd day]
0401 to 0800	0 [as 400 years has 0 odd day]
0801 to 1200	0 [as 400 years has 0 odd day]
1201 to 1600	0 [as 400 years has 0 odd day]
1600 to 1900	1 [as 300 years has 1 odd day]

Odd days till 1900 : 1

Step 2: Calculate odd days till end of previous year.

As we are calculating day for 15th August **1947, our previous year would be 1946**:

Year	Number of Years
1901 to 1946 [Number of Leap years]	11
1901 to 1946 [Number of Non Leap Years]	35 [calculate leap 1st and minus in from total like 46 -11 = 35

We have 1 odd day for normal year and 2 odd days for Leap year.

Odd days from 1901 to 1946= (35 * 1) + (11* 2)

$$= 35 + 22 = 57$$

Week is of 7 days and always it keeps repeating.

So divide by 7 and calculate remainder which will give us odd day count.

$\dfrac{57}{7}$, Quotient = 8 and Remainder = 1

Odd days from 1901 to 1946 is 1

Step 3: Calculate odd days in current year till required date

Calculate the day number of 15th August in current year (1947).

Here our day number table will help and it will look very simple to calculate rather that calculating month-wise. 1947 is normal year as not divisible by 4.

N th day of the year	Normal/Non Leap Year
1	1 January [Year start]
90	31 March [March ending]
180	29 June
270	**27** September
360	26 December [Boxing day]

Find nearest date to 15th August in this table. Better to go previous date.

29th June is 180 number day

In order to get number from 29th june to 15th August

= 1 [June ends on 30] + 31 [July month] + 15

 = 47

As 29th June is 180th day.

180 + 47 = 227

To get odd days :

$$\frac{227}{7}$$, Quotient = 32 and Remainder = 3

Number of odd days from 1st January 1947 to 15th August 1947 : 3

Now let us sum up all step output to get our answer

Steps	Calculation	
Step 1	Odd days Till 1900	1
Step 2	Odd days from 1901 to 1946	1
Step 3	Odd days from 1st Jan to 15th August 1947	3
Answer	**Total [final remainder after dividing by 7]**	**5 - FRIDAY**

This is really simple to remember as week starts on Monday.

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

Answer is Friday

Problem 2:

What was the day on 29th September 2000?

Solution:

Let us see how we will split and calculate odd days 1 by 1 to reach till 29th September 2000. [2000 = 1900 + 99 + Current year day for 29th September]

Step1: Calculate odd days till century [Century means nearest lower or equal century number]

1900 is nearest century number.

Odd days till 1900:

Year	Odd days
0001 to 0400	0 [as 400 years has 0 odd day]
0401 to 0800	0 [as 400 years has 0 odd day]
0801 to 1200	0 [as 400 years has 0 odd day]
1201 to 1600	0 [as 400 years has 0 odd day]
1600 to 1900	1 [as 300 years has 1 odd day]

Odd days till 1900 : 1

Step 2: Calculate odd days till end of previous year.

As we are calculating day for 29th September **2000, our previous year would be 1999**:

Year	Number of Years
1901 to 1999[Number of Leap years]	24
1901 to 1999 [Number of Non Leap Years]	75 [calculate leap 1st and minus in from total like 99 -24 = 75

We have 1 odd day for normal year and 2 odd days for Leap year.

Odd days from 1901 to 1999= (75 * 1) + (24* 2)

$$= 75 + 48 = 123$$

Week is of 7 days and always it keeps repeating.

So divide by 7 and calculate remainder which will give us odd day count.

$\dfrac{123}{7}$, Quotient =17 and Remainder = 4

Odd days from 1901 to 1999 is 4

<u>Step 3</u>: Calculate odd days in current year till required date

Calculate the day number of 29th September in current year (2000).

Here our day number table will help and it will look very simple to calculate rather that calculating month-wise. 2000 is Leap year as divisible by 4 and 400 as well (last 2 digit 00).

N th day of the year	Normal/Non Leap Year	**Leap Year**
1	1 January [Year start]	**1 January**
90	31 March [March ending]	**30 March**
180	29 June	**28 June**
270	**27** September	**26 September**
360	26 December [Boxing day]	**25 December**

Find nearest date to 29th September in this table. Better to go previous date.

26th September is 180 number day

In order to get number from 26th September to 29th September

= 3

As 26th September is 270th day.

270 + 3 = 273

To get odd days :

$$\frac{273}{7}$$, Quotient = 39 and Remainder = 0

Number of odd days from 1st January 2000 to 29th September 2000 : 0

Now let us sum up all step output to get our answer

Steps	Calculation	
Step 1	Odd days Till 1900	1
Step 2	Odd days from 1901 to 1999	4
Step 3	Odd days from 1st Jan to 29th September 2000	0
Answer	**Total [final remainder after dividing by 7]**	**5 - Friday**

This is really simple to remember as week starts on Monday.

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

Answer is Friday

Problem 3:

What will be the day on 20th November 2031?

Solution:

Let us see how we will split and calculate odd days 1 by 1 to reach till 20th November 2031. [2031 = 2000 + 30 + Current year day for 20th November]

Step1: Calculate odd days till century [Century means nearest lower or equal century number]

2000 is nearest century number.

Odd days till 2000:

Year	Odd days
0001 to 0400	0 [as 400 years has 0 odd day]
0401 to 0800	0 [as 400 years has 0 odd day]
0801 to 1200	0 [as 400 years has 0 odd day]
1201 to 1600	0 [as 400 years has 0 odd day]
1600 to 2000	0 [as 400 years has 1 odd day]

Odd days till 2000 : 0

Step 2: Calculate odd days till end of previous year.

As we are calculating day for 20th November 2031**, our previous year would be 2030:**

Year	Number of Years
2001 to 2030[Number of Leap years]	7
2001 to 2030 [Number of Non Leap Years]	23 [calculate leap 1st and minus in from total like 30 -7 = 23

We have 1 odd day for normal year and 2 odd days for Leap year.

Odd days from 2001 to 2030= (23 * 1) + (7* 2)

$$= 23 + 14 = 37$$

Week is of 7 days and always it keeps repeating.

So divide by 7 and calculate remainder which will give us odd day count.

$\dfrac{37}{7}$, Quotient = 5 and Remainder = 2

Odd days from 2001 to 2030 is 2

<u>Step 3</u>: Calculate odd days in current year till required date

Calculate the day number of 20th November in current year (2031).

Here our day number table will help and it will look very simple to calculate rather that calculating month-wise. 2031 is Normal year as not divisible by 4.

N th day of the year	Normal/Non Leap Year
1	1 January [Year start]
90	31 March [March ending]
180	29 June
270	**27** September
360	26 December [Boxing day]

Find nearest date to 20th November in this table. Better to go previous date.

27th September is 270 number day

In order to get number from 27th September to 20th Novembe

= 3 [September has 30 days] + 31 [October 31 day] + 20

= 54

As 27th September is 270th day.

270 + 54 = 324

To get odd days :

$$\frac{324}{7}$$, Quotient = 46 and Remainder = 2

Number of odd days from 1st January 2031 to 20th November 2031 : 2

Now let us sum up all step output to get our answer

Steps	Calculation	
Step 1	Odd days Till 2000	0
Step 2	Odd days from 2001 to 2030	2
Step 3	Odd days from 1st Jan to 20th November 2031	2
Answer	**Total [final remainder after dividing by 7]**	**4 - Thursday**

This is really simple to remember as week starts on Monday.

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

Answer is Thursday

Problem 4:

What will be the day on 18th April 1967?

Solution:

Let us see how we will split and calculate odd days 1 by 1 to reach till 18th April 1967. [1967 = 1900 + 66 + Current year day for 18th April]

Step1: Calculate odd days till century [Century means nearest lower or equal century number]

1900 is nearest century number.

Odd days till 1900:

Year	Odd days
0001 to 0400	0 [as 400 years has 0 odd day]
0401 to 0800	0 [as 400 years has 0 odd day]
0801 to 1200	0 [as 400 years has 0 odd day]
1201 to 1600	0 [as 400 years has 0 odd day]
1600 to 1900	1 [as 300 years has 1 odd day]

Odd days till 1900 : 1

Step 2: Calculate odd days till end of previous year.

As we are calculating day for 18th April 1967**, our previous year would be 1966:**

Year	Number of Years
1901 to 1966[Number of Leap years]	16
1901 to 1966 [Number of Non Leap Years]	50 [calculate leap 1st and minus in from total like 66 - 16 = 50]

We have 1 odd day for normal year and 2 odd days for Leap year.

Odd days from 1901 to 1966 = (50 * 1) + (16 * 2)

$$= 50 + 32 = 82$$

Week is of 7 days and always it keeps repeating.

So divide by 7 and calculate remainder which will give us odd day count.

$\dfrac{82}{7}$, Quotient = 11 and Remainder = 5

Odd days from 1901 to 1966 is 5

Step 3: Calculate odd days in current year till required date

Calculate the day number of 19th April in current year (1967).

Here our day number table will help and it will look very simple to calculate rather that calculating month-wise. 1967 is Normal year as not divisible by 4.

N th day of the year	Normal/Non Leap Year
1	1 January [Year start]
90	31 March [March ending]
180	29 June
270	**27** September
360	26 December [Boxing day]

Find nearest date to 18th April in this table. Better to go previous date.

31st March is 90th number day

In order to get number from 31st March to 18th April

= 18

As 31t March is 90th day

90 + 18 = 108

To get odd days :

$$\frac{108}{7}$$, Quotient = 15 and Remainder = 3

Number of odd days from 1st January 1967 to 18th April 1967 : 3

Now let us sum up all step output to get our answer

Steps	Calculation	
Step 1	Odd days Till 1900	1
Step 2	Odd days from 1901 to 1966	5
Step 3	Odd days from 1st Jan to 18th April 1967	3
Answer	**Total [final remainder after dividing by 7]**	**9 [9/7 Remainder will 2 – Tuesday]**

This is really simple to remember as week starts on Monday.

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

Answer is Tuesday