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DAILY QUESTIONS

28TH JUNE '18

REASONING - CALENDAR

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LEAP AND NON-LEAP YEAR

*A non-leap year has 365 days whereas a leap year has 366 days. (as February has 29 days).

*Every year which is divisible by 4 is called a leap year.

*Leap year consists of (52 complete weeks + 2 days),the extra 2 days are the odd days.

*In a non-leap year (52 complete weeks + 1 day), the extra 1 day is the odd day.

*every century year which is a multiple of 400,is a leap year (for example 400, 800, 1200 etc.) whereas which is not a multiple of 400 is a non-leap year (for example 500, 700, 900 etc.)

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COUTING THE NUMBER OF ODD DAYS

100 years consists of 24 leap years + 76 ordinary years.(100 years when divided by 4, we get 25. But at the 100th year is not a leap year, hence only 24 leap years).

=2 x 24 odd days + 1 x 76 odd days

=124 days

= 17 weeks + 5 days

The extra 5 days are the odd days.

So, 100 years contain 5 odd days.

Similarly, for 200 years we have 10 extra days (1 week + 3 days)

So, 200 years contains 3 odd days.

Similarly, 300 years contain 1 odd day and 400 years contain 0 odd days.

COUTING OF NUMBERS OF ODD DAYS, WHEN ONLY ONE DATE IS GIVEN:

Here we take January 1st as the earlier date and we assume that this day is a Monday. We take its previous day, i.e. Sunday as the reference day. After this the above mentioned method is applied to count the number of odd days and find the day of the week for the given date.

COUNTING NUMBER OF ODD DAYS, WHEN TWO DATES ARE GIVEN:

Any month which has 31 days has 3 odd days.
(as 31/7 leaves 3 as remainder) and any month which has 30 days has 2 odd days (30/7 leaves 2 as remainder).
Then, the total number of odd days are calculated by adding the odd days for each month. The value so obtained is again divided by 7 to get the final number of odd days. The day of the week of the second date is obtained by adding the odd days to the day of the week of earlier date.

CALENDAR

Q.1) Which of the following years has the same calendar as that of 1991?
[a] 2002
[b] 1996
[c] 2000
[d] 2001

Solution (a)

In order to have same calendar between two years, the number of odd days should be zero.

Year	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Odd days	1	2	1	1	1	2	1	1	1	2	1

As the number of odd days from 1991 to 2001 is 14, i.e. zero odd days. Year 2002 has the same calendar as that of year 1991.

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Q.2) If 1st January 2009 was a Thursday, then which day of the week was the new year celebrated in 2014?
[a] Tuesday
[b] Thursday
[c] Friday
[d] Wednesday

Solution (d)

Year	2010	2011	2012	2013	2014
Odd days	1	1	1	2	1

The number of odd days = 6
Hence January 1st, 2014 will be six days to Thursday, i.e. Wednesday.

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Q.3) If holidays are declared only on Sundays, and in a particular year 2nd February is a Sunday, is 21st September in that year a holiday?

[a] yes

[b] no

[c] yes, if it is a non-leap year

[d] no, if it is a non-leap year

Solution (c)

Month	Feb	Mar	Apr	May	June	July	Aug	Sep
Odd days (in a non-leap year)	5	3	2	3	2	3	3	0

As there are 28 days in the month of February in a non- leap year, only 26 days are left to be calculated after 2nd Feb to get odd days. The number of odd days = 21/7 = o odd days So, 21st September in that is a holiday, if that is a non-leap year.

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Q.4) If 12th December 2005 is a Monday, then 12th December 2605 is a ....?

[a] Monday

[b] Saturday

[c] Thursday

[d] Tuesday

Solution (c)

The number of years from 2005 to 2605 is 600 years.

600 years = 400 years + 200 years

= 0 odd days + 3 odd days

3 days to Monday is Thursday

So, 12 December 2605 is Thursday .

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Q.5) Independence day was celebrated on 15th August 1980 on……..?
[a] Saturday
[b] Friday
[c] Sunday
[d] cannot be determined

CALENDAR

Solution :5 (b)

15th August 1980 = 1600 +300+79+ (1st January, 1980 to 15th August 1980)

1600 years have 0 odd days

300 years have 1 odd days

79 years contain 19 leap years + 60 non-leap years.

One leap year contains 2 odd days

One non-leap year contain 1 odd day

In 79 years, number of odd days = 19x2+60 = 98 odd days

The number of odd days from 1st January, 1980 to 15th August 1980.

Month	Jan	Feb	Mar	Apr	May	June	July	Aug
Odd days	3	1	3	2	3	2	3	1

Total number of odd days = 0 + 1 + 98 + 18 = 117

117/4= 5 odd days

5th day means Friday

Hence, 15th August 1980 falls on Friday.

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Q.6) If a particular day is Thursday, then what will be the day of the week on the day which is 2 years and 80 days from Thursday?
[a] Wednesday
[b] Tuesday
[c] Thursday
[d] cannot be determined

Solution (d)
It is not mentioned whether there is a leap year or not in the two given years. If the two years are non-leap years then the number of odd days for 2 years 80 days are
= 2 (from two years) + 3 (from 80 days) = 5 odd days
The day will be a Tuesday.
If one of the two years is a leap year then the number of odd days = 3 (from two years) + 3 (from 80 days) = 6 odd days
The day will be a Wednesday.
Hence, without knowing whether there is a leap or non-leap year, answer cac not be determined.

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Q.7) If a year starts and ends on Tuesday, then what is the day of the week on 2nd September in that year?
[a] Tuesday
[b] Monday
[c] Sunday
[d] Wednesday

Solution (b)
As the year starts and ends on the same day, the year is a non-leap year.
It is given that 31st December is a Tuesday
The number of odd from 31st December to September 2nd is

Month	Dec	Nov	Oct	Sep (excluding 2nd)
Odd days	3	2	3	0

Number of odd days = 8 i.e. 1
So, December 31st is Tuesday, 1 day before Tuesday is Monday.

Q.8) If a year starts on Saturday but does not ends on Saturday, then what is the day of the week on 13th June in that year?
[a] Monday
[b] Tuesday
[c] Sunday
[d] Saturday

Solution (b)

As the year is starting and ending on two different days, it is a leap year.

It is given that 1st January is Saturday.

The number of odd days from 1st of January to 13th June is

=2(excusing 1st of Jan) + 1 + 3 + 2 + 3 + 6

= 17 = 3 odd days.

So, the third day after Saturday is Tuesday.

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Q.9) If 17th April in a year is Monday, then what is the number of Thursday in that year?

[a] 53

[b] 52

[c] 51

[d] cannot be determined

Solution (b)

It is given that 17th April in a year is Monday.

If it is an non-leap year, then the number of odd days from 1st January to 17th April

= 2 + 0 + 3 + 3 (from 17 days) = 1

1 day before Monday is Sunday

Thus if the year starts on Sunday, whether the year is leap or non-leap it will have 52 Thursdays.

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Q.10) Which of the following years starts and ends on different days of the week?
[a] 2014
[b] 1896
[c] 1900
[d] 2100

Solution (b)
A non-leap year starts and ends with the same day of the week, while a leap year starts and ends on different days of the week.
Among the given options, 1896 is the leap year.
Hence, it starts and ends on the different days of the week