Leap Year

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Why in News?

In 2024, February 29th marks Leap Day, an additional day added to the calendar during leap years. This extra day, known as Leap Year Day, extends the year to a total of 366 days.

What is a leap year?

- **Leap Year:**
  - A leap year has **366 days** in a year as opposed to the regular 365 days. The extra day is added to February, the shortest month of the year, as February 29.
  - A solar calendar signifies one complete orbit of the Earth around the Sun. The Earth's orbit takes about **365 days, 5 hours, 48 minutes, and 46 seconds** to simplify, a regular year is rounded to 365 days.
    - To account for the extra time, **rounded up to six hours, 24 hours (one full day)** are added to every fourth year.
  - Without leap years, the **calendar would become out of sync with the seasons** over time.
    - The extra day keeps calendars and seasons from gradually falling out of sync and **impacting harvesting, planting and other cycles based on the seasons.**
- **Evolution of Leap Years:**
  - The Julian calendar's approximation of the solar year led to accumulating errors over time, primarily due to a slight overcompensation.
  - By the 16th century, the calendar was approximately **10 days ahead of the solar year, prompting the need for reform.**
  - Pope Gregory XIII initiated calendar reform in 1582, removing ten days to realign the calendar with the solar year.
  - To prevent future errors, the Gregorian calendar introduced a refined leap year rule, **omitting three leap years every 400 years.**
- **Math of Leap Year:**
  - Leap years are always **multiples of four like 2016, 2020, 2024**, but a year that is a multiple of four is not always a leap year.
  - The Gregorian leap year rule states that the **year number must be divisible by four,** except for **end-of-century years (ending in '00'), which must be divisible by 400.**
    - This means that the year **2000 was a leap year, although 1900 was not.** 2024, 2028, 2032 and 2036 are all leap years.
  - This extra rule is needed because **adding a leap day every four years actually overcompensates for the slight difference** in the solar year. It turns out that adding a leap day every four years adds a little too much time, about 44 minutes more than necessary.
    - So, by skipping leap years for **centuries that aren't divisible by 400,** we fine-tune the calendar to stay even closer to the actual solar year and keep the seasons in check.