# CALENDAR

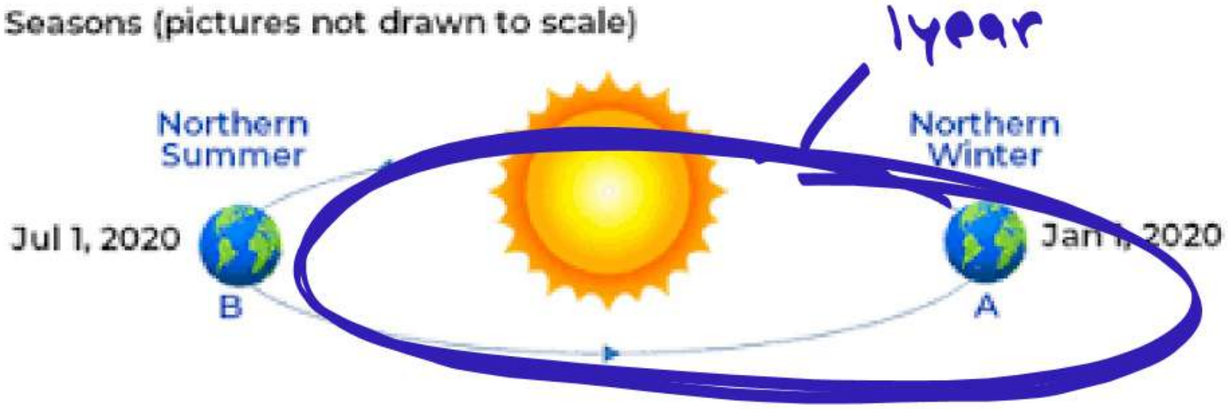
# कैलेंडर


FEBRU
7
14
21
28
15
22
29
16
23
6
13
20

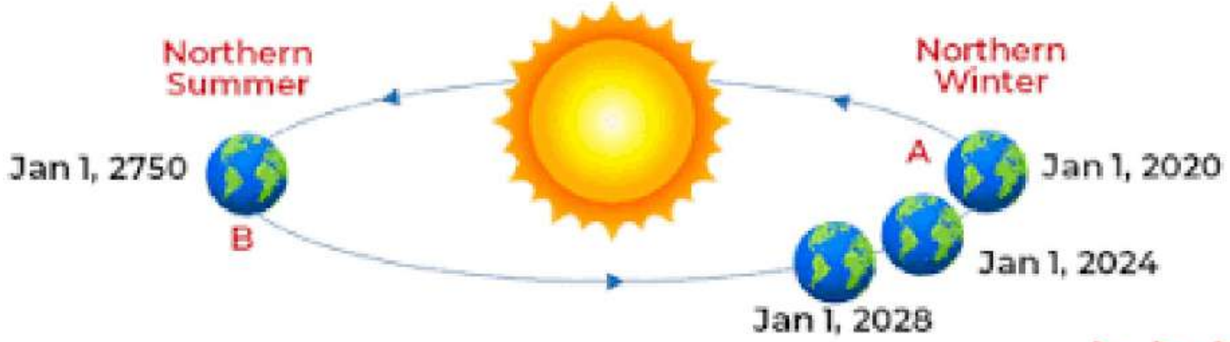
# 365 DAYS + 1 DAY = LEAP YEAR: WHY?

*Contributed by Dr Joseph B. W. Yeo and Dr Choy Ban Heng*
*NIE NTU, Singapore*

Seasons (pictures not drawn to scale)




What if there were no leap years?

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| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **1900** | 1904 | 1908 | 1912 | 1916 | 1920 | 1924 | 1928 | 1932 | 1936 |
| 1940 | 1944 | 1948 | 1952 | 1956 | 1960 | 1964 | 1968 | 1972 | 1976 |
| 1980 | 1984 | 1988 | 1992 | 1996 | 2000 | 2004 | 2008 | 2016 | **2020** |
| 2024 | 2028 | 2032 | 2036 | 2040 | 2044 | 2048 | 2052 | 2056 | 2060 |
| 2064 | 2068 | 2072 | 2076 | 2080 | 2084 | 2088 | 2092 | 2096 | **2100** |
| 2104 | 2108 | 2112 | 2116 | 2120 | 2124 | 2128 | 2132 | 2136 | 2140 |
| 2144 | 2148 | 2152 | 2156 | 2160 | 2164 | 2168 | 2172 | 2176 | 2180 |
| 2184 | 2188 | 2192 | 2196 | **2200** | 2204 | 2208 | 2212 | 2216 | 2220 |
| 2224 | 2228 | 2232 | 2236 | 2240 | 2244 | 2248 | 2252 | 2256 | 2260 |
| 2264 | 2268 | 2272 | 2276 | 2280 | 2284 | 2288 | 2292 | 2296 | **2300** |
| 2304 | 2308 | 2312 | 2316 | 2320 | 2324 | 2328 | 2332 | 2336 | 2340 |
| 2344 | 2348 | 2352 | 2356 | 2360 | 2364 | 2368 | 2372 | 2376 | 2380 |
| 2384 | 2388 | 2392 | 2396 | 2400 | 2404 | 2408 | 2412 | 2416 | 2420 |
| 2424 | 2428 | 2432 | 2436 | 2440 | 2444 | 2448 | 2452 | 2456 | 2460 |
| 2464 | 2468 | 2472 | 2476 | 2480 | 2484 | 2488 | 2492 | 2496 | **2500** |
| 2504 | 2508 | 2512 | 2516 | 2520 | 2524 | 2528 | 2532 | 2536 | 2540 |
| 2544 | 2548 | 2552 | 2556 | 2560 | 2564 | 2568 | 2572 | 2576 | 2580 |
| 2584 | 2588 | 2592 | 2596 | **2600** | 2604 | 2608 | 2612 | 2616 | 2620 |
| 2624 | 2628 | 2632 | 2636 | 2640 | 2644 | 2648 | 2652 | 2656 | 2660 |
| 2664 | 2668 | 2672 | 2676 | 2680 | 2684 | 2688 | 2692 | 2696 | **2700** |
| 2704 | 2708 | 2712 | 2716 | 2720 | 2724 | 2728 | 2732 | 2736 | 2740 |
| 2744 | 2748 | 2752 | 2756 | 2760 | 2764 | 2768 | 2772 | 2776 | 2780 |
| 2784 | 2788 | 2792 | 2796 | 2800 | 2804 | 2808 | 2812 | 2816 | 2820 |
| 2824 | 2828 | 2832 | 2836 | 2840 | 2844 | 2848 | 2852 | 2856 | 2860 |
| 2864 | 2868 | 2872 | 2876 | 2880 | 2884 | 2888 | 2892 | 2896 | **2900** |
| 2904 | 2908 | 2912 | 2916 | 2920 | 2924 | 2928 | 2932 | 2936 | 2940 |
| 2944 | 2948 | 2952 | 2956 | 2960 | 2964 | 2968 | 2972 | 2976 | 2980 |
| 2984 | 2988 | 2992 | 2996 | **3000** | | | | | |

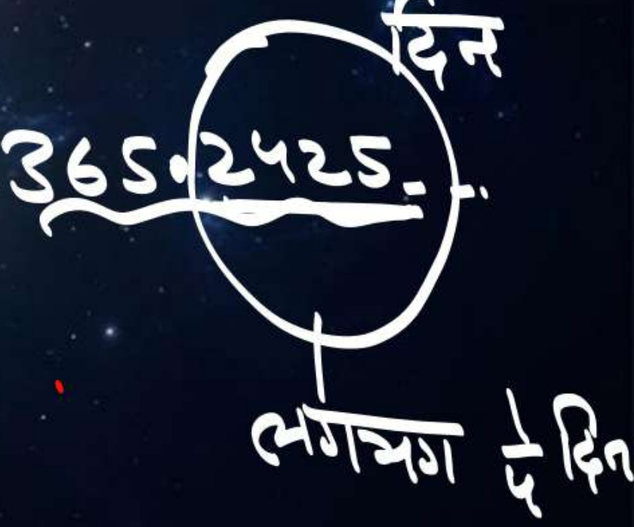
**The years 1900, 2100, 2200, 2300, 2500, 2600, 2700, 2900 and 3000 are not leap years.**


FEBRUARY
S M T W T F S
1
2 3 4 5 6 7 8
9 10 11 12 13 14 15
16 17 18 19 20 21 22
24 25 26 27 28 29
1 8 9 10 15 16 17 18 19
22 23 24 25 29 30 31
SEPTEM
S M

# WHAT'S A LEAP YEAR?

# The Cosmic Puzzle

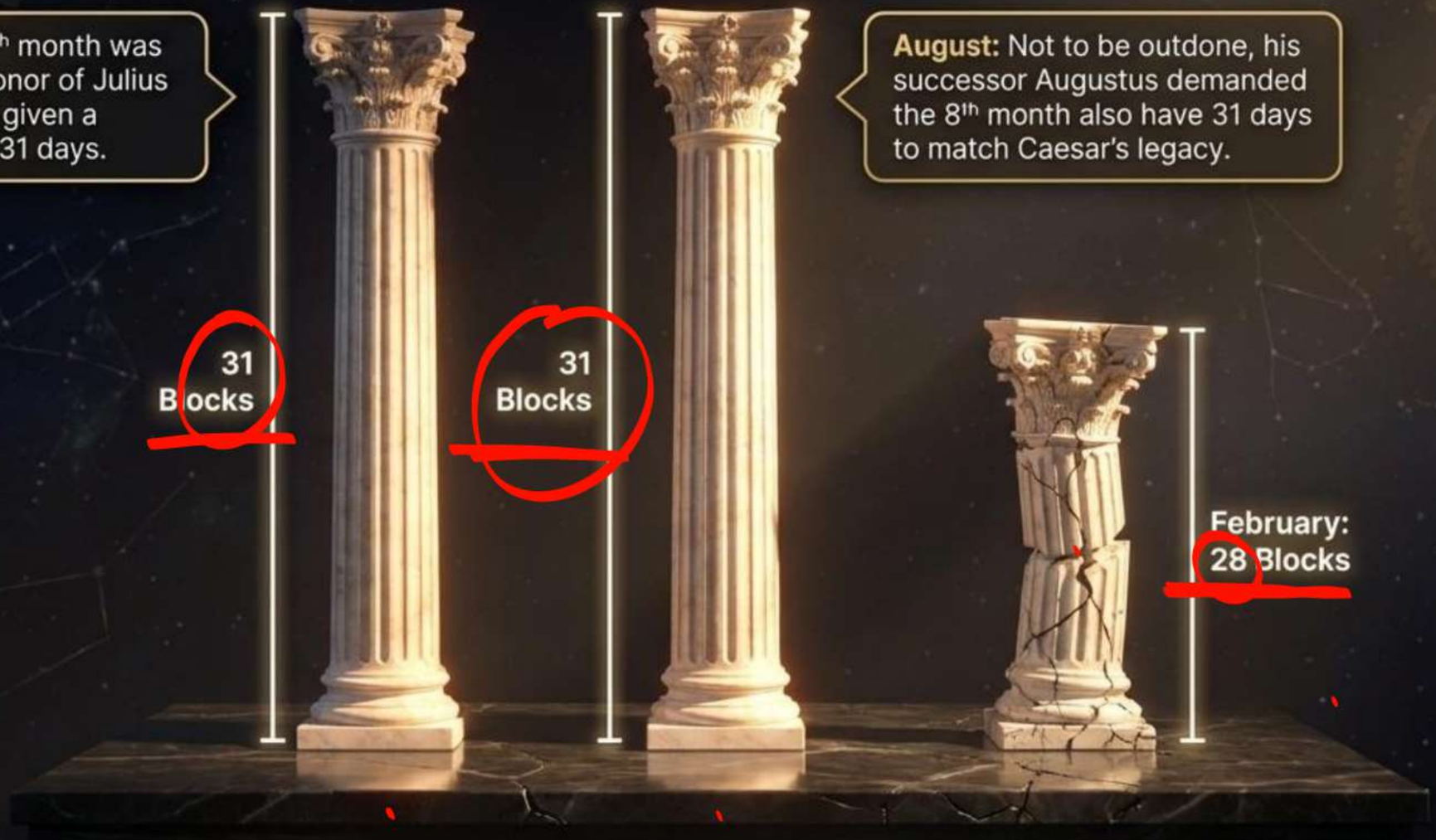
How Earth's movements, ancient astronomy, and imperial egos forged the modern calendar.



# The Ego of Emperors

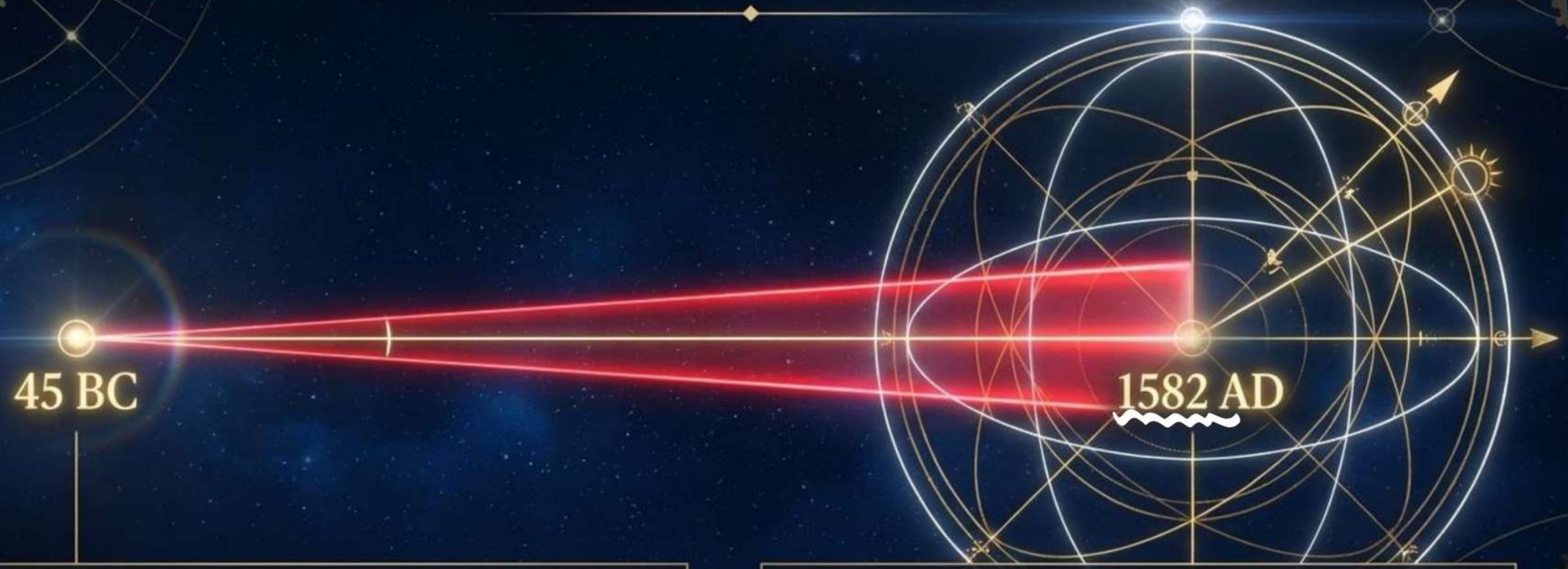
**July:** The 7th month was named in honor of Julius Caesar and given a prestigious 31 days.

**August:** Not to be outdone, his successor Augustus demanded the 8th month also have 31 days to match Caesar's legacy.



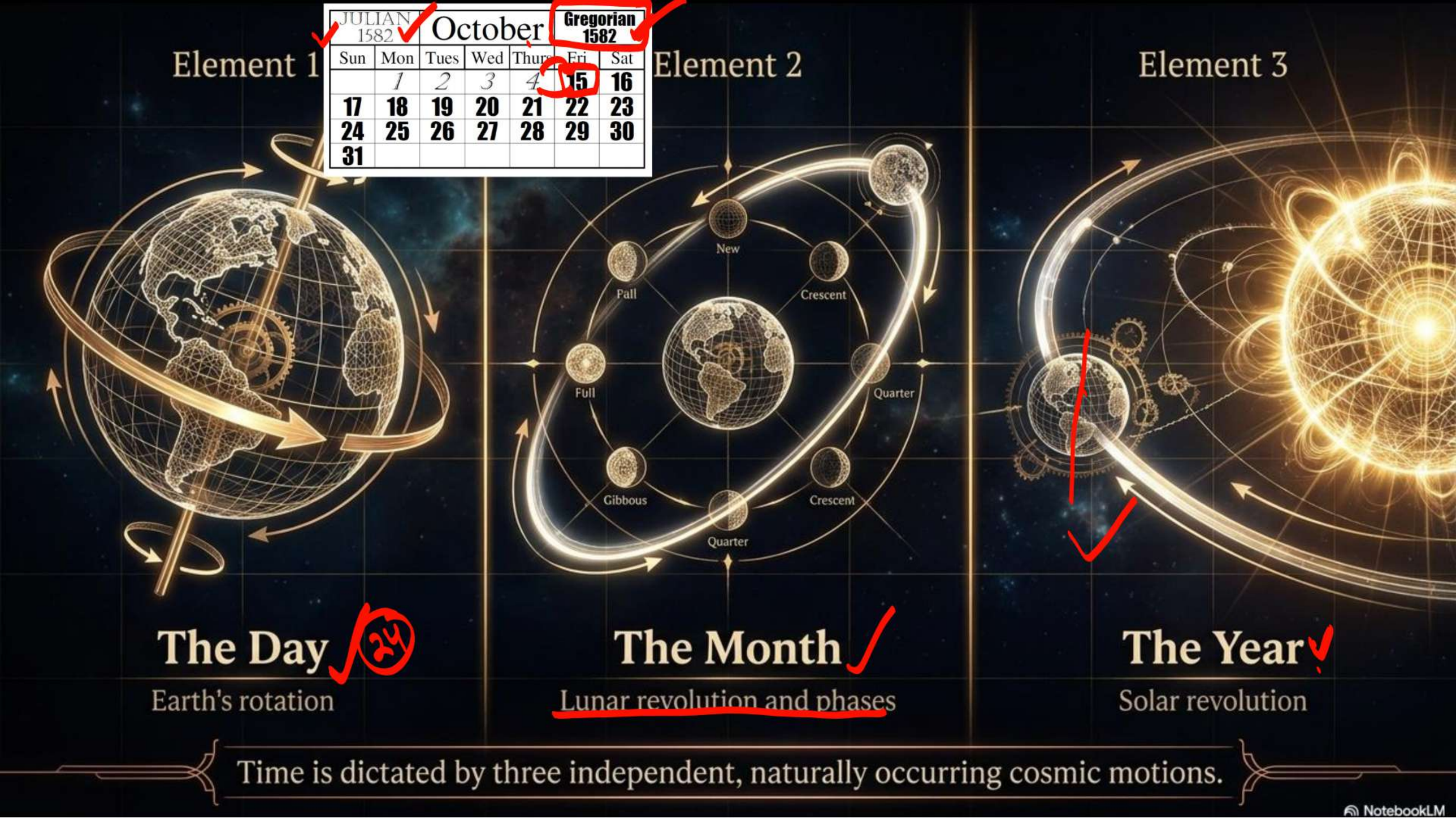

To accommodate imperial egos and make the 365-day math work, days were systematically stolen from February, leaving it permanently stunted.

# The Gregorian Fix: The 11-Minute Problem




Caesar's 365.25-day year was off by just 11 minutes annually. Over 1,600 years, this microscopic error compounded, causing the calendar to drift by 10 full days. Spring was arriving in early March.

In 1582, Pope Gregory XIII skipped 10 days instantly to reset the cosmos. He introduced the modern leap-year rule (skipping leap years on most century marks) to keep the calendar accurate to 1 day in 3,300 years.


JULIAN 1582
October
Gregorian 1582
Sun Mon Tues Wed Thurs Fri Sat
1 2 3 4 15 16
17 18 19 20 21 22 23
24 25 26 27 28 29 30
31
Element 1
Element 2
Element 3
New
Crescent
Quarter
Crescent
Quarter
Gibbous
Full
Pall
The Day
Earth's rotation
The Month
Lunar revolution and phases
The Year
Solar revolution
Time is dictated by three independent, naturally occurring cosmic motions.

# The 7-Day Week: A Human Invention

Sun → Sunday

Moon → Monday

Mars (Tiw) → Tuesday

Mercury (Woden) → Wednesday

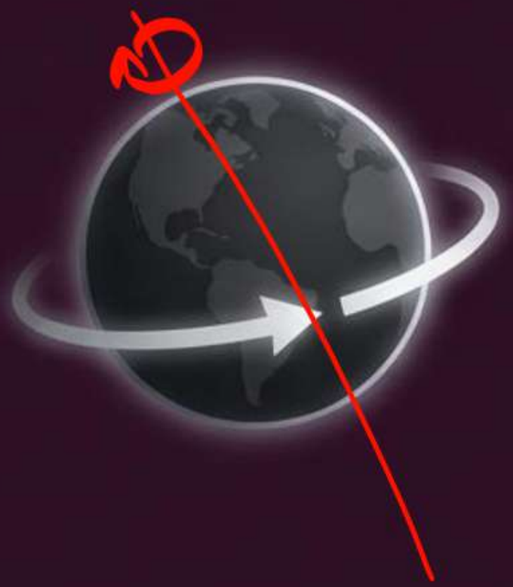
Jupiter (Thor) → Thursday

Venus (Frige) → Friday

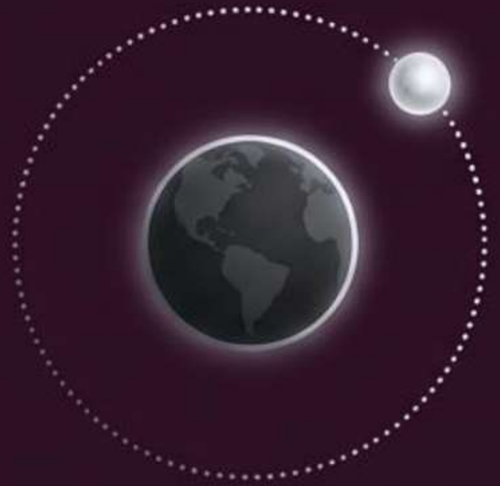
Saturn → Saturday

Unlike days, months, and years—which are driven by actual planetary physics—the continuous 7-day week is an artificial loop rooted in ancient astrological and planetary hours systems.

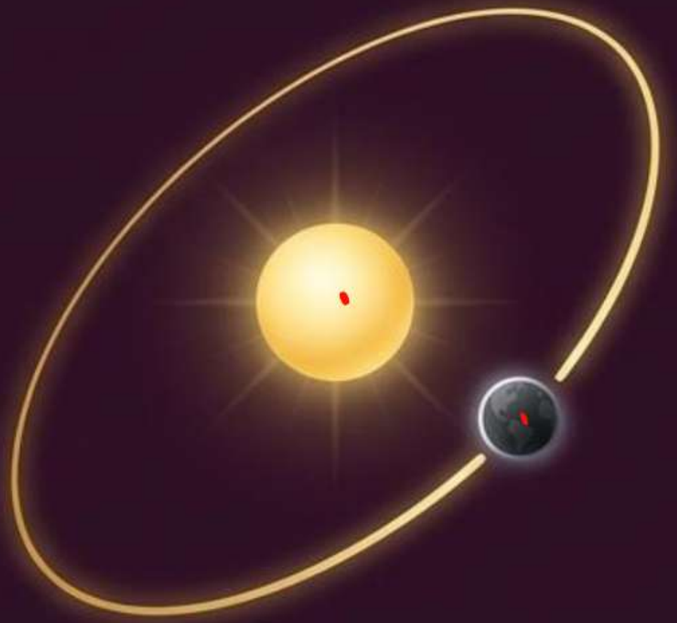
# Three natural rhythms dictate human time



The Day



The Month



The Year



A day is one full rotation of the Earth on its axis.

A month was originally based on the Moon's cycle of phases, taking roughly 29.5 days.


365 Day 5Hr 48min
A year is the time it takes the Earth to complete one full orbit around the Sun, roughly 365.24 days.
NotebookLM

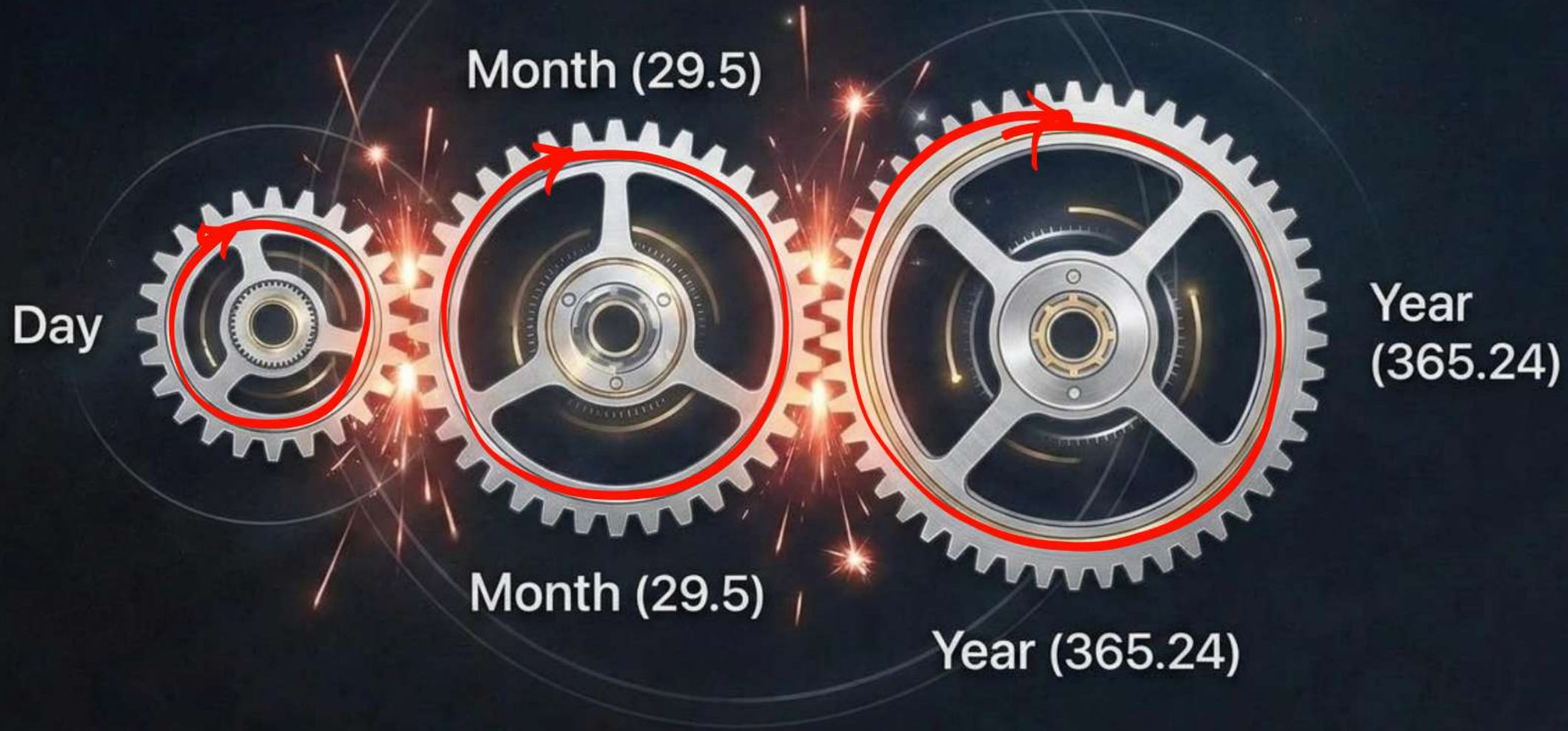
# The challenge of the calendar: Nature's numbers do not divide evenly.

1 Year = **365.24** Days

1 Lunar Cycle = **29.5** Days

12 Lunar Cycles = **354** Days (leaving an 11-day gap)

# Three celestial gears that refuse to lock smoothly.



| JULIAN 1582 ✔ | | October | | | Gregorian 1582 +3300 4882 | |
|---|---|---|---|---|---|---|
| Sun | Mon | Tues | Wed | Thurs | Fri | Sat |
| | 1 | 2 | 3 | 4 | 15 | 16 |
| 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| 31 | | | | | 3300 → 1 दिन | |

# Basic Classification of Months

**1 Year = 12 Months**

## 7 Months → 31 Days

- January
- March
- May
- July
- August
- October
- December

## 4 Months → 30 Days

- April
- June
- September
- November

## 1 Month → February

| Normal Year | Leap Year |
| --- | --- |
| 28 Days | 29 Days |

# Leap Year vs Normal Year

असाधारण

LEAP YEAR (लीप वर्ष)

- February = 29 Days
- Total Days = 366 = 52 W + 2 Day
- Non-century year → Divisible by 4

(ऐसे वर्ष जिसमें 4 का भाग जाता)

शताब्दी वर्ष

- Century year → Divisible by 400

Examples: 1600, 2000

अलीप

NORMAL YEAR (साधारण वर्ष)

- February = 28 Days
- Total Days = 365 = 52 Week + 1 Day
- Not divisible by 4
- Century year not divisible by 400

Examples: 1700, 1800, 1900

# Leap & Aleap

1972 ✓ L

2100 ÷400 ✗

2021 ✗

1963 ✗

1983 ✗

2000 ÷400 ✓ L

1992 ✓

1979 ✗

1999 ✗

1622 ✗

2009 ✗

2004 ✓ L

2016 ✓ L

1900 ÷400 ✗

2007 ✗

2001 ✗

1600 ÷400 ✓ L

1700 ÷400 ✗

1812 ✓ L

2413 ✗

2500 ÷400 ✗

## 4 की भाजकता :

**divisibility :→** if Last digits of a Number are divisible by 4, then the Number is divisible by 4.

आखिरी दो अंक से यदि 4 का भाग जायेगा तो पूरी संख्या भी 4 से विभाजित होगी।

16179473216 ✓

# LEAP YEAR

366 Day

29 feb ✓

सप्ताह

$\frac{366}{7}$ = 52 Weeks ✓ 2 Day ✓

# वर्ष Year

**LEAP लीप**

366

29 feb

**52 W = 364 दिन**

W = Week = सप्ताह

**ALEAP**

365

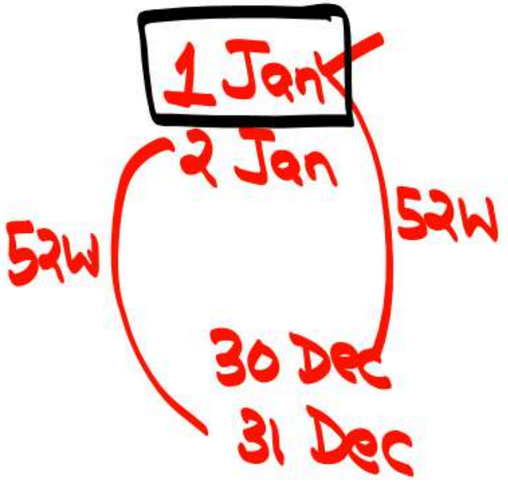
28 feb

$\frac{366}{7} = 52W + 2\ Day$

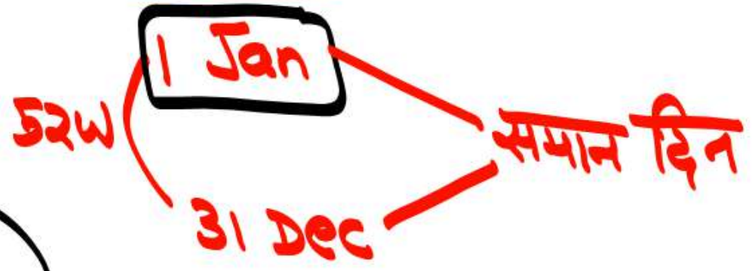
$\frac{365}{7} = 52 + 1\ Day$

2 दिन आपिमतस 53 बार आयेगों

1 दिन 53 बार आयेगा




1 Jan का दिन → 53 बार आना हैं



# Months महिने

12 महिने

- 7 महिने — 31 दिन
- 4 महिने — 30 दिन
- 1 महिना — 28 ✓ / 29 → $\frac{29}{7}$ = 4W + 1D

| | |
|---|---|
| Jan | 31 |
| feb | 28/29 |
| Mar | 31 |
| April | 30 |
| May | 31 |
| June | 30 |
| July | 31 |
| Aug | 31 |
| Sep | 30 |
| Oct | 31 |
| Nov | 30 |
| Dec | 31 |

| S | M | T | W | Th | F | Sat |
|---|---|---|---|---|---|---|
| | | | 1 | 2 | 3 | 4 |
| 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 26 | 27 | 28 | 29 | 30 | 31 | |

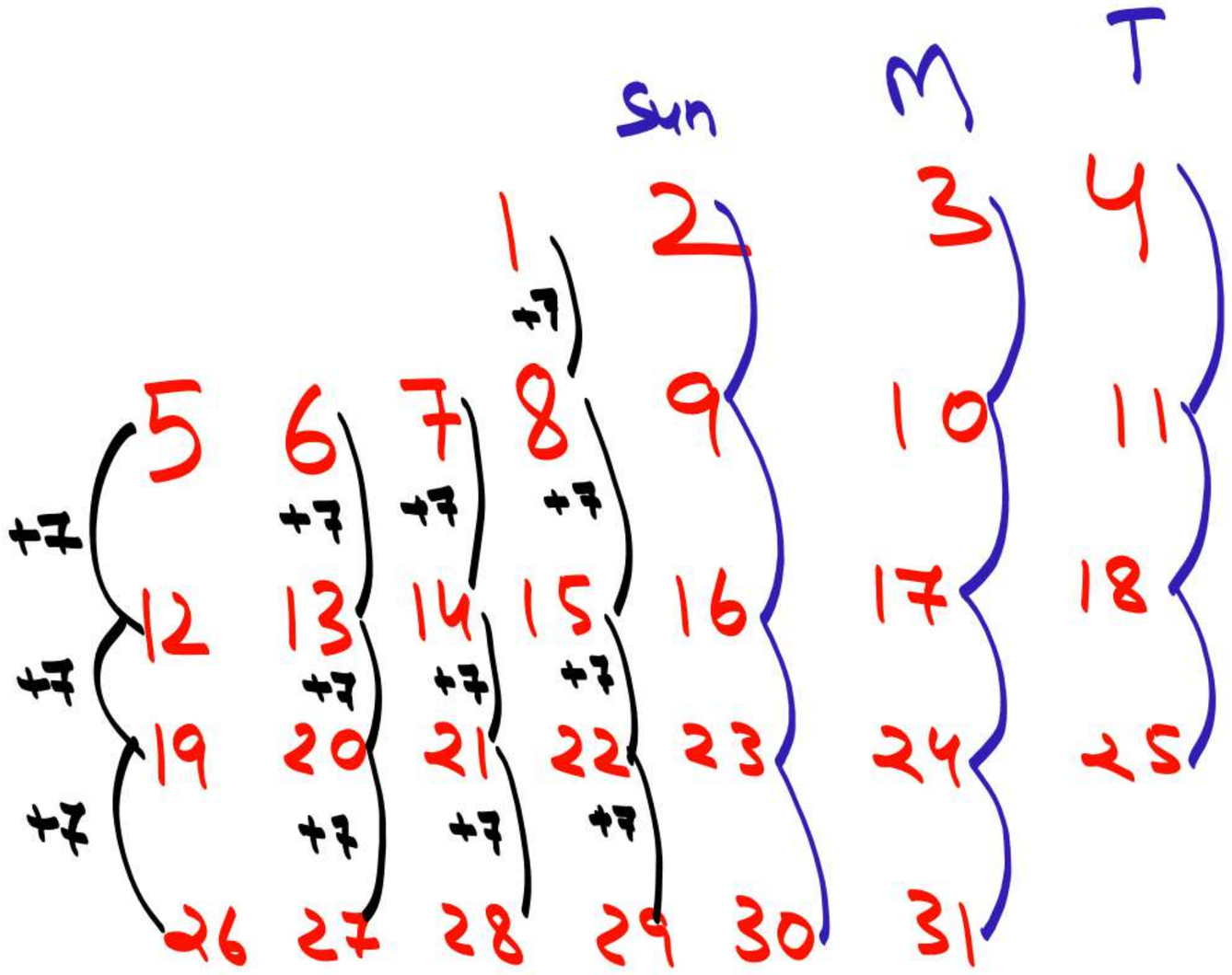
$\frac{31}{7}$ = 4W + 3D ✓✓

| S | M | T | W | Th | F | Sat |
|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| 21 | 22 | 23 | 24 | 25 | 26 | 27 |
| 28 | 29 | 30 | | | | |

$\frac{30}{7}$ = 4W + 2D

| S | M | T | W | Th | F | S |
|---|---|---|---|---|---|---|
| | | | | | | 1 |
| 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| 16 | 17 | 18 | 19 | 20 | 21 | 22 |
| 23 | 24 | 25 | 26 | 27 | 28 | |

$\frac{28}{7}$ = 4W




समांतर श्रेणी (A.P)

$d = 7$

3 = Wed

10

17

24

31