

Calendars through remainders modulo seven

Month lengths, leap-year tests, odd-day shifts and calendar repetition

• Calendar Remainder Method

01

1. Check Month Lengths and Leap Years

- April, June, September and November have 30 days; January, March and July have 31 days.
- February has 28 days in an ordinary year (0 odd days) and 29 in a leap year (1 odd day).
- A non-century year is leap if divisible by 4; century years are leap only if divisible by 400.



02

2. Count Elapsed Days Between Dates

- Exclude the starting date and include the target date when counting elapsed days in a span.
- You may reduce each month modulo 7 first: $21 \equiv 0$, $30 \equiv 2$, $23 \equiv 2$, giving $0 + 2 + 2 = 4$.
- From 10 Oct to 23 Dec 2023: Oct gives $31 - 10 = 21$ days, Nov 30, and Dec 23 (total 74 days).



03

3. Shift the Weekday Modulo 7

- Divide elapsed days by 7; the remainder is the net weekday shift ($74 = 10 \times 7 + 4$ gives 4).
- An ordinary year (365 days) shifts the calendar by 1 weekday; a leap year (366 days) by 2.
- Move forward for a later date and backward for an earlier date: Tuesday + 4 days = Saturday.



04

4. Match Whole-Year Calendars

- Two years share an identical calendar only if 1 Jan falls on the same weekday and both match in leap status.
- Do not apply a 28-year rule blindly across non-leap century years like 1900 or 2100.
- From 2016 to 2044 (28 years, 7 leap years), shift is $28 + 7 = 35 \equiv 0 \pmod{7}$; both are leap.

REMEMBER Convert day counts modulo 7, and for identical calendars verify both a zero weekday shift and matching leap-year status.