Introducing the Symmetry454 Calendar

A simple perpetual solar calendar that is symmetrical across and between equal quarters, having $4+5+4$ weeks per quarter, yet conserves the traditional 7-day week.

Home Page on the Web:
<http://individual.utoronto.ca/kalendis/symmetry.htm>

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Overview of the Symmetry454 Calendar

<http://individual.utoronto.ca/kalendis/symmetry.htm>

<table>
<thead>
<tr>
<th>Days</th>
<th>Weeks per Month</th>
<th>Weeks</th>
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<tbody>
<tr>
<td>91↑</td>
<td>Monday January</td>
<td>13</td>
</tr>
<tr>
<td>+91↑</td>
<td>Monday February</td>
<td>+13</td>
</tr>
<tr>
<td>+91↑</td>
<td>Monday March</td>
<td>+13</td>
</tr>
<tr>
<td>+91↑</td>
<td>Monday April</td>
<td>+13</td>
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<td></td>
<td>Monday May</td>
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<td>Monday June</td>
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<td>Monday July</td>
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<td>Monday August</td>
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<td>Monday November</td>
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<td></td>
<td>Monday December</td>
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</tbody>
</table>

= 364 ← Total in Non-Leap Years → = 52

+7↑ In a Leap Year append a Leap Week to December.

Leap years occur at symmetrically arranged intervals of 6 or 5 years.

= 371 ← Total in Leap Years → = 53
Symmetry454 Calendar — 3 by 4 design

Note: denotes the Mid-Quarter Day

In a Leap Year, append a Leap Week to December, making it a 5-week month. Leap years occur at symmetrically arranged intervals of 6 or 5 years.
In a Leap Year, append a Leap Week to December, making it a 5-week month. Leap years occur at symmetrically arranged intervals of 6 or 5 years.
The Symmetry454 calendar is perpetual — a permanent copy can be reused every year.

It conserves the 7-day week (no intercalary or “null” or leap days outside of the traditional 7-day weekly cycle).

Its symmetrical structure paves the way to simpler, aesthetically pleasing calendar designs.

Its superior symmetrical leap rule ensures excellent long-term astronomical accuracy:

- The simple fixed arithmetic 52/293 leap rule has 52 leap years that are automatically and inherently symmetrically spread as smoothly as possible within each repeating cycle of 293 years:
- It is a leap year only if the remainder of (52 × Year + 146) / 293 is less than 52.
- With this simple single-step leap rule, leap year intervals occur in groups of either 6 + 6 + 5 = 17 years or 6 + 5 = 11 years, which symmetrically group into sub-cycles of 17 + 17 = 45 years or sub-cycles of 17 + 17 + 11 + 17 + 17 = 79 years. In each full calendar cycle these sub-cycles inherently occur symmetrically in the sequence 45 + 79 + 45 + 79 + 45 = 293 years.
- With 52 leap weeks in the cycle, and 52 weeks in a regular year, the fixed cycle length equals exactly 294 regular years, and the average interval between leap weeks is exactly 294 weeks.
- The calendar mean year = 365 + 71/293 days = 365d 5h 48m 56+152/293s, which is intentionally slightly shorter than the present era northward equinoctial mean year of 365d 5h 49m 0s, ensuring essentially drift-free performance for more than 4 future millennia.
- Due to the symmetrical arrangement of leap years, the timing of the mean northward equinox moment always falls at the cycle average in the first year of every 293-year cycle. This feature simplifies astronomical performance evaluations.

Every Symmetry454 year, quarter, month and week starts on Monday and ends on Sunday.

Every day number within each Symmetry454 month is always on the same weekday in every month.

Weekday = DayInMonth MOD 7, where Sunday=0, Monday=1, Tuesday=2, etc.

Monthly meetings on a fixed weekday are always on the same day number in every month, simplifying scheduling, for example the 3rd Thursday is always the 18th day of every month.

Its symmetrical 13-week quarters are identical. Every quarter has the same count of weekdays and weekend days.

Every date has permanently fixed week-in-year and day-in-year ordinal numbers, facilitating administrative, academic, commercial and industrial applications, and simplifying calendrical arithmetic.

There is always a whole number of weeks in every year (common year = 52 weeks, leap year = 53 weeks), in every quarter (13 weeks, leap year last quarter = 14 weeks), and in every month (short = 4, long = 5 weeks).

Every secular holiday, event, anniversary, birthday, and memorial day has a permanently fixed weekday and date, because the calendar is perpetual.

Holiday and/or special day overlaps are less likely to occur and are easy to predict and avoid.

Sunday, April 7th is proposed as a permanently fixed Symmetry454 date for Easter, based on the median date of the Sunday after the day of the astronomical lunar opposition that is on or after the day of the astronomical northward equinox, calculated for the meridian of Jerusalem.

- Fixing Easter also fixes all Easter-related ecclesiastical calendar dates (counted before or after Easter).

The first 4 weeks of every Symmetry454 month are identical.

Note: It is likely that some regular monthly payments will become two-tiered, with 25% more payable for long months. For monthly comparisons increase short month statistics by 25% to match long months, or reduce the long month statistics by 20%.

The coherent structure of the calendar enables simple arithmetic expressions in calculating the following for statistical or business purposes: weekday; day number of year, quarter or month; week number of year, quarter or month; month number of year or quarter.

Symmetry454 calendar arithmetic is in the public domain, allowing royalty-free computer implementation.

The freeware Kalendis computer program demonstrates the calendar and inter-converts dates, and is freely available at <http://individual.utoronto.ca/kalendis/kalendis.htm>.

“Friday the 13th” never happens.