NTSE

Calendar Test

CALENDAR – TEST

To find the day of the week on a mentioned date. Certain concepts are defined as under.

- An ordinary year has 365 days.
- In an ordinary year, first and last day of the year are same.
- A leap year has 366 days. Every year which is divisible by 4 is called a leap year. For example 1200, 1600, 1992, 2004, etc. are all leap years.
- For a leap year, if first day is Monday than last day will be Tuesday for the same year.
- In a leap year, February is of 29 days but in an ordinary year, it has only 28 days.
- Year ending in 00's but not divisible by 400 is not considered a leap year. E.g., 900, 1000, 1100, 1300, 1400, 1500, 1700, 1800, 1900, 2100 are not leap years.
- The day on which calendar started (or the very first day) i.e. 1 Jan, 0001 was Monday.
- Calendar year is from 1 Jan to 31 Dec. Financial year is from 1 April to 31 March.

ODD DAYS

The number of days exceeding the complete number of weeks in a duration is the number of odd days during that duration.

COUNTING OF ODD DAYS

- Every ordinary year has 365 days = 52 weeks + 1 day.
  ∴ Ordinary year has 1 odd day.
- Every leap year 366 days = 52 weeks + 2 days.
  ∴ Leap year has 2 odd days.
- Odd days of 100 years = 5,
  Odd days of 200 years = 3,
  Odd days of 300 years = 1,
  Odd days of 400 years = 0.

Explanation:

- 100 year = 76 ordinary year + 24 leap years (The year 100 is not a leap year)
  = 76 odd days + 2 × 24 odd days = 124 odd days.
  odd days $= \frac{124}{7} = 5$ odd days.
- Similarly, 200 years = 10 odd days = 03 odd days
  300 years $= \frac{15}{7} = 1$ odd day.
  400 years $= \frac{20+1}{7} = 0$ odd day (1 is added as 400 is a leap year)
  Similarly, 800, 1200, 1600, 2000, 2400 year contain 0 odd days.
- After counting the odd days, we find the day according to the number of odd days.
- Sunday for 0 odd day, Monday for 01 odd day and so on as shown in the following table.

Table: 1 (Odd days for week days)

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

Table: 2 (Odd days for months in a year)

Ordinary Year	Days	Odd Days	Leap year	Days	Odd Days
January	31	3	January	31	3
February	28	0	February	29	1
March	31	3	March	31	3
April	30	2	April	30	2
May	31	3	May	31	3
June	30	2	June	30	2
Total	**181 days**	**6**	**Total**	**182 days**	**0**
July	31	3	July	31	3
August	31	3	August	31	3
September	30	2	September	30	2
October	31	3	October	31	3
November	30	2	November	30	2
December	31	3	December	31	3
Total	**184 days**	**1**	**Total**	**184 days**	**2**

Table: 3 (Odd days for every quarter)

Month of years	Ist three Months 1 jan to 31 March	IInd three months 1 Apr to 30 June	IIIrd three months 1 july to 30 Sep.	Ivth three months 1 Oct. to 31 Dec.	Total year 1 Jan to 31 Dec.
Total days	90 / 91	91	92	92	365 / 366 Ord. Leap
Odd days	6 / 0 Ord. / Leap	0 Odd day	1 Odd day	1 Odd day	1 / 2 Ord. / Leap

Ex. 1 Find the day of the week on 18 July, 1776.

Sol. Here 1600 years have 0 odd day …(A)
100 years have 5 odd days …(B)
75 years = (18 leap years + 57 ordinary years)
$= (18 \times 2 + 57 \times 1) = 93$ odd days
$= (7 \times 13 + 2)$
= 2 odd days. …(C)

Now, the number of days from 1st January to 18th July, $1776 = 182 + 18 = (28 \times 7 + 4)$ days

= 4 odd days …(D)

Adding A, B, C, & D = 0 + 5 + 2 + 4 =4 odd days. Hence, the required day is Thursday.

Ex. 2 On what dates of October, 1975 did Tuesday fall?

Sol. For determining the dates, we find the day on 1st Oct, 1975.

1600 years have 0 odd days …(A)

300 years have 1 odd days …(B)

74 years have (18 leap years + 56 ordinary years)

$2 \times 18 + 1 \times 56 == 92$ odd days = 1 odd days …(C)

Days from 1st January to 1st Oct.

= 1st Jan to 30 June + 1st July to 1 st Oct.

= 181 + 31 + 31 + 30 + 1 = 274 days.

Odd days 274/7=1 odd days. …(D)

Adding A, B, C, & D = 0 + 1 + 1 + 1 = 3 odd days. So, Wednesday falls on 1st Oct.

Hence, 7, 14, 21, 28 October will Tuesday fall.

Ex. 3 If it was Saturday on 17th December 1982 what will be the day on 22nd December 1984?

Sol. Total number of odd days between 17 Dec. 1982 to 17 Dec. 1984 the number of odd days = 51+2=3. From 17 to 22 Dec. number of odd days = 5

$\therefore 3 + 5 = 8$ odd days = 1 odd day.

∴ Saturday + 1 odd day = Sunday.

Ex. 4 Which year will have the same calendar next to 1995.

Sol. The calendar for 1995 and the required year will be the same if day on 1st January of both the years is same.

This is possible only if the total odd days from 1st January 1995 to 31st December of the previous year of required year is 0.

Let the required year is 2006 then, we have 3 leap years (1996, 2000, 2004) and 8 ordinary years (1995, 1997, 1998, 1999, 2001, 2002, 2003, 2005)

Total odd days $= (2 \times 3 + 1 \times 8) = 14 = 0$ odd days. Hence, the required year is 2006.

Ex. 5 prove that last day of a century cannot be Tuesday, Thursday or Saturday.

Sol. 100 years have = 5 odd days.

∴ Last day of 1st century is Friday.

200 year have = 10 odd days = 3 odd days.

∴ Last day of 2nd century is Wednesday.

300 years have = 15 odd days = 1 odd day

∴ Las day of 3rd century is Monday.

400 years have $= 5 \times 4 + 1 = 21 = 0$ odd days.

So, the last day of 4th century is Sunday.

Since the order keeps on cycling, we see that the last day of the century cannot be Tuesday, Thursday or Saturday.

EXERCISE

1. Find the day of the week on 26 January, 1950.
(A) Tuesday (B) Friday
(C) Wednesday (D) Thursday

2. Which two months in a year have always the same calendar?
(A) June, Oct. (B) April, Nov.
(C) April, July (D) Oct, Dec.

3. Are the year 900 and 1000 leap years?
(A) Yes (B) No
(C) Can't say (D) None of these

4. If it was Sunday on 17th November, 1962 what will be the day on 22nd November, 1964"
(A) Sunday (B) Tuesday
(C) Wednesday (D) Monday

5. Sangeeta remembers that her father's birthday was certainly after eighth but before thirteenth of December. Her sister Natasha remembers that their father's birthday was definitely after ninth but before fourteenth of December. On which date of December was their father's birthday?
(A) 10th (B) 11th
(C) 12th (D) Data inadequate

6. Find the day of the week on 15 August, 1947.
(A) Tuesday (B) Friday
(C) Wednesday (D) Thursday

7. Karan was born on Saturday 22nd March 1982. On what day of the week was he 14 years 7 months and 8 days of age?
(A) Sunday (B) Tuesday
(C) Wednesday (D) Monday

8. In U.P. on 17th Oct. 1996, the president rule was declared. Find the day of week on that date.
(A) Tuesday (B) Friday
(C) Wednesday (D) Thursday

9. If on 14th day after 5th March be Wednesday, what day of the week will fall on 10th December of the same year?
(A) Friday (B) Wednesday
(C) Thursday (D) Tuesday

10. If third day before tomorrow was Saturday, what day will fall on the second day after yesterday?
(A) Sunday (B) Wednesday
(C) Tuesday (D) Monday

11. If 1st October is Sunday, then 15 November will be:
(A) Monday (B) Tuesday
(C) Wednesday (D) Thursday

12. If February 1, 1996 is Wednesday, what day is March 10, 1996?
(A) Monday (B) Sunday
(C) Saturday (D) Friday

13. If the seventh day of a month is three days earlier than Friday, what day will it be on the nineteenth day of the month?
(A) Sunday (B) Monday
(C) Wednesday (D) Tuesday

14. If the day before yesterday was Saturday, what day will fall on the day after tomorrow?
(A) Friday (B) Thursday
(C) Wednesday (D) Tuesday

15. Mohini went to the movies nine days ago. She goes to the movies only Thursday. What day of the week is today?
(A) Thursday (B) Saturday
(C) Sunday (D) Friday

16. If the sixth day of a month is fourth day after Sunday then which day of the weak will be on 19^{th} day of that month - **(NTSE Stage-I/Raj./2007)**
(A) Friday (B) Wednesday
(C) Saturday (D) Tuesday

17. If Sripal's birthday falls on Thursday 20^{th} March, 2000, then on which day of the week his birthday falls in the year 2001?
(NTSE Stage-I/Raj./2008)
(A) Wednesday (B) Friday
(C) Saturday (D) Sunday

ANSWER KEY

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	D	C	B	D	D	B	D	D	B	C	C	C	A	C	B
Que.	16	17													
Ans.	B	B													