

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>>

4:5:4 Weeks per Month

Days	4 ↓	5 ↓	4 ↓	Weeks
91 →	Monday January	Monday February	Monday March	← 13
+91 →	Monday April	Monday May	Monday June	← +13
+91 →	Monday July	Monday August	Monday September	← +13
+91 →	Monday October	Monday November	Monday December	← +13
= 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.			← +1
= 371	← Total in Leap Years →			= 53

Symmetry454 Calendar — 3 by 4 design

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

Note: **18** denotes the Mid-Quarter Day

January

week	Mon	Tue	Wed	Thu	Fri	Sat	Sun
1	1	2	3	4	5	6	7
2	8	9	10	11	12	13	14
3	15	16	17	18	19	20	21
4	22	23	24	25	26	27	28

February

week	Mon	Tue	Wed	Thu	Fri	Sat	Sun
5	1	2	3	4	5	6	7
6	8	9	10	11	12	13	14
7	15	16	17	18	19	20	21
8	22	23	24	25	26	27	28
9	29	30	31	32	33	34	35

March

week	Mon	Tue	Wed	Thu	Fri	Sat	Sun
10	1	2	3	4	5	6	7
11	8	9	10	11	12	13	14
12	15	16	17	18	19	20	21
13	22	23	24	25	26	27	28

April

week	Mon	Tue	Wed	Thu	Fri	Sat	Sun
14	1	2	3	4	5	6	7
15	8	9	10	11	12	13	14
16	15	16	17	18	19	20	21
17	22	23	24	25	26	27	28

May

week	Mon	Tue	Wed	Thu	Fri	Sat	Sun
18	1	2	3	4	5	6	7
19	8	9	10	11	12	13	14
20	15	16	17	18	19	20	21
21	22	23	24	25	26	27	28
22	29	30	31	32	33	34	35

June

week	Mon	Tue	Wed	Thu	Fri	Sat	Sun
23	1	2	3	4	5	6	7
24	8	9	10	11	12	13	14
25	15	16	17	18	19	20	21
26	22	23	24	25	26	27	28

July

week	Mon	Tue	Wed	Thu	Fri	Sat	Sun
27	1	2	3	4	5	6	7
28	8	9	10	11	12	13	14
29	15	16	17	18	19	20	21
30	22	23	24	25	26	27	28

August

week	Mon	Tue	Wed	Thu	Fri	Sat	Sun
31	1	2	3	4	5	6	7
32	8	9	10	11	12	13	14
33	15	16	17	18	19	20	21
34	22	23	24	25	26	27	28
35	29	30	31	32	33	34	35

September

week	Mon	Tue	Wed	Thu	Fri	Sat	Sun
36	1	2	3	4	5	6	7
37	8	9	10	11	12	13	14
38	15	16	17	18	19	20	21
39	22	23	24	25	26	27	28

October

week	Mon	Tue	Wed	Thu	Fri	Sat	Sun
40	1	2	3	4	5	6	7
41	8	9	10	11	12	13	14
42	15	16	17	18	19	20	21
43	22	23	24	25	26	27	28

November

week	Mon	Tue	Wed	Thu	Fri	Sat	Sun
44	1	2	3	4	5	6	7
45	8	9	10	11	12	13	14
46	15	16	17	18	19	20	21
47	22	23	24	25	26	27	28
48	29	30	31	32	33	34	35

December

week	Mon	Tue	Wed	Thu	Fri	Sat	Sun
49	1	2	3	4	5	6	7
50	8	9	10	11	12	13	14
51	15	16	17	18	19	20	21
52	22	23	24	25	26	27	28
53	29	30	31	32	33	34	35

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.

Symmetry454 Calendar

quad "stack" design, ordinal day numbers

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

Note: **18** denotes the Mid-Quarter Day

week	Mon	Tue	Wed	Thu	Fri	Sat	Sun
January	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
February	29	30	31	32	33	34	35
	8	9	10	11	12	13	14
	15	16	17	18	19	20	21
	22	23	24	25	26	27	28
	29	30	31	32	33	34	35
March	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

week	Mon	Tue	Wed	Thu	Fri	Sat	Sun
July	27	28	29	30	31	32	33
	34	35	36	37	38	39	40
	41	42	43	44	45	46	47
	48	49	50	51	52	53	54
August	55	56	57	58	59	60	61
	62	63	64	65	66	67	68
	69	70	71	72	73	74	75
	76	77	78	79	80	81	82
	83	84	85	86	87	88	89
September	90	91	92	93	94	95	96
	97	98	99	100	101	102	103
	104	105	106	107	108	109	110
	111	112	113	114	115	116	117

week	Mon	Tue	Wed	Thu	Fri	Sat	Sun
April	14	15	16	17	18	19	20
	21	22	23	24	25	26	27
	28	29	30	31	32	33	34
	35	36	37	38	39	40	41
May	42	43	44	45	46	47	48
	49	50	51	52	53	54	55
	56	57	58	59	60	61	62
	63	64	65	66	67	68	69
	70	71	72	73	74	75	76
June	77	78	79	80	81	82	83
	84	85	86	87	88	89	90
	91	92	93	94	95	96	97
	98	99	100	101	102	103	104

week	Mon	Tue	Wed	Thu	Fri	Sat	Sun
October	40	41	42	43	44	45	46
	47	48	49	50	51	52	53
	54	55	56	57	58	59	60
	61	62	63	64	65	66	67
November	68	69	70	71	72	73	74
	75	76	77	78	79	80	81
	82	83	84	85	86	87	88
	89	90	91	92	93	94	95
	96	97	98	99	100	101	102
December	103	104	105	106	107	108	109
	110	111	112	113	114	115	116
	117	118	119	120	121	122	123
	124	125	126	127	128	129	130

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.

365	366	367	368	369	370	371	
53	29	30	31	32	33	34	35

Symmetry454 Calendar Benefits <<http://individual.utoronto.ca/kalendis/symmetry.htm>>

- The Symmetry454 calendar is perpetual — a permanent copy can be reused every year.
- It conserves the 7-day week (no intercalated 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 $(52 \times \text{Year} + 146) / 293$ 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 $17 + 11 + 17 = 45$ 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 $\equiv 365 + \frac{71}{293}$ days $\equiv 365\text{d } 5\text{h } 48\text{m } 56 + \frac{152}{293}\text{s}$, 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.**
- $\text{Weekday} = \text{DayInMonth} \text{ MOD } 7$, 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).
 - See “**Appendix: A Declaration of the Second Ecumenical Council of the Vatican on Revision of the Calendar**” at the end of the archive “[Constitution on the sacred liturgy Sacrosanctum Concilium solemnly promulgated by His Holiness Pope Paul VI on December 4, 1963](http://www.vatican.va/archive/hist_councils/ii_vatican_council/documents/vat-ii_const_19631204_sacrosanctum-concilium_en.html)” at <http://www.vatican.va/archive/hist_councils/ii_vatican_council/documents/vat-ii_const_19631204_sacrosanctum-concilium_en.html>.
- 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.