

* Calender *

Page: WALERS
Date: 5/1/2024

* Basic Concepts +

- (1) Multiple of 4 is leap year [4, 8, 12, 16 ...]
- (2) Every century year is not leap year [100, 200 ...]
- (3) 4th century year is a leap year [400, 800, 1200 ...]

Note: Century $\times 4 = 0 \Rightarrow$ leap year

Century $\times 400 = 0 \Rightarrow$ leap year

Q. Why every century year is not leap year
→

1 year is 365 days, 5 hours, 48 mins & 46 sec.

Q. How many weeks in ordinary year & leap year
→

(i) for ordinary year

→ There are 365 days and in a week there are 7 days so

$$\left\lfloor \frac{365}{7} \right\rfloor = 52 \text{ & } \underbrace{1}_{\text{remainder 1}} \text{ days}$$

(ii) for leap year

$$\left\lfloor \frac{366}{7} \right\rfloor = 52 \text{ & } \underbrace{2}_{\text{remainder 2}} \text{ days}$$

Q How many odd days in ordinary year & leap year



extra days

- in ordinary year → 1 extra day
- in leap year → 2 extra days

Q How many leap year from 1st to 500th year



$$\left\lfloor \frac{100}{4} \right\rfloor = 25$$

→ because every multiple of 4th is leap year

→ But 100 is not leap year so
 $25 - 1 = 24$

Q How many odd days from 1st to 500th year

→ As we know that

ordinary year → 1 odd day

leap year → 2 odd day

→ here 1st to 500th year we consider ordinary year

→ so it has 500 odd days

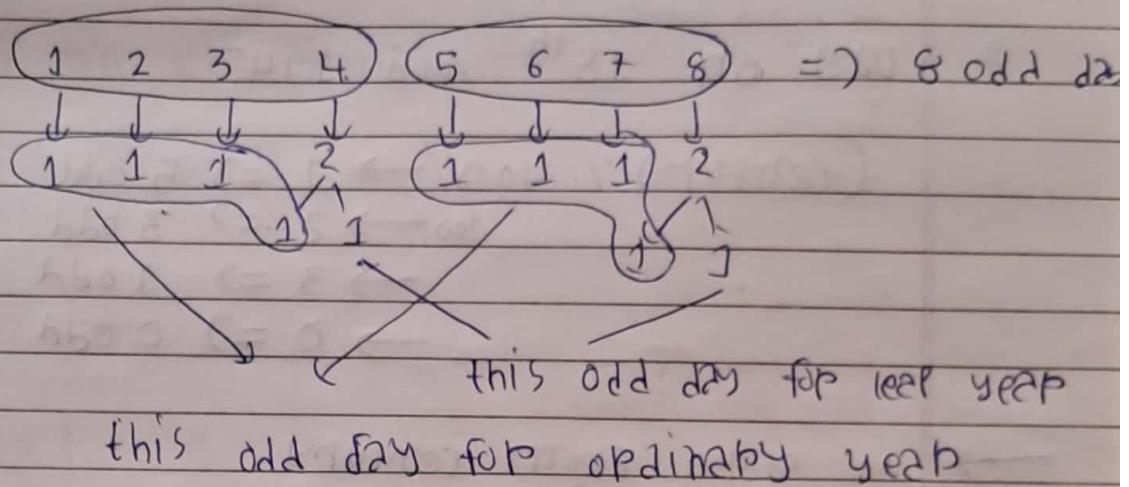
→ but as we know that 500th year has 24 leap year and leap year has 2 odd days

→ but 1 odd day has been already counted in ordinary year so now leap year has only 1 extra day

- we have 24 leap year so 24 odd days
 → so we have $10 + 21 \times 100 + 24 = 124$ odd days
 from 1st to 100th year

* simple trick *

1 to 8th year



→ So total $8 + 2 = 10$

* summary *

- extra days of years $\therefore 7 =$ odd days
 → $124 \div 7 = 5$ odd days

(1) 1st odd day will be Monday

(2) 2nd odd day will be Tuesday

(3) 3rd odd day will be Wednesday

:

(7) 7th odd day will be Sunday

100 year \rightarrow 5 odd days

200 year \rightarrow 3 odd days

300 year \rightarrow 1 odd day

400 year \rightarrow 0 odd days

\rightarrow hence 400, 800, 1200, 1600, 2000
all produce 0 odd days

Q. Day on 15th Aug 1947

(century i.e. 400) \rightarrow 1 \Rightarrow 5 odd

100 \rightarrow 2 \Rightarrow 3 odd

\rightarrow 3 \Rightarrow 1 odd

\rightarrow 0 \Rightarrow 0 odd

\rightarrow we start from century

(1900 i.e. 400) / 100 = 3 \Rightarrow 1 odd day

\rightarrow now for 47

$$\left[\begin{array}{l} 46 \\ 4 \end{array} \right] = 11$$

$$46 + 11 = 57 \text{ i.e. } 7 \Rightarrow 1 \text{ odd day}$$

$$1 + 1 = 2 \text{ odd day}$$

\rightarrow now we complete upto 1946 and we enter 1947 so we go month by month

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG
3 odd	0	3 odd	2 odd	3 odd	2 odd	3 odd	1 odd
31 i.e. 7	28 i.e. 7	31 i.e. 7	30 i.e. 7	31 i.e. 7	30 i.e. 7	31 i.e. 7	15 i.e. 7

→ now sum of all odd day include 1446 year

$$\begin{aligned} &= 3 + 3 + 2 + 3 + 2 + 3 + 1 + 2 \\ &= 19 \text{ extra days} \\ &= 14 \cdot 7 \\ &= 5 \text{ odd days Friday} \end{aligned}$$

Q. Day on 22 April 2022

→ $(2000 \div 400) / 100 = 0 \Rightarrow 0 \text{ odd day}$

→ now for 21

$$\left[\frac{21}{4} \right] = 5$$

$$21 + 5 = 26 \cdot 7 = 5 \text{ odd day}$$

Jan	Feb	Mar	Apr
3 odd	0	3 odd	1 odd

$$\begin{aligned} &= 3 + 3 + 1 + 5 \\ &= 12 \cdot 7 \\ &= 5 \text{ odd days Friday} \end{aligned}$$

① if 15th Aug 1947 was Friday then 26th Jan 1950 was

→ $(1900 \div 400) / 100 = 3 \Rightarrow 1 \text{ odd day}$

→ for 25

$$\left[\begin{array}{r} 25 \\ 4 \end{array} \right] = 5$$

$$= 25 + 5$$

$$= 30 \times 7$$

= 2 odd days

∴ 2m

5 odd

$$= 5 + 2 + 1$$

= 8 odd day Monday

* Short cut trick *

15 AUG 197 → Friday

+1 16 → Saturday

+1 17 → Sunday

+1 18 → Monday

+1 19 → Tuesday

+1 20 → Wednesday

+1 21 → Thursday

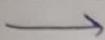
22 → Friday

→ So at 31 Aug which day

→ we add 16

→ after 14 2 cycle repeat and +2 extra
day so Sunday

Q. if 31 Aug 1947 was Sunday, 5 July 1949



for 31 Aug 1947

SEP	OCT	NOV	DEC
2 Odd	3 Odd	2 Odd	3 Odd

→ now for 1948, is a leap year so it has 2 odd day

→ for 5 July 1949

JAN	FEB	MAR	APR	MAY	JUN	JULY
3 Odd	0 Odd	3 Odd	2 Odd	3 Odd	2 Odd	5 Odd

$$= 30 \div 7$$

= 2 odd day Tuesday

* Logarithm fundamentals *

