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Leap Years

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Leap Years

The Rule:

According to the **Gregorian calendar**, which is the civil calendar in use today, years evenly divisible by 4 are leap years, with the exception of centurial years that are not evenly divisible by 400. Therefore, the years 1700, 1800, 1900 and 2100 are not leap years, but 1600, 2000, and 2400 are leap years.

Background:

The Gregorian calendar year is intended to be of the same length as the cycle of the seasons. However, the cycle of the seasons, technically known as the **tropical year**, is approximately 365.2422 days. Since a calendar year consists of an integral number of whole days, a calendar year cannot exactly match the tropical year. If the calendar year always consisted of 365 days, it would be short of the tropical year by about 0.2422 days every year. Over a century, the calendar and the seasons would depart by about 24 days, so that the beginning of Spring in the northern hemisphere would shift from March 20 to April 13.

To synchronize the calendar and tropical years, leap days are periodically added to the calendar, forming leap years. If a leap day is added every fourth year, the average length of the calendar year is 365.25 days. This was the basis of the **Julian calendar**, introduced by Julius Caesar in 46 B.C. In this case the calendar year is longer than the tropical year by about 0.0078 days. Over a century this difference accumulates to a little over three quarters of a day. From the time of Julius Caesar to the sixteenth century A.D., the beginning of Spring shifted from March 23 to March 11.

When Pope Gregory XIII instituted the Gregorian calendar in 1582, the calendar was shifted to make the beginning of Spring fall on March 21 and a new system of leap days was introduced. Instead of intercalating a leap day every fourth year, 97 leap days would be introduced every 400 years, according to the rule given above. Thus, the average Gregorian calendar year is 365.2425 days in length. This agrees to within a half a minute of the length of the tropical year. It will take about 3300 years before the Gregorian calendar is as much as one day out of step with the seasons.

USNO Master Clock Time

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The Sky This Week

The Sky This Week,
2011 October 4 - 11

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