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PROFESSIONAL
UNIVERSITY

Transforming Education Transforming India

SU	MO	TU	WE	TH	FR	SU	MO	TU	WE	TH	FR	SU
26	27	28	29	30	31	01	02	03	04	05	06	07
10	11	12	13	14	15	16	17	18	19	20	21	22
24	25	26	27	28	29	30	31					

EVENTS

CALENDAR

SUN	MON	TUE	WED	THU	FRI	SAT	SUN	MON	TUE	WED	THU	FRI	SAT
01	02	03	04	05	06	07	08	09	10	11	12	13	
14	15	16	17	18	19	20	21	22	23	24	25	26	27
28	29	30											

Ping Pong



FOR Obligations

Content

- I. Introduction- Origin of calendar
- II. Ordinary year and leap year
- III. Odd day Concept
- IV. Major types of questions:
 - 1) Finding day for a date-
 - a) Conventional method
 - b) Shortcut
 - 2) Finding a year having the same calendar as another year
- V. Practice Questions

I. Introduction

*The Calendar which we currently follow is called the **Gregorian Calendar**. It is named after Pope Gregory XIII, who introduced it in October 1582.*

The calendar was a refinement to the Julian calendar amounting to a. The motivation for the reform was to stop the drift of the calendar and set the date for Easter celebrations. Transition to the Gregorian calendar would restore the holiday to the time of the year in which it was celebrated when introduced by the early Church.

The reform was adopted initially by the Catholic countries of Europe. Protestants and Eastern Orthodox countries continued to use the traditional Julian calendar and adopted the Gregorian reform after a time, for the sake of convenience in international trade.

The last European country to adopt the reform was Greece, in 1923.

The Gregorian reform modified the Julian calendar's scheme of leap years as follows:

- 1. Every year that is exactly divisible by four is a leap year, except for years that are exactly divisible by 100, but these centurial years are leap years if they are exactly divisible by 400. For example, the years 1700, 1800, and 1900 are not leap years, but the years 1600 and 2000 are.*
- 2. In addition to the change in the mean length of the calendar year from 365.25 days (365 days 6 hours) to 365.2425 days (365 days 5 hours 49 minutes 12 seconds)*

II. What are Ordinary and Leap years??

The time taken by the Earth to make one complete revolution is said to be a complete Year, which is equivalent to exactly

365.2425 days.

*But ignoring the .2425 we generalize an **ordinary** year to be of **365** days.*

*Further for approximate calculation we assume the 365.2425 days to be **365.25** days.*

*This extra **0.25** days in **4 years** becomes **1 full day**. Hence that extra day is added to a year **every 4 years**. That particular year is called a **leap** year, which has one extra day than the ordinary year, which means a leap year has **366 days** in total.*

365.2425

0.0025 when ignored

365.24

0.24 approximated to 0.25 for simpler calculation

365.25

Only the 365 days taken

The 0.25 becomes 1 extra day in 4 years

Ordinary year

365 days

Leap year

$$\begin{aligned} &= \text{Ordinary year} + (0.25 \times 4) \\ &= 365 + 1 \\ &= \mathbf{366 \text{ days}} \end{aligned}$$

How to check for a leap year?

1. Non Century Years:

If any non-century year (not ending with “00”) is divisible by 4 (last two digits of the year should be divisible by 4), then it is said to be a leap year.

Reason: As explained in the previous slide, the 0.25 extra days of 365.25 days become one extra day every 4 years ($0.25 \times 4 = 1$).

Hence every 4 years we have one leap year.

Ex: 1844, 1892, 1996, 2004, 2012, 2016 etc

2. Century Years:

But in case of a century year(Years ending with “00”,ex: 1400,1600,2000,etc), the year will be a leap year only if it is divisible by 400.

Reason:

Let us take an example. The 100th year is divisible by 4. But it is not a leap year.

Why???

The approximation we make while assuming 365.24 days to be 365.25 days (increasing the value by 0.01), leads to an extra 1 day which does not exist in real. Hence this extra 1 day which is forming every 100 year should be removed from the 100th year. So, although the hundredth year is divisible by 4 and should be a leap year, we remove that extra one day of the leap year from the 100th year. Hence it ends up as an ordinary year only.

But why is the 400th year a leap year then???



So, till now we learnt that the 100th year (Ex: 100,200,300 etc) is not a leap although it is divisible by 4.

But why is 400th year a leap year then???

*This answer also lies in the value **365.2425** days which is the time taken by the earth for one revolution.*

*In 365.24**25** we initially ignore **0.0025**. which is a negligible value for one year. But in 400 years, this **0.0025** becomes 1 complete day (**0.0025x4=1**) and we add this extra day every 400th year.*

Although like every 100th year, 400th year also should have been an ordinary year, but because of the addition of this extra day(mentioned above), every 400th year is a leap year.

And that is why every century leap year is divisible by 400.

***Example:** 400,1200,1600,2000 etc.*

Let us take a quick quiz(Ask the students)

Q1. Is 1996 a leap year? Why?

Q2. Are all the years divisible by 4 leap years? Why?

Q3. How do you check for a century year, whether it is a leap year or not? Why?

III. Odd day concept

If we are supposed to find the day of the week on a given date, we use the concept of 'odd days'. In a given period, the number of days more than the complete weeks are called odd days .

For example the number of odd days in 15 total days = 1, since remainder when 15 is divided by 7 is 1.

Similarly the number of odd days in the month of January is 3. Since January has 31 days,

$$31/7= R(3).$$

Note: The odd day value will always lie from 0 to 6. If the odd day value is more than 6, keep dividing it by 7 until the remainder value comes below 7. The remainder value smaller than 7 is the final odd day value.

Finding odd days

1. In a single year

Now that you know what are odd days, can you find out how many odd days are there in an ordinary year and a leap year respectively???

1. Ordinary year:

Total no. of days=365 days

$$365/7= R(1)$$

Odd days = 1

2. Leap year:

Total number of days= 366

$$366/7= R(2)$$

Odd days= 2

Finding odd days

2. Through out a century/year span

Let us see through examples how to find the number of odd days through out a century or year span.

Ex: Find the number of odd days in the first 35 years in a century.

Step1: Let us first find the number of leap years and ordinary years in these 35 years. 35 years have **8 leap years** ($4 \times 8 = 32$, closest to 35).

Therefore no. of ordinary years = $35 - 8 = \text{27 years}$.

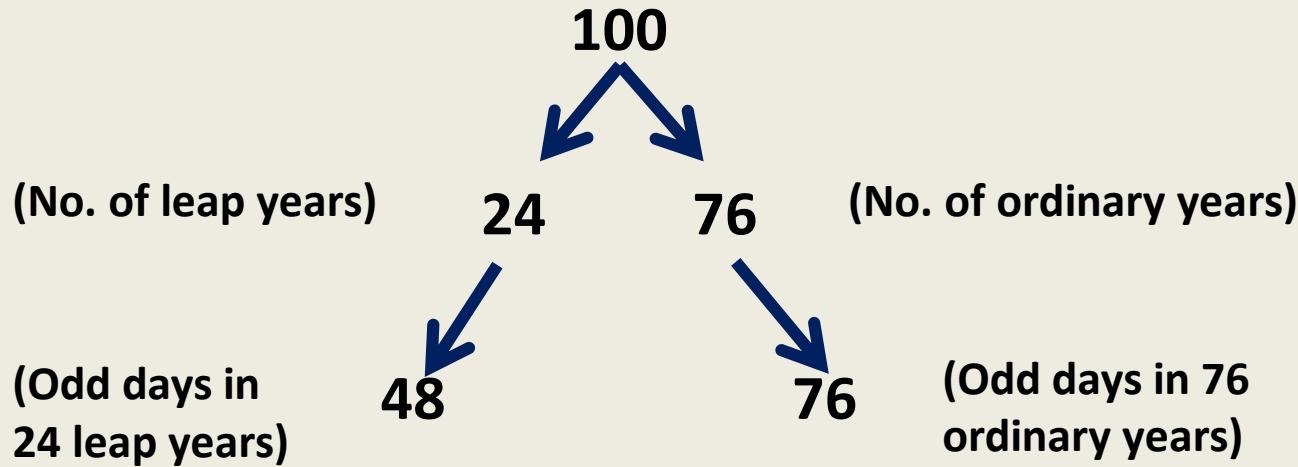
Step2: Odd days in 8 leap years = $8 \times 2 = \text{16}$ (Since 1 leap year has 2 odd days)

Odd days in 27 ordinary years = $27 \times 1 = \text{27}$ (Since 1 ordinary year has 1 odd day)

Step3: Total number of odd days = $(16 + 27) = 43 = 43/7 = R(1)$

Therefore number of odd days in 35 years = **1**

Following the same steps, find the number of odd days in the first century(first 100 years).



$$\text{Total no. of odd days} = (48 + 76) = 124$$

$$124/7=R(5)$$

Hence, the first 100 years(century) have 5 odd days in total.

Note: The first 100 years have 24 leap years, not 25.

Because 100th year is not a leap year as discussed in slide no.8.

Odd days in the centuries

Since first 100 years is having 5 odd days, we can say:

First 200 years have $5 \times 2 = 10$, $10/7 = R(3)$

First 300 years have $5 \times 3 = 15$, $15/7 = R(1)$

First 400 years have $5 \times 4 = 20$, $20/7 = R(6) + 1 = 7 = R(0)$

And the cycle keeps repeating for the next centuries from here.

Note: 1 extra day has been repeated for 400 years, since 400th year is a leap year as mentioned in earlier slides.

Until Century	Up to Year	Odd days	Similar centuries	
1 st	100	5	500	>
2 nd	200	3	600	>
3 rd	300	1	700	>
4 th	400	0	800	>

Odd days in the months

Month	No. of days	Odd days
January	31	3
February	28,29	0,1
March	31	3
April	30	2
May	31	3
June	30	2
July	31	3
August	31	3
September	30	2
October	31	3
November	30	2
December	31	3

Concept Review Question

Q. If May 10, 1997 was a Monday, what will be the day on Oct 10, 2001?

- A. Wednesday**
- B. Thursday**
- C. Friday**
- D. Saturday**

Solution:

In this question the reference point is May 10, 1997 and we have to find the number of odd days from May 10, 1997 up to Oct 10, 2001.

Now, from May 11, 1997 - May 10, 1998 = 1 odd day

May 11, 1998 - May 10, 1999 = 1 odd day

May 11, 1999 - May 10, 2000 = 2 odd days (2000 was leap year)

May 11, 2000 - May 10, 2001 = 1 odd day

Thus, the total number of odd days up to May 10, 2001 = 5.

Now, the remaining 21 days of May will give 0 odd days.

In June, we have 2 odd days; in July, 3 odd days; in August, 3 odd days; in September, 2 odd days and up to 10th October, we have 3 odd days.

Hence, total number of odd days = 18 i.e. 4 odd days.

Since, May 10, 1997 was a Monday, then 4 days after Monday will be Friday. So, Oct 10, 2001 would be a Friday.

IV. 1. a) Finding the day for a particular date

1. *Odd days in the year(Actual year-1)*
2. *Odd days in the month(Actual month-1)*
3. *Odd days in the date*

Get the sum of the odd days and the final odd day value from it.

Ex: 15/07/2016

1. *Odd days in 2015*
2. *Odd days in January to June*
3. *Odd days in the date(15/7= R(1))*

Sum/7=Odd day value

Odd day value	1	2	3	4	5	6	7 or 0
Day of the week	Mon	Tue	Wed	Thu	Fri	Sat	Sun

Concept review Questions:

*Using the above mentioned **conventional method**, find the day for the following dates:*

1. Independence day of India
2. Republic Day of India

IV. 2 b) Shortcut to find the day

1. Month Code:

1	4	4		0	2	5		0	3	6			1	4	6
Jan	Feb	Mar		Apr	May	Jun		July	Aug	Sept			Oct	Nov	Dec

2. Century Code

Years between	Code/Odd days
1600-1699	6
1700-1799	4
1800-1899	2
1900-1999	0
2000-2099	6

Steps:

Find the sum of:

1. Date
2. Last 2 digits of the year
3. Quotient of last two digits of the year when divided by 4
4. Code of month
5. Odd days of the year

The odd days in the above sum value will give the day

Note:

Incase of months of January and Februray in a leap year, subtract one odd day from the total odd days.

Concept review Questions:

*Using the **Shortcut-method**, find the day for the following dates:*

1. Independence day of India
2. Republic Day of India

IV.3. Finding years with similar calendars

For two different years having the same calendar, the following conditions should be satisfied:

- 1. Both years must be of the same type. i.e., both years must be ordinary years or both years must be leap years.*
- 2. 1st January of both the years must be the same day of the week.*

It simply means that for a year to have the same calendar with X year ,the total odd days from X should be 0.

Let us understand with an example.

Example:

For a year to have the same calendar with 2007 ,the total odd days from 2007 should be 0.

As we know how to recognize an ordinary and leap year, and also we know the number of odd days they have, we can make the below table:

Year	:	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Odd Days	:	1	2	1	1	1	2	1	1	1	2	1

Since up to 2017 the number of odd days become 0, hence the next year(2018) will have the same calendar as 2007.

And also both the years are ordinary years, hence the first condition is also satisfied.

Shortcut (Only when you are not crossing a an ordinary century year) :

Leap year calendar repeats every 28 years.

LY	1ST	2ND	3RD	LY
28	6	11	11	28

Here 28 is distributed as 6+11+11.

Rules:

a) If given year is at 1st position then next repeated calendar year is **Given+6**.

b) If given year is at 2nd position then next repeated calendar year is **Given+11**.

c) If given year is at 3rd position then next repeated calendar year is **Given+11**.

Example:

Find the year which has same calendar as that of 2007 after it.

Sol:

LY	1ST	2ND	3RD	LY
28	6	11	11	28

Given year is 2007

According to the above Rule:

2007 is at the 3rd position. So add 11 yr

$$2007 + 11 = 2018$$

so the same Calendar after 2007 is 2018.

Concept Review Question

Find the year after 2015 which has the same calendar as 2015.

- A. 2019
- B. 2023
- C. 2026
- D. 2029

Ans: C

Concept Review Question

The year after 1996 having the same calendar as of 1996 will be

- A. 1999
- B. 1998
- C. 2001
- D. None of these

Ans: D

PRACTICE QUESTION

Q1. If today is Monday, what will be the day one year and 50 days from now? (Tech Mahindra-2011)

- A. Tuesday
- B. Wednesday
- C. Thursday
- D. Can not be determined

Q3. If day before Yesterday it was Monday, What day will fall on day after tomorrow ? (*Tech Mahindra-2013*)

- a. Sunday
- b. Tuesday
- c. Saturday
- d. Friday

Q4. Radha remembers that her father's birthday is after 16th but before 21st of March, While her brother Mangesh remembers that his father,s birthday is before 22nd but after 19th of March. On which date is the birthday of their father?

(Tech Mahindra-2015)

- a) 19th
- b) 20th
- c) 21st
- d) Cannot be determined
- e) None of these

Q5. *1.12.91 is the first Sunday. Which is the fourth Tuesday of December 91?*

(TCS-2015)

- (a) 31.12.91
- (b) 24.12.91
- (c) 17.12.91
- (d) 26.12.91

Q6. If the third day of the month is Monday, Which of the following will be the fifth day from 21st of that month? (Tech Mahindra-2015)

- a) Tuesday
- b) Monday
- c) Wednesday
- d) Thursday
- e) None of these

Q7. If 8th Dec, 2007 was Saturday then what day of the week was it on 8th Dec, 2006? (*Capegemini-2015*)

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

Q8. Two brothers were expected to return here on the same day. Rajat returned 3 days earlier but Rohit returned 4 days later. If Rajat returned on Thursday, what was the expected day when both the brothers were to return home and when did Rohit Return? (Infosys 2015)

- a) Wednesday, Sunday
- b) Thursday, Monday
- c) Sunday, Thursday
- d) Monday, Friday

Q9. 8th Dec 2009 was Tuesday, what day of the week was it on 8th Dec, 2006? (SSC,2016)

- A. Sunday
- B. Tuesday
- C. Friday
- D. Tuesday

Q11. What was the day of the week on January 1, 1998? (*Tech Mahindra-2016*)

- a. Wednesday
- b. Monday
- c. Friday
- d. Thursday

**Q13. The day of week on July 1,2000 was
(Tech Mahindra-2014)**

- a) Monday
- b) Friday
- c) Saturday
- d) Tuesday
- e) None of the above

Q14. On what dates of August 1980 did Monday fall? (TCS-2014)

- A. 4th, 11th, 18th, 25th
- B. 3rd, 10th, 17th, 24th
- C. 6th, 13th, 20th, 27th
- D. 9th, 16th, 23rd, 30th

Q15. If we suppose the 60th independence day of India was on Thursday, then the 85th independence day would have been on?

- A. Monday
- B. Wednesday
- C. Friday
- D. Sunday

Q16. If 1 Jan 2015 is Thursday then probability of 22nd October to be Wednesday will be? (Infosys-2015**)**

- A. 0
- B. 0.5
- C. 1
- D. Can not be determined

Q17. The calendar for 1992 is the same as for (*Tech Mahindra-2012,2015*)

- a) 1997
- b) 2020
- c) 2016
- d) 1994

Q18. *The calendar of year 1982 is same as which year?*

- A. 1988
- B. 1990
- C. 1992
- D. 1993

Q21. *History Professor Nagarajan was talking to the students about a century which has started with a Monday. What day India would be witnessing on the last day of the century, the Professor was posing a question. Incidentally he posed a question that the last day of the century cannot be:*

- | | |
|--------------|-------------|
| (a)Monday | (b) Tuesday |
| (c)Wednesday | (d) Friday |

Can you answer the Professor 's question?



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EVENTS

CALENDAR

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Fall
Calendar

FOR Obligations

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 - a) Conventional method
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I. Introduction

*The Calendar which we currently follow is called the **Gregorian Calendar**. It is named after Pope Gregory XIII, who introduced it in October 1582.*

The calendar was a refinement to the Julian calendar amounting to a. The motivation for the reform was to stop the drift of the calendar and set the date for Easter celebrations. Transition to the Gregorian calendar would restore the holiday to the time of the year in which it was celebrated when introduced by the early Church.

The reform was adopted initially by the Catholic countries of Europe. Protestants and Eastern Orthodox countries continued to use the traditional Julian calendar and adopted the Gregorian reform after a time, for the sake of convenience in international trade.

The last European country to adopt the reform was Greece, in 1923.

The Gregorian reform modified the Julian calendar's scheme of leap years as follows:

- 1. Every year that is exactly divisible by four is a leap year, except for years that are exactly divisible by 100, but these centurial years are leap years if they are exactly divisible by 400. For example, the years 1700, 1800, and 1900 are not leap years, but the years 1600 and 2000 are.*
- 2. In addition to the change in the mean length of the calendar year from 365.25 days (365 days 6 hours) to 365.2425 days (365 days 5 hours 49 minutes 12 seconds)*

II. What are Ordinary and Leap years??

The time taken by the Earth to make one complete revolution is said to be a complete Year, which is equivalent to exactly

365.2425 days.

*But ignoring the .2425 we generalize an **ordinary** year to be of **365** days.*

*Further for approximate calculation we assume the 365.2425 days to be **365.25** days.*

*This extra **0.25** days in **4 years** becomes **1 full day**. Hence that extra day is added to a year **every 4 years**. That particular year is called a **leap** year, which has one extra day than the ordinary year, which means a leap year has **366 days** in total.*

365.2425

0.0025 when ignored

365.24

0.24 approximated to 0.25 for simpler calculation

365.25

Only the 365 days taken

The 0.25 becomes 1 extra day in 4 years

Ordinary year

365 days

Leap year

$$\begin{aligned} &= \text{Ordinary year} + (0.25 \times 4) \\ &= 365 + 1 \\ &= \mathbf{366 \text{ days}} \end{aligned}$$

How to check for a leap year?

1. Non Century Years:

If any non-century year (not ending with “00”) is divisible by 4 (last two digits of the year should be divisible by 4), then it is said to be a leap year.

Reason: As explained in the previous slide, the 0.25 extra days of 365.25 days become one extra day every 4 years ($0.25 \times 4 = 1$).

Hence every 4 years we have one leap year.

Ex: 1844, 1892, 1996, 2004, 2012, 2016 etc

2. Century Years:

But in case of a century year(Years ending with “00”,ex: 1400,1600,2000,etc), the year will be a leap year only if it is divisible by 400.

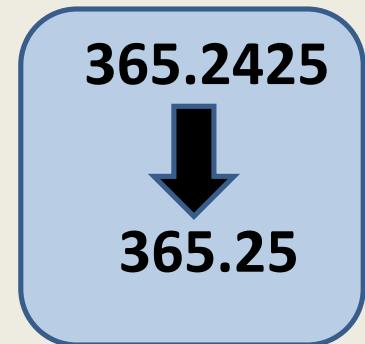
Reason:

Let us take an example. The 100th year is divisible by 4. But it is not a leap year.

Why???

The approximation we make while assuming 365.24 days to be 365.25 days (increasing the value by 0.01), leads to an extra 1 day which does not exist in real. Hence this extra 1 day which is forming every 100 year should be removed from the 100th year. So, although the hundredth year is divisible by 4 and should be a leap year, we remove that extra one day of the leap year from the 100th year. Hence it ends up as an ordinary year only.

But why is the 400th year a leap year then???



So, till now we learnt that the 100th year (Ex: 100,200,300 etc) is not a leap although it is divisible by 4.

But why is 400th year a leap year then???

*This answer also lies in the value **365.2425** days which is the time taken by the earth for one revolution.*

*In 365.24**25** we initially ignore **0.0025**. which is a negligible value for one year. But in 400 years, this **0.0025** becomes 1 complete day (**0.0025x4=1**) and we add this extra day every 400th year.*

Although like every 100th year, 400th year also should have been an ordinary year, but because of the addition of this extra day(mentioned above), every 400th year is a leap year.

And that is why every century leap year is divisible by 400.

***Example:** 400,1200,1600,2000 etc.*

Let us take a quick quiz(Ask the students)

Q1. Is 1996 a leap year? Why?

Q2. Are all the years divisible by 4 leap years? Why?

Q3. How do you check for a century year, whether it is a leap year or not? Why?

III. Odd day concept

If we are supposed to find the day of the week on a given date, we use the concept of 'odd days'. In a given period, the number of days more than the complete weeks are called odd days .

For example the number of odd days in 15 total days = 1, since remainder when 15 is divided by 7 is 1.

Similarly the number of odd days in the month of January is 3. Since January has 31 days,

$$31/7= R(3).$$

Note: The odd day value will always lie from 0 to 6. If the odd day value is more than 6, keep dividing it by 7 until the remainder value comes below 7. The remainder value smaller than 7 is the final odd day value.

Finding odd days

1. In a single year

Now that you know what are odd days, can you find out how many odd days are there in an ordinary year and a leap year respectively???

1. Ordinary year:

Total no. of days=365 days

$$365/7= R(1)$$

Odd days = 1

2. Leap year:

Total number of days= 366

$$366/7= R(2)$$

Odd days= 2

Finding odd days

2. Through out a century/year span

Let us see through examples how to find the number of odd days through out a century or year span.

Ex: Find the number of odd days in the first 35 years in a century.

Step1: Let us first find the number of leap years and ordinary years in these 35 years. 35 years have **8 leap years** ($4 \times 8 = 32$, closest to 35).

Therefore no. of ordinary years = $35 - 8 = \text{27 years}$.

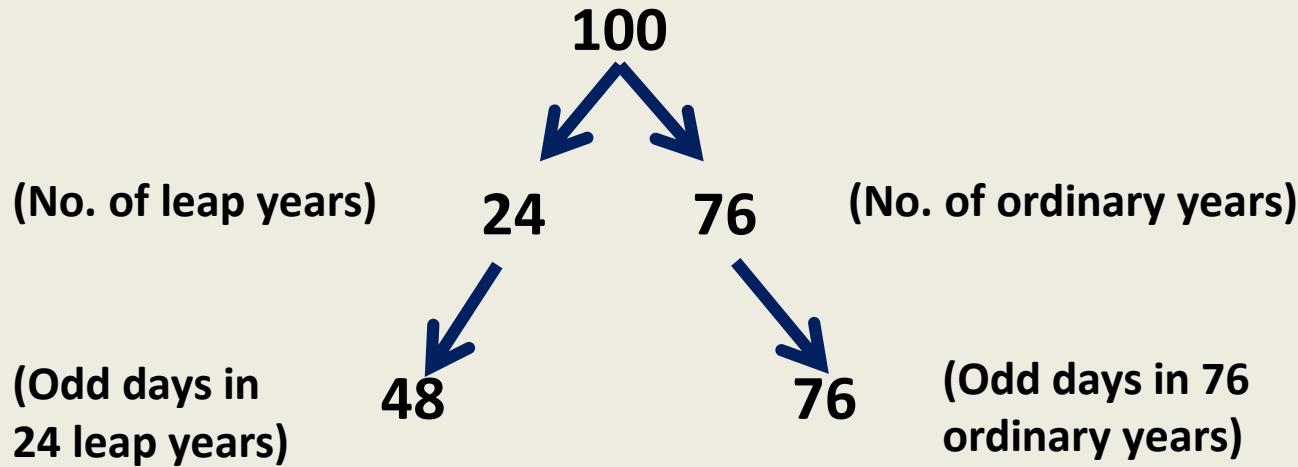
Step2: Odd days in 8 leap years = $8 \times 2 = \text{16}$ (Since 1 leap year has 2 odd days)

Odd days in 27 ordinary years = $27 \times 1 = \text{27}$ (Since 1 ordinary year has 1 odd day)

Step3: Total number of odd days = $(16 + 27) = 43 = 43/7 = R(1)$

Therefore number of odd days in 35 years = **1**

Following the same steps, find the number of odd days in the first century(first 100 years).



$$\text{Total no. of odd days} = (48 + 76) = 124$$

$$124/7=R(5)$$

Hence, the first 100 years(century) have 5 odd days in total.

Note: The first 100 years have 24 leap years, not 25.

Because 100th year is not a leap year as discussed in slide no.8.

Odd days in the centuries

Since first 100 years is having 5 odd days, we can say:

First 200 years have $5 \times 2 = 10$, $10/7 = R(3)$

First 300 years have $5 \times 3 = 15$, $15/7 = R(1)$

First 400 years have $5 \times 4 = 20$, $20/7 = R(6) + 1 = 7 = R(0)$

And the cycle keeps repeating for the next centuries from here.

Note: 1 extra day has been repeated for 400 years, since 400th year is a leap year as mentioned in earlier slides.

Until Century	Up to Year	Odd days	Similar centuries	
1 st	100	5	500	>
2 nd	200	3	600	>
3 rd	300	1	700	>
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Odd days in the months

Month	No. of days	Odd days
January	31	3
February	28,29	0,1
March	31	3
April	30	2
May	31	3
June	30	2
July	31	3
August	31	3
September	30	2
October	31	3
November	30	2
December	31	3

Concept Review Question

Q. If May 10, 1997 was a Monday, what will be the day on Oct 10, 2001?

- A. Wednesday**
- B. Thursday**
- C. Friday**
- D. Saturday**

Solution:

In this question the reference point is May 10, 1997 and we have to find the number of odd days from May 10, 1997 up to Oct 10, 2001.

Now, from May 11, 1997 - May 10, 1998 = 1 odd day

May 11, 1998 - May 10, 1999 = 1 odd day

May 11, 1999 - May 10, 2000 = 2 odd days (2000 was leap year)

May 11, 2000 - May 10, 2001 = 1 odd day

Thus, the total number of odd days up to May 10, 2001 = 5.

Now, the remaining 21 days of May will give 0 odd days.

In June, we have 2 odd days; in July, 3 odd days; in August, 3 odd days; in September, 2 odd days and up to 10th October, we have 3 odd days.

Hence, total number of odd days = 18 i.e. 4 odd days.

Since, May 10, 1997 was a Monday, then 4 days after Monday will be Friday. So, Oct 10, 2001 would be a Friday.

IV. 1. a) Finding the day for a particular date

1. *Odd days in the year(Actual year-1)*
2. *Odd days in the month(Actual month-1)*
3. *Odd days in the date*

Get the sum of the odd days and the final odd day value from it.

Ex: 15/07/2016

1. *Odd days in 2015*
2. *Odd days in January to June*
3. *Odd days in the date(15/7= R(1))*

Sum/7=Odd day value

Odd day value	1	2	3	4	5	6	7 or 0
Day of the week	Mon	Tue	Wed	Thu	Fri	Sat	Sun

Concept review Questions:

*Using the above mentioned **conventional method**, find the day for the following dates:*

1. Independence day of India
2. Republic Day of India

IV. 2 b) Shortcut to find the day

1. Month Code:

1	4	4		0	2	5		0	3	6			1	4	6
Jan	Feb	Mar		Apr	May	Jun		July	Aug	Sept			Oct	Nov	Dec

2. Century Code

Years between	Code/Odd days
1600-1699	6
1700-1799	4
1800-1899	2
1900-1999	0
2000-2099	6

Steps:

Find the sum of:

1. Date
2. Last 2 digits of the year
3. Quotient of last two digits of the year when divided by 4
4. Code of month
5. Odd days of the year

The odd days in the above sum value will give the day

Note:

Incase of months of January and Februray in a leap year, subtract one odd day from the total odd days.

Concept review Questions:

*Using the **Shortcut-method**, find the day for the following dates:*

1. Independence day of India
2. Republic Day of India

IV.3. Finding years with similar calendars

For two different years having the same calendar, the following conditions should be satisfied:

- 1. Both years must be of the same type. i.e., both years must be ordinary years or both years must be leap years.*
- 2. 1st January of both the years must be the same day of the week.*

It simply means that for a year to have the same calendar with X year ,the total odd days from X should be 0.

Let us understand with an example.

Example:

For a year to have the same calendar with 2007 ,the total odd days from 2007 should be 0.

As we know how to recognize an ordinary and leap year, and also we know the number of odd days they have, we can make the below table:

Year	:	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Odd Days	:	1	2	1	1	1	2	1	1	1	2	1

Since up to 2017 the number of odd days become 0, hence the next year(2018) will have the same calendar as 2007.

And also both the years are ordinary years, hence the first condition is also satisfied.

Shortcut (Only when you are not crossing a an ordinary century year) :

Leap year calendar repeats every 28 years.

LY	1ST	2ND	3RD	LY
28	6	11	11	28

Here 28 is distributed as 6+11+11.

Rules:

a) If given year is at 1st position then next repeated calendar year is **Given+6**.

b) If given year is at 2nd position then next repeated calendar year is **Given+11**.

c) If given year is at 3rd position then next repeated calendar year is **Given+11**.

Example:

Find the year which has same calendar as that of 2007 after it.

Sol:

LY	1ST	2ND	3RD	LY
28	6	11	11	28

Given year is 2007

According to the above Rule:

2007 is at the 3rd position. So add 11 yr

$$2007 + 11 = 2018$$

so the same Calendar after 2007 is 2018.

Concept Review Question

Find the year after 2015 which has the same calendar as 2015.

- A. 2019
- B. 2023
- C. 2026
- D. 2029

Ans: C

Concept Review Question

The year after 1996 having the same calendar as of 1996 will be

- A. 1999
- B. 1998
- C. 2001
- D. None of these

Ans: D

PRACTICE QUESTION

Q1. If today is Monday, what will be the day one year and 50 days from now? (Tech Mahindra-2011)

- A. Tuesday
- B. Wednesday
- C. Thursday
- D. Can not be determined

Q3. If day before Yesterday it was Monday, What day will fall on day after tomorrow ? (*Tech Mahindra-2013*)

- a. Sunday
- b. Tuesday
- c. Saturday
- d. Friday

Q4. Radha remembers that her father's birthday is after 16th but before 21st of March, While her brother Mangesh remembers that his father,s birthday is before 22nd but after 19th of March. On which date is the birthday of their father?

(Tech Mahindra-2015)

- a) 19th
- b) 20th
- c) 21st
- d) Cannot be determined
- e) None of these

Q5. *1.12.91 is the first Sunday. Which is the fourth Tuesday of December 91?*

(TCS-2015)

- (a) 31.12.91
- (b) 24.12.91
- (c) 17.12.91
- (d) 26.12.91

Q6. If the third day of the month is Monday, Which of the following will be the fifth day from 21st of that month? (Tech Mahindra-2015)

- a) Tuesday
- b) Monday
- c) Wednesday
- d) Thursday
- e) None of these

Q7. If 8th Dec, 2007 was Saturday then what day of the week was it on 8th Dec, 2006? (*Capegemini-2015*)

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

Q8. Two brothers were expected to return here on the same day. Rajat returned 3 days earlier but Rohit returned 4 days later. If Rajat returned on Thursday, what was the expected day when both the brothers were to return home and when did Rohit Return? (Infosys 2015)

- a) Wednesday, Sunday
- b) Thursday, Monday
- c) Sunday, Thursday
- d) Monday, Friday

Q9. 8th Dec 2009 was Tuesday, what day of the week was it on 8th Dec, 2006? (SSC,2016)

- A. Sunday
- B. Tuesday
- C. Friday
- D. Tuesday

Q11. What was the day of the week on January 1, 1998? (*Tech Mahindra-2016*)

- a. Wednesday
- b. Monday
- c. Friday
- d. Thursday

**Q13. The day of week on July 1,2000 was
(Tech Mahindra-2014)**

- a) Monday
- b) Friday
- c) Saturday
- d) Tuesday
- e) None of the above

Q14. On what dates of August 1980 did Monday fall? (TCS-2014)

- A. 4th, 11th, 18th, 25th
- B. 3rd, 10th, 17th, 24th
- C. 6th, 13th, 20th, 27th
- D. 9th, 16th, 23rd, 30th

Q15. If we suppose the 60th independence day of India was on Thursday, then the 85th independence day would have been on?

- A. Monday
- B. Wednesday
- C. Friday
- D. Sunday

Q16. If 1 Jan 2015 is Thursday then probability of 22nd October to be Wednesday will be? (Infosys-2015**)**

- A. 0
- B. 0.5
- C. 1
- D. Can not be determined

Q17. The calendar for 1992 is the same as for (*Tech Mahindra-2012,2015*)

- a) 1997
- b) 2020
- c) 2016
- d) 1994

Q18. *The calendar of year 1982 is same as which year?*

- A. 1988
- B. 1990
- C. 1992
- D. 1993

Q21. *History Professor Nagarajan was talking to the students about a century which has started with a Monday. What day India would be witnessing on the last day of the century, the Professor was posing a question. Incidentally he posed a question that the last day of the century cannot be:*

- | | |
|--------------|-------------|
| (a)Monday | (b) Tuesday |
| (c)Wednesday | (d) Friday |

Can you answer the Professor 's question?

C L O C K S



CONCEPT BASE

DIAL:

- The face or dial of a clock is a circle whose circumference is divided into 60 equal parts, called minute spaces.
- They are marked by short lines in the face of the clock. However, the end of every fifth minute space is marked longer than the others and the 60 minute spaces are represented as 12 divisions or 12 hour spaces.

They are usually numbered from 1 to 12 as shown in the figure below.



HANDS OF THE CLOCK:

- A clock has two hands; the smaller one is called the hour hand or short hand while the larger one is called the minute hand or long hand as shown in the figure above.
- The hands of the clock are the indicators of time.
- The time is read based on the positions of the hands with respect to minute or hour spaces.

UNIT OF TIME:

- The unit of time in clocks is seconds.
- A second, the SI unit of time, is defined as the natural periodicity of the radiation of a caesium-133 atom.
- A duration of 60 seconds is defined as a minute.
- In clocks, it is also defined as the time taken by the minute hand to move across a minute space.
- A duration of 60 minutes is defined as an hour.
- In clocks, it is also defined as the time taken by the hour hand or short hand to move across five minute spaces or one hour space.
- A day is also defined as the duration of 24 hours

- The time is measured owing to the movement of the hands of a clock. A complete rotation of any of the hands would cover a measure of 360 degrees (circular displacement) .
- Degree is the unit of measurement of angles and is denoted by the symbol °.
- Hour hand covers an angle of 360° in 12 hours. So, the hour hand in one hour will cover $360 / 12 = 30^\circ$.
- So for every minute, the hour hand moves through $30 / 60 = 0.5^\circ$.

- Minute hand covers an angle of 360° in 1 hour.
So for every minute, the minute hand moves through $360/60 = 6^\circ$.
- Both the hands of the clock move in same direction.
- So, their relative displacement for every minute is 5.5° or $11/2^\circ$.
- This 5.5° movement constitutes the movements of both the hands.
- So for every minute, both the hands give a relative displacement of 5.5° .



FORMULA TO FIND THE ANGLE BETWEEN THE HANDS OF THE CLOCK:

$$\theta = 30^\circ H - 11/2M$$

(when the minute hand is trailing the hour hand)

$$\theta = 11/2M - 30^\circ H$$

(when the minute hand is leading the hour hand)

- θ = Angle between the hands of the clock
- $30^\circ H$ = Initial gap; H - the division pointed by the hour hand which indicates the gap between the minute hand and hour hand initially when multiplied by 30° .
- $11/2M$ = Relative displacement for a period of time; $11/2$ - Relative speed of the hands of the clock; M - no. of minute spaces moved by the minute hand.

COINCIDENCE OF THE HANDS OF THE CLOCK:

- At 12 o' clock, the hands of the clock overlap i.e. the angle formed between them is 0° .
- To find the next time they overlap, the gap between them should be 360° so that they are at the same point. Hence it takes,

$$11/2 \times t = 360$$

$$t = 720/11 = 65 \frac{5}{11} \text{ minutes}$$

- Thus, it can be easily concluded that the hands of the clock coincide every $65 \frac{5}{11}$ minutes.



FREQUENCY OF FORMATION OF ANGLES BETWEEN THE HANDS OF THE CLOCK:

- With the relative displacement, it is easier to find the frequency at which the hands of a clock form a particular angle.
- Let's find the no. of times the hands of the clock form 0° in a day.
- We know that the hands of the clock coincide every $65 \frac{5}{11}$ or $720/11$ minutes. So, in a day there are $24 \times 60 = 1440$ minutes
- Therefore, in a day the hands of the clock coincide $(1440 \times 11) / 720 = 22$ times.

- Thus, it can be inferred that the hands of the clock coincide once in every hour except for two occasions i.e. from 11 to 1 o' clock they coincide only once at 12 o' clock.
- So, it is 11 times in 12 hours and thus 22 times in 24 hours.
- The finding can be extended to other angles by applying the formula,

$$\theta = 30^\circ H - 11/2M \text{ or}$$

$$\theta = 11/2M - 30^\circ H$$

for every hour in the clock.

GAIN AND LOSS OF TIME IN AN INCORRECT CLOCK:

- A normal clock becomes incorrect when there is a change in the speeds of the hands of the clock.
- As seen already, duration of a day is measured by the time taken by the hour hand to move across the 12 divisions twice.
- So, when the speed of the hands of the clock increases they complete their rotation for a day sooner.
- Thus, they result in loss of time when actually compared with the duration for a day in a correct clock .
- Similarly, when the hands of the clock move slower than usual, they take more time to complete the rotations for a day.
- Thus, they result in gaining more time for a day when compared with that in a correct clock.



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KEY POINTS:

1. In 60 minutes, the minute hand gains 55 minutes on the hour hand
2. The hands of the clock coincide every $65 \frac{5}{11}$ minutes and for every hour, both the hands coincide once
3. The hands are in the same straight line when they are coincident or opposite to each other
4. When the two hands are at right angles, they are 15 minute spaces apart

5. When the hands are in opposite directions, they are 30 minute spaces apart
6. The hands of the clock form an angle of 0° or 180° – 22 times a day
7. The hands of the clock form an angle of 1° to 179° – 44 times a day
8. If a watch or a clock indicates 8:15, when the correct time is 8, it is said to be 15 minutes faster than the correct time. On the other hand, if it indicates 7:45, when the correct time is 8, it is said to be 15 minutes slow.



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PRACTICE QUESTIONS

1. Find the angle between the hands of a clock when the time is 5:40.

- (a) 80°
- (b) 160°
- (c) 70°
- (d) 120°

2. Find the angle between the minute hand and the hour hand of a clock when the time is 7:20.
- (a) 80°
 - (b) 90°
 - (c) 100°
 - (d) 110°

3. The reflex angle between the hands of a clock at 10:25 is

- (a) 180°
- (b) 162.5°
- (c) 165°
- (d) 197.5°

4. Find the angle between the hour hand and the minute hand of a clock when the time is 15:25.

- (a) 47.5°
- (b) 45.5°
- (c) 50°
- (d) None of these

5. At what time between 5 p.m. and 6 p.m., do the hands of a clock coincide?
- (a) 8 hour 29 $\frac{3}{11}$ min
 - (b) 9 hour 33 $\frac{8}{11}$ min
 - (c) 5 hour 27 $\frac{3}{11}$ min
 - (d) None of these

6. Find at what time (in minutes) past 8 o' clock but before 9 o' clock will the hands of a clock be in the same straight line but not together.
- (a) $100/11$
 - (b) $110/11$
 - (c) $120/11$
 - (d) None of these

7. How many times in a day do the hands of a clock form 90° ?

- (a) 22
- (b) 33
- (c) 44
- (d) 55

8. A few times per day, the minute hand of a clock is exactly above (or below) the hour hand. How many times per day does this occur?
- (a) 11 times
 - (b) 24 times
 - (c) 22 times
 - (d) 44 times

9. At how many times between 12 o'clock and 1 o' clock are the minute hand and the hour hand of a clock at an angle of 90 degrees to each other?

- (a) 4
- (b) 6
- (c) 3
- (d) 2

10. How much does a watch gains or loses per day, if its hands coincide every 64 minutes?

- (a) $32 \frac{8}{11}$ min
- (b) $36 \frac{5}{11}$ min
- (c) 90 min
- (d) 96 min

11. My watch was 8 minutes behind at 8 p.m. on Sunday but it was 7 minutes ahead of time at 8 p.m. on Wednesday. During this period, at which time has this watch shown the correct time?
- (a) Tuesday 10.24 a.m.
 - (b) Wednesday 9.16 p.m.
 - (c) Tuesday 10.24 p.m.
 - (d) Wednesday 9.16 a.m.



12. The minute hand of a clock overtakes the hour hand at intervals of 65 minutes of the correct time. How much a day does the clock gain or lose in minutes?

- (a) $1440/143$
- (b) $1444/143$
- (c) $1400/143$
- (d) $4440/143$

13. A clock is set right at 8 a.m. The clock gains 10 minutes in 24 hours. What will be the true time when the clock indicates 1 p.m. on the following day?

- (a) 48 min past 12
- (b) 48 min past 11
- (c) 45 min past 12
- (d) 45 min past 11

14. At what time between 4 and 5 o'clock, will the hands of a watch point in opposite directions?

- (a) 54 min past 4
- (b) $53 \frac{7}{11}$ min past 4
- (c) $54 \frac{7}{11}$ min past 4
- (d) $54 \frac{6}{11}$ min past 4

15. A watch which gains 5 seconds in 3 minutes was set right at 7 a.m. In the afternoon of the same day, when the watch indicated quarter past 4 o'clock, the true time is
- (a) 3:59:35 p.m.
 - (b) 6 p.m.
 - (c) 5 p.m.
 - (d) 7 p.m.

16. At what time between 5.30 and 6 o' clock, will the hands of a clock be at right angles?

- (a) $43 \frac{5}{11}$ min past 5
- (b) $43 \frac{7}{11}$ min past 5
- (c) 5 p.m.
- (d) 7 p.m.

17. Find the reflex angle between the hour hand and the minute hand of a clock when the time is 11:25.

- (a) 192.5°
- (b) 230°
- (c) 45°
- (d) 72°



Inequalities:-

Quote of the day:-

**“You can learn to be happy
in any circumstances”.**

INEQUALITIES:-

Q1:- Which of the following expressions is true, if the given expression is true? $N > R \leq S < T = M \geq V$

[A] $R = V$

[B] $N > T$

[C] $M > R$

[D] $S < V$

INEQUALITIES:-

Q2:- Statements: $T \leq M \leq J = Q > F > S$; $M > R$

Conclusions: I. $Q \geq T$ II. $J > S$

[A] Only conclusion I is true

[B] Either conclusion I or II is true

[C] Only conclusion II is true

[D] Both conclusion I and II are true

INEQUALITIES:-

Q3:- Statements: $H > S \geq F = B \leq U \leq T; E \leq B \leq K$

Conclusions: I. $U \geq E$ II. $S > T$

[A] Only conclusion I is true

[B] Either conclusion I or II is true

[C] Only conclusion II is true

[D] Both conclusion I and II are true

INEQUALITIES:-

Q4:- Statements: $B \geq C > D \leq E \leq F < G$

Conclusions: I. $B \geq F$ II. $D < G$

- [A] Only conclusion I is true [**
- B] Either conclusion I or II is true**
- C] Only conclusion II is true**
- D] Both conclusion I and II are true**

INEQUALITIES:-

Q5:- . Statements: $H > S \geq F = B < U < T; E \leq B \leq K$

Conclusions: I. $K > H$ II. $K = H$

[A] Only conclusion I is true

[B] Either conclusion I or II is true

[C] Only conclusion II is true

[D] Neither conclusion I nor II are true

INEQUALITIES:-

Q6:- . Statements: $T < M < J = Q \geq F > S; M > R$

Conclusions: I. $M < S$ II. $F \geq R$

[A] Only conclusion I is true

[B] Either conclusion I or II is true

[C] Only conclusion II is true

[D] Neither conclusion I nor II are true

INEQUALITIES:-

Q7:- Statement: $L \geq Q > P = N \leq K \leq R$

Conclusions: I. $L > N$ II. $R \geq P$

[A] If only conclusion I is true

[B] If only conclusion II is true

[C] If either conclusion I or II is true

[D] If both conclusions I and II are true

INEQUALITIES:-

Q8:- Statement: $B \leq D = E > G \geq H \geq J$

Conclusions: I. $E > B$ II. $D > J$

[A] If only conclusion I is true

[B] If only conclusion II is true

[C] If either conclusion I or II is true

[D] If neither conclusion I nor II is true

INEQUALITIES:-

Q9:- Statement: $P = Q \geq R = S > T \geq V$

Conclusions: I. $P \geq S$ II. $R > V$

[A] If only conclusion I is true

[B] If only conclusion II is true

[C] If either conclusion I or II is true

[D] If both conclusions I and II are true

INEQUALITIES:-

Q10:- . Which of the following explanation is false, if the given expression is true? $E = F > G \leq H = I$

- 1) $E > G$
- 2) $H \geq G$
- 3) $H \geq F$
- 4) $I \geq G$

- [A] Only 1
- [B] Only 2
- [C] Only 3 & 4
- [D] Only 3

INEQUALITIES:-

Q11:- . $L \leq O > V = E \geq S$ Which of the following ones is correct?

1) $L \leq V$

2) $O = E$

3) $O > S$

4) $S \geq L$

[A] Only 1 [B] Only 2 [C] Only 3 [D] Only 3 & 4

INEQUALITIES:-

Q12:- $B > E \leq A = T \geq S$ Which of the following ones is correct?

1) $B > S$

2) $E = T$

3) $E < T$

4) $E \leq S$

[A] Only 1

[B] Either 2 or 3

[C] Only 2

[D] Either 3 or 4

INEQUALITIES:-

Q13:- $M = O < N = K \leq S$ Which of the following ones is correct?

- 1) $M = S$
 - 2) $O < S$
 - 3) $N > S$
 - 4) $O = K$
- [A] Only 1 [B] Only 2 [C] Only 2 & 3 [D] Either 3 or 4

INEQUALITIES:-

Q14:- $C \geq H = A > T > S$ Which of the following ones is correct?

1) $S < C$

2) $T = C$

3) $H < T$

4) $H \leq S$

[A] Only 1

[B] Only 2

[C] Either 1 or 2

[D] Only 4

INEQUALITIES:-

Q15:- $S \geq T = U > D \leq Y$ Which of the following ones is correct?

- 1) $Y > U$
- 2) $S = D$
- 3) $S = U$
- 4) $S > U$

[A] Only 1

[B] Only 2

[C] Either 3 or 4

[D] Only 4

INEQUALITIES:-

Q16:- $G \leq R > E = A \leq T$ Which of the following ones is correct?

1) $R > T$

2) $R = A$

3) $G \leq T$

4) $E \leq T$

[A] Only 1

[B] Only 2

[C] Only 3 & 4

[D] Only 4

INEQUALITIES:-

Q17:- $S = T \leq R < E = A > M$ Which of the following ones is correct?

1) $S > M$

2) $A > S$

3) $A < T$

4) $M > R$

[A] Only 1

[B] Only 2

[C] Only 2 & 4

[D] Only 4

INEQUALITIES:-

Q18:- $D > R \geq E = A \leq M$ Which of the following ones is correct?

1) $D > M$

2) $A < D$

3) $E = D$

4) $M < R$

[A] Only 1

[B] Only 2

[C] Only 2 & 3

[D] Either 1 or 4

INEQUALITIES:-

**Q19:- Which of the following expressions will be true, if the expression
 $R > O = A > S < T$ is definitely true?**

[A] $O > T$

[B] $S < R$

[C] $T > A$

[D] $S = O$

INEQUALITIES:-

Directions: Study the following question carefully and choose the right answer.

Q21:- Statement: $M \geq P < H, V > T = M$

Conclusions: I. $V > P$ II. $T \geq H$

[A] If only conclusion I is true

[B] If only conclusion II is true

[C] If either conclusion I or II is true

[D] If neither conclusion I nor II is true

INEQUALITIES:-

Q22:- Statements: $A > B = C \geq D$, $V \geq G \leq H = D$

Conclusion: (I) $C \geq D$

(II) $A > H$

(III) $B \geq G$

(IV) $C < V$

[A] Only I and II are true

[B] Only III and IV are true

[C] Only I, II and III are true

[D] All I, II, III and IV are true

INEQUALITIES:-

Q23:- Statements: $M \leq N < L \geq Q, R > T \geq Q$

Conclusions: (I) $R \geq L$

(II) $T \leq N$

(III) $L > M$

(IV) $R \geq M$

[A] Only III and IV are true [B] Only III is true [C] Only I and IV are true

[D] All I, II, III and IV are true

INEQUALITIES:-

Q24:- Statements: $M \geq P < H, V > T = M$

Conclusions: I. $V > P$

II. $T \geq H$

[A] If only conclusion I is true

[B] If only conclusion II is true

[C] If either conclusion I or II is true

[D] If neither conclusion I nor II is true

INEQUALITIES:-

Q25:- Statements: $E = G \geq H = N$, $C > F \geq M = N$

Conclusions: (I) $F \geq E$

(II) $E \geq M$

(III) $C \geq G$

(IV) $C > H$

[A] Only I and III are true

[B] All I, II, III and IV are true

[C] Only II and IV are true

[D] Only II is true

INEQUALITIES:-

Q26:- Statements:

$$W < H \leq L < J \leq N < V, M = F \neq J = G \geq I > Q, U \leq P < E = C = I$$

Conclusions: (I) $E < V$ (II) $W < P$

[A] Neither Conclusion (I) nor (II) follows

[B] Only Conclusion (I) follows

[C] Both conclusions follow

[D] Only Conclusion (II) follows

INEQUALITIES:-

Q27:- .Statements:

$A > C = B = F \geq J < M, K = Q \leq J < Z < N, X = U \neq K = S \geq Z > X$

Conclusions: (I) $Z < C$ (II) $A > K$

[A] Neither conclusion (I) nor (II) follows

[B] Only conclusion (I) follows

[C] Both conclusions follow

[D] Only conclusion (II) follows

INEQUALITIES:-

Q28:- Statements: $4 = 6 \neq 9 < 7 = 2 \neq 1$, $Y = 7 < 3 \leq 5 < 0 = Z$

Conclusions: (I) $Z > 6$ (II) $0 \leq 4$

[A] Neither conclusion (I) nor (II) follows

[B] Only conclusion (I) follows

[C] Both conclusions follow

[D] Either conclusion (I) or (II) follows

INEQUALITIES:-

Q29:- Statements: $2 > 3 > 4 = 1 < 5, 9 \leq 7 = 8 < 4 < 0$

Conclusions: (I) $3 > 7$ (II) $9 \leq 1$

[A] Neither conclusion (I) nor (II) follows

[B] Only conclusion (I) follows

[C] Both conclusion (I) and (II) follow

[D] Only conclusion (II) follows

INEQUALITIES:-

Directions: Study the following information carefully and answer the questions given below:

'A @ B' means '**A is neither greater than nor smaller than B.**'

'A % B' means '**A is not greater than B.**'

'A # B' means '**A is neither smaller than nor equal to B.**'

'A © B' means '**A is not smaller than B.**'

'A δ B' means '**A is neither greater than nor equal to B.**'

INEQUALITIES:-

Q30:- Statements: $J \# K$, $K @ P$, $P \delta R$

Conclusions: (I) $J \# R$ (II) $J \delta R$

[A] If only conclusion I is true

[B] If only conclusion II is true

[C] If either conclusion I or II is true

[D] If neither conclusion I nor II is true

INEQUALITIES:-

Q31:- Statements: $M \delta N$, $Q \% S$, $N \odot Q$

Conclusions: (I) $M \delta Q$ (II) $N \% S$

[A] If only conclusion I is true

[B] If only conclusion II is true

[C] If either conclusion I or II is true

[D] If neither conclusion I nor II is true

INEQUALITIES:-

Q32:-Statements: P # R, R @ L, L © T

Conclusions: (I) L δ P (II) P # T

[A]If only conclusion I is true

[B]If only conclusion II is true

[C]If either conclusion I or II is true

[D] If both conclusions I and II are true

INEQUALITIES:-

Q33:- Statements: C @ D, D © P, K δ P

Conclusions: (I) C © P (II) D # K

[A] If only conclusion I is true

[B] If only conclusion II is true

[C] If either conclusion I or II is true

[D] If both conclusions I and II are true

INEQUALITIES:-

'P © Q' means 'P is either greater than or equal to Q'

'P \$ Q' means 'P is either smaller than or equal to Q'

'P % Q' means 'P is neither greater than nor smaller than Q'

'P * Q' means 'P is greater than Q'

'P @ Q' means 'P is smaller than Q'

Inequalities:-

Q34:- Statements: F * G, G © R, R © K

Conclusions: (I) K * G (II) R @ F

[A] If only conclusion I is true

[B] If only conclusion II is true

[C] If either conclusion I or conclusion II is true

[D] If neither conclusion I nor conclusion II is true

Inequalities:-

Q35:- . Statements: E © K, K @ M, M * R

Conclusions: (I) R @ K (II) M @ E

[A] If only conclusion I is true

[B] If only conclusion II is true

[C] If either conclusion I or conclusion II is true

[D] If neither conclusion I nor conclusion II is true

Inequalities:-

Q36:- Statements: $W \$ N$, $N \% B$, $B * F$

Conclusions: (I) $B \% W$ (II) $B * W$

[A] If only conclusion I is true

[B] If only conclusion II is true

[C] If either conclusion I or conclusion II is true

[D] If neither conclusion I nor conclusion II is true

Inequalities:-

Q37:- Statements: M % T, T * J, J © D

Conclusions: (I) D @ T (II) J @ M

[A] If only conclusion I is true

[B] If only conclusion II is true

[C] If either conclusion I or conclusion II is true

[D] If both conclusion I and II are true

Inequalities:-

Q38:- Statements: B @ H, H \$ N, N % F

Conclusions: (I) F © H (II) N * B

[A] If only conclusion I is true

[B] If only conclusion II is true

[C] If either conclusion I or conclusion II is true

[D] If both conclusion I and II are true

**Count your life by smiles not
tears!!!**



Analytical Reasoning

- Seating Arrangement
- Circular Arrangement



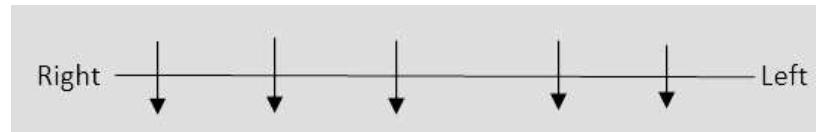
Seating Arrangement

- Linear arrangement & Practice from PPT
- Circular Arrangement & Practice from PPT
- Square table arrangement & Practice from PPT



Seating Arrangements

Linear Arrangement: Here the arrangement of the persons is linear i.e. you have to arrange them in a line. Here generally a single row of arrangement is formed.





Seating Arrangements

Five girls are sitting on a bench to be photographed. Seema is to the left of Rani and to the right of Bindu. Mary is to the right of Rani. Reeta is between Rani and Mary.

1. Who is sitting immediate right to Reeta ?

- A. Bindu
- B. Rani
- C. Mary
- D. Seema



Seating Arrangements

Five girls are sitting on a bench to be photographed. Seema is to the left of Rani and to the right of Bindu. Mary is to the right of Rani. Reeta is between Rani and Mary.

2. Who is in the middle of the photograph ?

- A. Bindu
- B. Rani
- C. Reeta
- D. Seema



Seating Arrangements

Five girls are sitting on a bench to be photographed. Seema is to the left of Rani and to the right of Bindu. Mary is to the right of Rani. Reeta is between Rani and Mary.

3. Who is second from the right ?

- A. Mary
- B. Rani
- C. Reeta
- D. Bindu



Seating Arrangements

Five girls are sitting on a bench to be photographed. Seema is to the left of Rani and to the right of Bindu. Mary is to the right of Rani. Reeta is between Rani and Mary.

4. Who is second from the left in photograph ?

- A. Reeta
- B. Mary
- C. Bindu
- D. Seema



Seating Arrangements

Double row arrangement: In these questions, there will be two groups of persons. You have to arrange one group in one row and the other group in other row. The persons in these rows normally face each other.



Seating Arrangements

Direction: A ,B, C, D and E are five men sitting in a line facing to south - while M, N, O, P and Q are five ladies sitting in a second line parallel to the first line and are facing to North.

B who is just next to the left of D, is opposite to Q.

C and N are diagonally opposite to each other.

E is opposite to O who is just next right of M.

P who is just to the left of Q, is opposite to D.

M is at one end of the line.

5. Who is sitting third to the right of O ?

- A. Q
- B. N
- C. M
- D. Data inadequate



Seating Arrangements

Direction: A ,B, C, D and E are five men sitting in a line facing to south - while M, N, O, P and Q are five ladies sitting in a second line parallel to the first line and are facing to North.

B who is just next to the left of D, is opposite to Q.

C and N are diagonally opposite to each other.

E is opposite to O who is just next right of M.

P who is just to the left of Q, is opposite to D.

M is at one end of the line.

6. If B shifts to the place of E, E shifts to the place of Q, and Q shifts to the place of B, then who will be the second to the left of the person opposite to O ?

- A. Q
- B. P
- C. E
- D. D



Seating Arrangements

Direction: A ,B, C, D and E are five men sitting in a line facing to south - while M, N, O, P and Q are five ladies sitting in a second line parallel to the first line and are facing to North.

B who is just next to the left of D, is opposite to Q.

C and N are diagonally opposite to each other.

E is opposite to O who is just next right of M.

P who is just to the left of Q, is opposite to D.

M is at one end of the line.

7. Which of the following pair is diagonally opposite to each other ?

- A. EQ
- B. BO
- C. AN
- D. AM



Seating Arrangements

Direction: A ,B, C, D and E are five men sitting in a line facing to south - while M, N, O, P and Q are five ladies sitting in a second line parallel to the first line and are facing to North.

B who is just next to the left of D, is opposite to Q.

C and N are diagonally opposite to each other.

E is opposite to O who is just next right of M.

P who is just to the left of Q, is opposite to D.

M is at one end of the line.

8. If O and P, A and E and B and Q interchange their positions, then who will be the second person to the right of the person who is opposite to the person second of the right of P ?

- A. D
- B. A
- C. E
- D. O



Seating Arrangements

Direction: A ,B, C, D and E are five men sitting in a line facing to south - while M, N, O, P and Q are five ladies sitting in a second line parallel to the first line and are facing to North.

B who is just next to the left of D, is opposite to Q.

C and N are diagonally opposite to each other.

E is opposite to O who is just next right of M.

P who is just to the left of Q, is opposite to D.

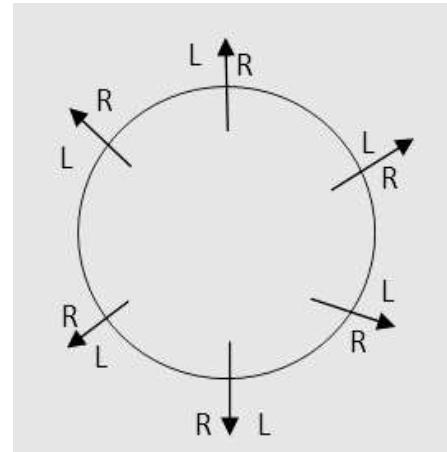
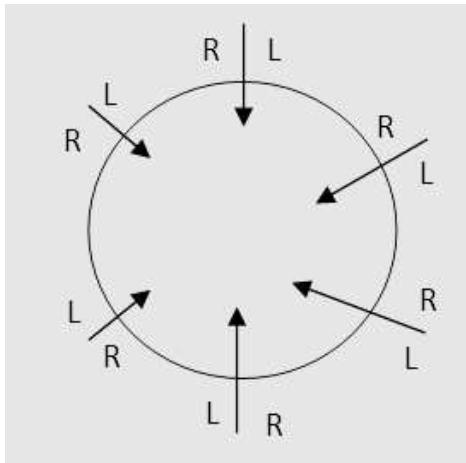
M is at one end of the line.

9. In the original arrangement who is sitting just opposite to N ?

- A. B
- B. A
- C. C
- D. D

Seating Arrangements

Circular arrangement: In the circular seating arrangement questions, you have to arrange the persons around a circular table etc. fulfilling certain conditions.





Seating Arrangements

Direction: P, Q, R, S, T, U, V and W are sitting round the circle and are facing the centre:

P is second to the right of T who is the neighbor of R and V.

S is not the neighbor of P.

V is the neighbor of U.

Q is not between S and W. W is not between U and S.

10. Which two of the following are not neighbors ?

- A. RV
- B. UV
- C. RP
- D. QW



Seating Arrangements

Direction: P, Q, R, S, T, U, V and W are sitting round the circle and are facing the centre:

P is second to the right of T who is the neighbour of R and V.

S is not the neighbour of P.

V is the neighbour of U.

Q is not between S and W. W is not between U and S.

11. Which one is immediate right to the V ?

- A. P
- B. U
- C. R
- D. T



Seating Arrangements

Direction: P, Q, R, S, T, U, V and W are sitting round the circle and are facing the centre:

P is second to the right of T who is the neighbour of R and V.

S is not the neighbour of P.

V is the neighbour of U.

Q is not between S and W. W is not between U and S.

12. Which of the following is correct ?

- A. P is to the immediate right of Q
- B. R is between U and V
- C. Q is to the immediate left of W
- D. U is between W and S



Seating Arrangements

Direction: P, Q, R, S, T, U, V and W are sitting round the circle and are facing the centre :

P is second to the right of T who is the neighbour of R and V.

S is not the neighbour of P.

V is the neighbour of U.

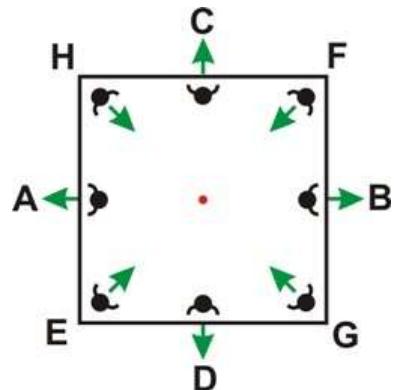
Q is not between S and W. W is not between U and S.

13. What is the position of S ?

- A. Between U and V
- B. Second to the right of P
- C. To the immediate right of W
- D. Data inadequate.

Seating Arrangements

Rectangular/Square arrangement: These arrangements are almost similar to the circular arrangements; the only difference is that the persons are sitting around a rectangular table.





Seating Arrangements

Direction: 8 persons E, F, G, H, I, J, K and L are seated around a square table - two on each side.

There are 3 ladies who are not seated next to each other.

J is between L and F.

G is between I and F.

H, a lady member is second to the left of J.

F, a male member is seated opposite to E, a lady member.

There is a lady member between F and I.

19. Who among the following is to the immediate left of F ?

- A. G
- B. I
- C. J
- D. H



Seating Arrangements

Direction: 8 persons E, F, G, H, I, J, K and L are seated around a square table - two on each side.

There are 3 ladies who are not seated next to each other.

J is between L and F.

G is between I and F.

H, a lady member is second to the left of J.

F, a male member is seated opposite to E, a lady member.

There is a lady member between F and I.

20. What is true about J and K ?

- A. J is male, K is female
- B. J is female, K is male
- C. Both are female
- D. Both are male



Seating Arrangements

Direction: 8 persons E, F, G, H, I, J, K and L are seated around a square table - two on each side.

There are 3 ladies who are not seated next to each other.

J is between L and F.

G is between I and F.

H, a lady member is second to the left of J.

F, a male member is seated opposite to E, a lady member.

There is a lady member between F and I.

21. How many persons are seated between K and F ?

- A. 1
- B. 2
- C. 3
- D. 4



Seating Arrangements

Directions: 8 persons E, F, G, H, I, J, K and L are seated around a square table - two on each side.

There are 3 ladies who are not seated next to each other.

J is between L and F.

G is between I and F.

H, a lady member is second to the left of J.

F, a male member is seated opposite to E, a lady member.

There is a lady member between F and I.

22. Who among the following are three lady members ?

- A. E, H and J
- B. E, F and G
- C. E, H and G
- D. C, H and J



Seating Arrangements

Direction: 8 persons E, F, G, H, I, J, K and L are seated around a square table - two on each side.

There are 3 ladies who are not seated next to each other.

J is between L and F.

G is between I and F.

H, a lady member is second to the left of J.

F, a male member is seated opposite to E, a lady member.

There is a lady member between F and I.

23. Who among the following is seated between E and H ?

- A. F
- B. I
- C. K
- D. Cannot be determined



A, B, C, D, E and F, not necessarily in that order, are sitting at a round table. A is between D and F, C is opposite to D and D and E are not on neighboring chairs. Which one of the following pairs must be sitting on neighboring chairs?

- A. A and B
- B. C and E
- C. B and F
- D. A and C



Read the following information carefully and answer the questions given below:

- Zika, Yisha, Xomi, Wara, Veta, Uma, Tani and Sipa are sitting around a circle facing the centre but not necessarily in the same order.
- Yisha sits second to the left of Sipa's husband. No female is an immediate neighbours of Yisha.
- Wara's daughter sits second to the right of Uma. Uma is the sister of Tani. Uma is not an immediate neighbours of Sipa's husband.
- Only one person sits between Zika and Uma. Zika is father of Tani.
- Sipa's brother Wara sits on the immediate left of Sipa's mother.
- Only one person sits between Sipa's mother and Veta.
- Only one person sits between Sipa and Tani. Tani is the mother of Xomi. Tani is not an immediate neighbours of Veta.

What is the position of Zika with respect to his mother-in-law?

- A.Immediate Left
- B.Third to right
- C.Third to the left
- D.Second to the right



Read the following information carefully and answer the questions given below:

- Zika, Yisha, Xomi, Wara, Veta, Uma, Tani and Sipa are sitting around a circle facing the centre but not necessarily in the same order.
- Yisha sits second to the left of Sipa's husband. No female is an immediate neighbours of Yisha.
- Wara's daughter sits second to the right of Uma. Uma is the sister of Tani. Uma is not an immediate neighbours of Sipa's husband.
- Only one person sits between Zika and Uma. Zika is father of Tani.
- Sipa's brother Wara sits on the immediate left of Sipa's mother.
- Only one person sits between Sipa's mother and Veta.
- Only one person sits between Sipa and Tani. Tani is the mother of Xomi. Tani is not an immediate neighbours of Veta.

Who amongst the following is Wara's daughter?

- (A)Yisha
- (B)Xomi
- (C)Veta
- (D)Tani



Read the following information carefully and answer the questions given below:

- Zika, Yisha, Xomi, Wara, Veta, Uma, Tani and Sipa are sitting around a circle facing the centre but not necessarily in the same order.
- Yisha sits second to the left of Sipa's husband. No female is an immediate neighbours of Yisha.
- Wara's daughter sits second to the right of Uma. Uma is the sister of Tani. Uma is not an immediate neighbours of Sipa's husband.
- Only one person sits between Zika and Uma. Zika is father of Tani.
- Sipa's brother Wara sits on the immediate left of Sipa's mother.
- Only one person sits between Sipa's mother and Veta.
- Only one person sits between Sipa and Tani. Tani is the mother of Xomi. Tani is not an immediate neighbours of Veta.

What is the position of Zika with respect to his grandchild?

- (A) Immediate Right
- (B) Third to the right
- (C) Third to the left
- (D) Second to the left.



Seating Arrangements

Directions(24-28): Study the following information to answer the given questions.

Eight persons – A, B, C, D, E, F, G and H – from eight different fields viz. Agriculture, Banking, Business, Army, Medicine, Navy, Software and Teaching sit in two different rows, four persons in each facing each other but not necessarily in the same order. The following information is given.

- (a) B and the person from Teaching are adjacent to each other and one among them sits at one of the ends.
- (b) The person from Banking and G are opposite each other. H is not from Banking.
- (c) Either C or the person from Navy sits at one of the ends and both sit in the different rows.
- (d) Only one person sits to the left of G.
- (e) H who is not from Medicine is the neighbours of the persons from Army and Software.
- (f) The person from Business who is not D is adjacent to A and opposite E, who faces north.
- (g) C sits to the right of the person from Army.



Seating Arrangements

24. H is from which field?

- A. Business
- B. Banking
- C. Agriculture
- D. Teaching
- E. Navy



Seating Arrangements

25. Who among the following are at the ends of the row?

- A. H, the person from Business
- B. B, E
- C. G, D
- D. The person from Teaching, E
- E. F, A



Seating Arrangements

26. Who sits opposite the person from Army?

- A. B
- B. G
- C. The person from Banking
- D. F
- E. The person from Business



Seating Arrangements

27. Who is from banking field?

- A. B
- B. A
- C. C
- D. H
- E. None of these



Seating Arrangements

28. Find the odd one out.

- A. F-E
- B. A-G
- C. B-H
- D. C-B
- E. None of these



Directions (Q.14-18): Study the following information carefully and answer the given questions:

M, N, O, P, Q, R, S and T are eight persons. Each of them has a different favourite fruit i.e. Mango, Banana, Apple, Guava, Grapes, Orange, Pineapple and Litchi but not necessarily in the same order. All of them are sitting around a circular table and facing the center.

Neither M nor O is an immediate neighbor of Q. Neither M nor O has Grapes as his favourite fruit. Q sits third to the left of the person whose favourite fruit is Grapes. Only two persons sit between M and O. The person whose favourite fruit is Litchi sits second to the right of T. T is not an immediate neighbor of Q. T doesn't have Grapes as his favourite fruit and Litchi is not the favourite fruit of Q. The person whose favourite fruit is Mango sits third to the left of P. The persons with favourite fruits as Mango and Grapes are not immediate neighbours. Only one person sits between T and the person whose favourite fruit is Apple. Persons with favourite fruits as Banana and Guava are immediate neighbours. Banana is not the favourite fruit of T. Only one person sits between R and the person whose favourite fruit is Orange. The person with Orange as his favourite fruit is an immediate neighbor of N. O and R are not immediate neighbours.



Q.14. Who among the following has Pineapple as his favourite fruit?

- a) S
- b) R
- c) N
- d) Q
- e) P

Seating Arrangements



Q.15. Which of the following would come in place of question mark based upon the given seating arrangement?

TS, RT, NR, PN, ?

- a) QP
- b) SP
- c) RT
- d) SM
- e) None of these

Seating Arrangements



Q.16. Which of the following is true with respect to the given seating arrangement?

- a) T and R are sitting opposite to each other.
- b) Orange is the favourite fruit of N.
- c) Q sits third right of P.
- d) Persons with favourite fruits as Orange and Grapes are sitting opposite to each other.
- e) None of these.



Q.18. What is the position of person whose favourite fruit is Litchi with respect to S?

- a) Immediate right
- b) Immediate left
- c) Second to the left
- d) Second to the right
- e) Third to the left



Thank
you

#Think BIG