

# CALENDAR



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# What is Calendar?

A Calendar is a chart or series of pages showing the days, weeks and months of a particular year, or giving particular seasonal information.

Given below is the list of topics under the Calendar section:

A basic structure of a calendar and a concept of an odd day.

Decoded days of the weeks.

Evaluation of a leap year.

Evaluation of odd days in a century.

Type 1 problems: Finding the day when another day is given.

Type 2 problems: Finding the day when another day is not given.

Type 3 problems: Matching the calendars of a month.

Basic Structure of a Calendar

Ordinary year: Any year which 365 days is called an ordinary year.Ex: 1879, 2009, 2019, etc.

Leap year: Any year which has 366 days is called a leap year.Ex: 2012, 2016 2020 etc.

The division of the number 365 by 7 gives the quotient 52 and remainder 1 which indicates that an ordinary year has 52 weeks and one extra day. This extra day is referred to as an “odd day” throughout the calendar topics.

A leap year has 366 days, the division of the number 366 by 7 gives the quotient 52 and remainder 2. This indicates that a leap year has 52 weeks and 2 extra days.

These two extra days are also referred to as “odd days”

### Concept of an Odd Day

#### A number of odd days in a month

January has 31 days, irrespective of whether it's an ordinary year or leap year. The division of the number 31 by 7 provides the remainder 3 hence January has 3 odd days. On generalising, any month which has 31 days has 3 odd days and any month which has 30 days has 2 odd days.

The only exception happens is in the case of February. The February month of an ordinary year has 28 days, division of 28 by 7 provides zero as remainder.

The below table depicts the number of odd days in different months of a calendar year:

| Month                   | Number of odd days |
|-------------------------|--------------------|
| January                 | 3                  |
| February(ordinary/leap) | (0/1)              |
| March                   | 3                  |
| April                   | 2                  |
| May                     | 3                  |
| June                    | 2                  |
| July                    | 3                  |
| August                  | 3                  |
| September               | 2                  |
| October                 | 3                  |
| November                | 2                  |
| December                | 3                  |

## Decoded day of the week

The week always begins with Monday and hence Saturday and Sunday are referred to as weekends. In order to make the calculation easier and reduce its time during the exams.

The days of the week are coded as follows:

|   |                  |
|---|------------------|
| 0 | <i>Sunday</i>    |
| 1 | <i>Monday</i>    |
| 2 | <i>Tuesday</i>   |
| 3 | <i>Wednesday</i> |
| 4 | <i>Thursday</i>  |
| 5 | <i>Friday</i>    |
| 6 | <i>Saturday</i>  |

**Ex:** If the value obtained at the final stage of calculation is 10, then the number 10 is divided by 7 (as we have 7 days in a week) and the remainder which is 3 is decoded back to select the correct options from the given list. Here the remainder 3 indicates the correct answer is Wednesday.

**Example 1:**

Today is Monday. After 61 days, it will be:

- A. Tuesday
- B. Wednesday
- C. Thursday
- D. Saturday

**Explanation:**

Each day of the week is repeated after 7 days. So, after 63 days, it will be on Monday. After 61 days, it will be on Saturday.

### **Evaluation of Leap Year**

The leap year occurs every four years, most of the time, but there are scenarios where the gap between two leap years was 8 years instead of the regular 4 years.

**Ex: The year 1896 is a leap year. The next leap year comes in 1904 (1900 is not a leap year).**

In order to make the investigation easier and faster, any year which is divisible by number 4 completely (remainder becomes zero) is considered as a leap year.

**Ex: 1888, 2012, 2016 are leap years as it's completely divisible by 4. Years like 2009, 2019 etc. are not divisible by 4 completely hence they normal years.**

**An exception to note:**

A year 700 is completely divisible by 4, but it is not considered as a leap year. For a century year, the logic follows that it should always be divisible by 400 not by 4. Even though the year 700 is divisible by 4 but not by 400. Hence, the year 700 cannot be considered as a leap year.

**Ex: 400, 800, 1200 etc. are leap years as they are divisible by 400 and years 300, 700, 100 etc. are not leap years as they are not divisible by 400.**

### **Evaluation of Odd Days of a Century**

This concept helps students in answering the question of calendars in less than 30

Observe the question:

Q: What day of the week was year 100 A.D December 31<sup>st</sup>?

This might look like a difficult and big problem. But it's definitely not.

Solution: Let's consider the first 100 years i.e. Year 1.A.D to year 100 A.D

Dividing the first 100 by 4 we get that first 100 years had 76 ordinary years and 24 leap years.  
(The quotient when 100 is divided by 4 gives 25 but the year 100 itself is not a leap year as it is not divisible by 400 hence 24 is considered instead of 25)

Step 1: 100 years = 76 ordinary years + 24 leap years

We know that an ordinary year has 1 odd day and a leap year has 2 odd days. Hence, 76 ordinary years will have 76 odd days and 24 leap years will  $24 \times 2 = 48$  odd days. Adding both the results we get  $76+48 = 124$  odd days in total.

Step 2: 100 years =  $(76 \times 1 + 24 \times 2)$  odd days = 124 odd days.

Dividing the total odd days 124 by 7 gives the quotient as 17 and a remainder as 5. This indicates that 124 days had 17 weeks and 5 odd days.

Step 3: 100 years = (17 weeks + days) 5 odd days.

A number of odd days in 100 years = 5.

Now decoding the number to the days of the week from the table gives the result that the number 5 stands for Friday.

Hence, the last day (December 31<sup>st</sup>) of the year 100 A.D was Friday

Extension of the logic

Similarly, one can find the last day of the other century years by extending the same logic.

If 100 years had 5 odd days, then logically 200 years should have 10 odd days. Since 10 is greater than 7, the division of 10 by 7 gives the remainder 3. Hence, the 200 years had 3 odd days, which means the last day of the year 200 was Wednesday.

Number of odd days in 200 years =  $(5 \times 2) = 10 = (7+3) = 3$  odd days.

If 100 years had 5 odd days and 200 years 10 odd days logically 300 years should have 15 odd days. The division of 15 by 7 indicates it has 1 odd day from the remainder which indicates it is Monday. Hence, the last day of the year 300 was Monday.

Number of odd days in 300 years =  $(5 \times 3) = 15 = (14+1) = 1$  odd day.

Logically, 400 years should have 20 odd days since 400<sup>th</sup> year is a leap year as it is divisible by 400. This year will have  $20+1 = 21$  odd days, which when divided by 7 gives the zero (0) as remainder. Hence, 400 years had 0 odd day and that was Sunday.

The logical approach for the next few years is shown in the table given below:

| Century            | Number of odd days | Day of the week |
|--------------------|--------------------|-----------------|
| 100                | 5                  | Friday          |
| 200                | 3                  | Wednesday       |
| 300                | 1                  | Monday          |
| 400                | 0                  | Sunday          |
| 500 = (100+400)    | (5+0) = 5          | Friday          |
| 600 =(200+400)     | (3+0) =3           | Wednesday       |
| 700 = (300+400)    | (1+0) = 1          | Monday          |
| 800 = (400+400)    | (0+0) = 0          | Sunday          |
| 900 = ( 400 + 500) | (0 + 5) = 5        | Friday          |
| 1000 = (500 +500)  | (5+5)= (7+3) = 3   | Wednesday       |

**Observations from the table:**

1. The cycle of a number of days repeats after every four centuries and also hence the days at which it ends. The order will always be Friday, Wednesday Monday and Sunday.
2. A century will always end on either Friday, Wednesday, Monday or Sunday (Decoded values of these days are 5, 3, 1, and 0 respectively).
3. A century will never end on Tuesday, Thursday and Saturday (Decoded values of these days are 2, 4, and 6 respectively).

**Type 1 Problems: Finding the day when another day is given**

In this section, one has to find out the day of the week of a given date using the day of the week information on the reference date.

**Question:** If 17<sup>th</sup> march 2008 was Monday, what was 1<sup>st</sup> April 2012?

**Solution:** The total number of odd days from 17<sup>th</sup> March 2008 to 17<sup>th</sup> March 2012.

|                             |                   |
|-----------------------------|-------------------|
| <b>2008 (leap year)</b>     | <b>2 odd days</b> |
| <b>2009 (ordinary year)</b> | <b>1 odd day</b>  |
| <b>2010 (ordinary year)</b> | <b>1 odd day</b>  |
| <b>2011 (ordinary year)</b> | <b>1 odd day</b>  |
| <b>Total odd days =</b>     | <b>5 odd days</b> |

Since 17<sup>th</sup> march 2008 was Monday and 17<sup>th</sup> march 2012 is 5 days more than Monday. Then adding 5 odd days to Monday, we get Saturday. Hence 17<sup>th</sup> march to April 1<sup>st</sup> we have 15 days. Saturday+15=Sunday. Adding 15 days or (15 = 14+1) to Saturday, we get the answer as Sunday. Question: If today is Sunday, what will be the day on 7777<sup>th</sup> day? Solution: If today is Sunday, then the 7<sup>th</sup> day from today will be Sunday. Similarly, the 14<sup>th</sup> day, 21<sup>st</sup> day or 70<sup>th</sup> day or 700<sup>th</sup> day or 7000<sup>th</sup> day or 7777<sup>th</sup> day will be Sunday. Hence, the answer is Sunday.

**Type 2 Problems: Find the day when another day is not given**

In this section, one has to find out the day of the week of a given date. There will no reference date or day has given here. One can make use of the concept of an odd day to find the answer.

**Question: What day of the week was 15<sup>th</sup> August 1947?**

**Solution:** The date August 15<sup>th</sup> 1947 can be divided as follows for easy calculation:

1600 years + 300 years+ 46 years (1901 to 1946) + Jan 1<sup>st</sup> to august 15<sup>th</sup> (of 1947)

**Note:-** Do not write 47 years in the third section, it would indicate 47<sup>th</sup> year in that century is over.

1600 years + 300 years+ 46 years (1901 to 1946) + Jan 1<sup>st</sup> to august 15<sup>th</sup> (of 1947)

**Now let's find out the total number of odd days in each section:**

**Section 1:**

1600 is a multiple of 400 years. 400 years have 0 odd days hence 1600 years should have 0 odd days.

**Section 2:**

The second section 30 years will have 1 odd day. Kindly refer to “evaluation of odd days in a century” topic for clarification.

**Section 3:**

This section has 46 years from 1901 to 1946, we know that an ordinary year has one odd day and a leap year has 2 odd days.

Let's first calculate the total number of leap years from 1901 to 1946.

Division of 46 by 4 gives the quotient as 11, which indicates that from 1901 to 1946 we have 11 leap years. If there are 11 leap years among 46 years then remaining 35 years should be ordinary years. Hence, 35 ordinary years will have 35 odd days and 11 leap years will have  $11 \times 2 = 22$  years.

The total number of odd days in 46 years will be  $35 + 22 = 57$  odd days. The division of 57 by 7 given the remainder as 1. This indicates from 1901 to 1946 there is only one odd day.

**Section 4:**

It has months from January to August 15<sup>th</sup>. We have already calculated the total number of odd days in each month in the odd day's section.

Since 1947 is not a leap year February had zero odd days.

Check the table below for a better understanding of the number of odd days in a month

The total number of odd days is 31 which when divided by 7 gives the remainder 3. Hence, the total number of odd days in the year 1947 from January 1<sup>st</sup> to August 15<sup>th</sup> is 3.

**Adding the total number of odd days of each section:**

| Section   | Years                                       | Odd days |
|-----------|---------------------------------------------|----------|
| Section 1 | 1600                                        | 0        |
| Section 2 | 300                                         | 1        |
| Section 3 | 46                                          | 1        |
| Section 4 | Jan 1 <sup>st</sup> to Aug 15 <sup>th</sup> | 3        |

## CALENDAR

**Q 1.** If the first day of a year, which is not a leap year is Sunday, which day will fall on the last day of that year?

- (a) Friday
- (b) Sunday
- (c) Monday
- (d) Tuesday

## CALENDAR

**Q 1.** If the first day of a year, which is not a leap year is Sunday, which day will fall on the last day of that year?

- (a) Friday
- (b) Sunday**
- (c) Monday
- (d) Tuesday

# CALENDAR

## **Q 2. How many times will 29the February come in 400 years?**

# CALENDAR

## **Q 2. How many times will 29the February come in 400 years?**



(c) 97

## CALENDAR

**Q 3. If the first day of a leap year is Friday, which day will fall on the last day of that year?**

- (a) Friday                    (b) Sunday                    (c) Saturday                    (d) Tuesday

# CALENDAR

**Q 3. If the first day of a leap year is Friday, which day will fall on the last day of that year?**

- (a) Friday      (b) Sunday      (c) Saturday      (d) Tuesday

## CALENDAR

**Q 4.** It was Sunday on Jan 1, 2006. What was the day of the week Jan 1, 2010?

- (a) Sunday
- (b) Saturday
- (c) Friday
- (d) Wednesday

## CALENDAR

**Q 4.** It was Sunday on Jan 1, 2006. What was the day of the week Jan 1, 2010?

(a) Sunday

(b) Saturday

(c) Friday

(d) Wednesday

## CALENDAR

**Q 5.** Which days fell on 8th June 2007?

- (a) Friday
- (b) Saturday
- (c) Sunday
- (d) Wednesday

## CALENDAR

**Q 5.** Which days fell on 8th June 2007?

- (a) Friday      (b) Saturday      (c) Sunday      (d) Wednesday

## CALENDAR

**Q 6.** How many days are there altogether in  $x$  weeks and  $x$  days.

- (a)  $7x^2$
- (b)  $8x$
- (c)  $14x$
- (d) Data insufficient

## CALENDAR

**Q 6.** How many days are there altogether in  $x$  weeks and  $x$  days.

- (a)  $7x^2$       (b)  $8x$       (c)  $14x$       (d) Data insufficient

## CALENDAR

**Q 7.** On what dates of April, 2001 did Wednesday fall?

- (a) 1st, 8th, 15th, 22nd, 29th
- (b) 2nd, 9th, 16th, 23th, 30th
- (c) 3rd, 10th, 17th, 24th,
- (d) 4th, 11th, 18th, 25th

## CALENDAR

**Q 7.** On what dates of April, 2001 did Wednesday fall?

- (a) 1st, 8th, 15th, 22nd, 29th
- (b) 2nd, 9th, 16th, 23th, 30th
- (c) 3rd, 10th, 17th, 24th,
- (d) 4th, 11th, 18th, 25th

## CALENDAR

**Q 8.** Which of the following is not a leap year?

- (a) 700
- (b) 800
- (c) 1200
- (d) 2000

# CALENDAR

## **Q 8. Which of the following is not a leap year?**

## CALENDAR

**Q 9.** On 8th Dec 2007, Saturday falls. What day of the week was it on 8th Dec 2006?

- (a) Sunday
- (b) Thursday
- (c) Tuesday
- (d) Friday

## CALENDAR

**Q 9.** On 8th Dec 2007, Saturday falls. What day of the week was it on 8th Dec 2006?

- (a) Sunday
- (b) Thursday
- (c) Tuesday
- (d) Friday

## CALENDAR

**Q 10.** Mr. Verma's birthday is 15 August, 2005. Which was Friday. When he again arrange his birthday on Friday?

- (a) 15 Aug, 2010   (b) 15 Aug, 2016   (c) 15 Aug, 2011   (d) 15 Aug, 2013

## CALENDAR

**Q 10.** Mr. Verma's birthday is 15 August, 2005. Which was Friday. When he again arrange his birthday on Friday?

- (a) 15 Aug, 2010
- (b) 15 Aug, 2016
- (c) 15 Aug, 2011**
- (d) 15 Aug, 2013

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## CALENDAR

**Q 11.** The calendar of which of the following years is similar to that of 2003?

- (a) 2009
- (b) 2010
- (c) 2012
- (d) 2014

## CALENDAR

**Q 11.** The calendar of which of the following years is similar to that of 2003?

- (a) 2009                    (b) 2010                    (c) 2012                    (d) 2014

## CALENDAR

**Q 12.** 5th June 2007 was Tuesday. Which day will fall on 5th June 2006?

- (a) Sunday
- (b) Monday
- (c) Tuesday
- (d) Wednesday

## CALENDAR

**Q 12.** 5th June 2007 was Tuesday. Which day will fall on 5th June 2006?

- (a) Sunday      (b) Monday      (c) Tuesday      (d) Wednesday

## CALENDAR

**Q 13.** India became a republic on 26th January 1950. Which day of the week it?

(a) Monday

(b) Tuesday

(c) Thursday

(d) Saturday

## CALENDAR

**Q 13.** India became a republic on 26th January 1950. Which day of the week is it?

- (a) Monday
- (b) Tuesday
- (c) Thursday
- (d) Saturday

## CALENDAR

**Q 14.** If 6th Oct. 1981 is Thursday, then what was the day of the week on 6th March, 2004?

- (a) Monday
- (b) Thursday
- (c) Friday
- (d) Saturday

## CALENDAR

**Q 14.** If 6th Oct. 1981 is Thursday, then what was the day of the week on 6th March, 2004?

- (a) Monday
- (b) Thursday
- (c) Friday
- (d) Saturday

## CALENDAR

**Q 15.** If 26th Dec. is 2012 is Thursday, then what was the day of the week on 6th March, 2012?

- (a) Monday
- (b) Wednesday
- (c) Friday
- (d) Saturday

## CALENDAR

**Q 15.** If 26th Dec. is 2012 is Thursday, then what was the day of the week on 6th March, 2012?

- (a) Monday      (b) Wednesday      (c) Friday      (d) Saturday

## CALENDAR

**Q 16.** Abha correctly remembers that her mother's birthday is before Friday but after Monday. Her brother Abhay correctly remembers that their mother's birthday is after Wednesday while before Saturday. On which of the following days does their mother's birthday definitely fall?

- (a) Tuesday      (b) Wednesday      (c) Thursday      (d) Friday

## CALENDAR

**Q 16.** Abha correctly remembers that her mother's birthday is before Friday but after Monday. Her brother Abhay correctly remembers that their mother's birthday is after Wednesday while before Saturday. On which of the following days does their mother's birthday definitely fall?

- (a) Tuesday      (b) Wednesday      (c) Thursday      (d) Friday

## CALENDAR

**Q 17.** Sankar was born on 3rd March 1960. Ramesh was born 6 days before Sankar. If in the same year republic day was on Sunday, then on which day of the week Ramesh was born?

- (a) Monday
- (b) Wednesday
- (c) Thursday
- (d) Friday

## CALENDAR

**Q 17.** Sankar was born on 3rd March 1960. Ramesh was born 6 days before Sankar. If in the same year republic day was on Sunday, then on which day of the week Ramesh was born?

- (a) Monday
- (b) Wednesday
- (c) Thursday
- (d) Friday

## CALENDAR

**Q 18.** On reaching Agra Suman said that she has reached 4 days before the scheduled time. Rakesh reached there 5 days after the scheduled time. If Suman reached Agra on Sunday, then Rakesh reached there on which day?

- (a) Wednesday
- (b) Tuesday
- (c) Thursday
- (d) Friday

## CALENDAR

**Q 18.** On reaching Agra Suman said that she has reached 4 days before the scheduled time. Rakesh reached there 5 days after the scheduled time. If Suman reached Agra on Sunday, then Rakesh reached there on which day?

- (a) Wednesday      (b) Tuesday      (c) Thursday      (d) Friday

## CALENDAR

**Q 19.** After reaching a conference on Saturday I came to know that I have reached two days before the scheduled time. If I reached there on the following Thursday then, I would be late by how many days?

- (a) 1 days
- (b) 2 days
- (c) 3 days
- (d) 4 days

## CALENDAR

**Q 19.** After reaching a conference on Saturday I came to know that I have reached two days before the scheduled time. If I reached there on the following Thursday then, I would be late by how many days?

- (a) 1 days
- (b) 2 days
- (c) 3 days
- (d) 4 days

## CALENDAR

**Q 20.** If every Sunday of any month is on fourth, eleventh. Then what is the last day of the month if first day of the month is Thursday.

- (a) Saturday
- (b) Tuesday
- (c) Thursday
- (d) Data insufficient

## CALENDAR

**Q 20.** If every Sunday of any month is on fourth, eleventh. Then what is the last day of the month if first day of the month is Thursday.

- (a) Saturday      (b) Tuesday      (c) Thursday      (d) Data insufficient

## CALENDAR

**Q 21.** Gita is 314 days elder to Suman, while Sapna is 70 weeks elder to Gita.  
If Sapna was born on Thursday, then on which day Suman was born?

- (a) Friday                    (b) Tuesday                    (c) Saturday                    (d) Wednesday

## CALENDAR

**Q 21.** Gita is 314 days elder to Suman, while Sapna is 70 weeks elder to Gita.  
If Sapna was born on Thursday, then on which day Suman was born?

- (a) Friday                    (b) Tuesday                    (c) Saturday                    (d) Wednesday

## CALENDAR

**Q 22.** Calendar of which of the following months are similar.

- (a) April-July
- (b) August-December
- (c) September-December
- (d) July-October

## CALENDAR

**Q 22.** Calendar of which of the following months are similar.

- (a) April-July
- (b) August-December
- (c) September-December
- (d) July-October

## CALENDAR

**Q 23. Which of following cannot be the last days of a century year?**

- (a) Friday, Sunday
- (b) Friday, Monday
- (c) Tuesday, Thursday and Saturday
- (d) Wednesday, Thursday

## CALENDAR

**Q 23. Which of following cannot be the last days of a century year?**

- (a) Friday, Sunday
- (b) Friday, Monday
- (c) Tuesday, Thursday and Saturday**
- (d) Wednesday, Thursday

## CALENDAR

**Q 24.** If the 3rd of any month is Monday, then which day of the week will be the fifth day from the 21st of that month?

- (a) Sunday
- (b) Monday
- (c) Tuesday
- (d) Wednesday

## CALENDAR

**Q 24.** If the 3rd of any month is Monday, then which day of the week will be the fifth day from the 21st of that month?

- (a) Sunday      (b) Monday      (c) Tuesday      (d) Wednesday

## CALENDAR

**Q 25.** Rani's birthday falls on 4th February 1990. Which day will fall on the day which is 47 days after her birthday if 4th February 1990 is Sunday?

- (a) Saturday      (b) Friday      (c) Wednesday      (d) Tuesday

## CALENDAR

**Q 25.** Rani's birthday falls on 4th February 1990. Which day will fall on the day which is 47 days after her birthday if 4th February 1990 is Sunday?

- (a) Saturday      (b) Friday      (c) Wednesday      (d) Tuesday

## CALENDAR

**Q 26.** If 4 days after tomorrow is Sunday, then which day fell 4 days before yesterday?

- (a) Sunday      (b) Tuesday      (c) Wednesday      (d) Thursday

# CALENDAR

**Q 26. If 4 days after tomorrow is Sunday, then which day fell 4 days before yesterday?**

- (a) Sunday      (b) Tuesday      (c) Wednesday      (d) Thursday

## CALENDAR

**Q 27.** Day after tomorrow will be Lord Ganesha festival. In the next week the same day will be Deepawali. If today is Friday, then which day will be 4 days after Deepawali?

- (a) Saturday
- (b) Sunday
- (c) Friday
- (d) Thursday

## CALENDAR

**Q 27.** Day after tomorrow will be Lord Ganesha festival. In the next week the same day will be Deepawali. If today is Friday, then which day will be 4 days after Deepawali?

- (a) Saturday      (b) Sunday      (c) Friday      (d) Thursday

**Q.28. What was the day of the week on 28th May, 2006?**

- (a) Sunday      (b) Friday      (c) Wednesday      (d) Tuesday

**Q.28. What was the day of the week on 28th May, 2006?**

- (a) Sunday      (b) Friday      (c) Wednesday      (d) Tuesday**

# THANK YOU



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