

CANADA LENGTH OF DAY

Produced by the Geographical Services Division, Surveys and Mapping Branch, Energy, Mines and Resources Canada. Printed 1987.

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Des exemplaires de cette carte sont disponibles en français. Précisez MCR 4068F.

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Scale 1:12 500 000 or 1 centimetre represents 125 kilometres
125 0 125 250 375 500
Kilometres

Lambert Conformal Conic Projection, Standard Parallels 49°N and 77°N.
Modified Polyconic Projection, North of Latitude 80°.

Length of Day: The period of time between sunrise and the following sunset (McIntosh, 1972).
The longest and shortest days of the year are defined by the solstices (the times at which the position of the sun is farthest north and farthest south of the equator). Although the dates of June 21 and December 21 are given as the longest and shortest days respectively, the exact dates may vary between June 20-22 and December 20-22. This variation is caused by the 0.2422 day difference between the calendar year and the tropical year. The accumulated difference is adjusted for every fourth year by the addition of one day in leap year.

The Arctic Circle (66° 33' 30" N) is theoretically the dividing latitude for 24 hours of daylight on the longest day of the year and 24 hours of darkness on the shortest day of the year. Reference to the maps however, will show these dividing latitudes as 65° 44' N and 67° 24' N respectively. Two factors are responsible for this increase in day length over theoretical expectations: atmospheric refraction and the diameter of the sun. Refraction of light by the earth's atmosphere appears to elevate the position of the sun with the result that sunrise arrives earlier and sunset later than theory would predict. Since sunrise and sunset are defined in terms of the upper edge of the sun's disc, additional time is required for half of the sun's diameter to sink below the visual horizon. The additional time requirement is greatest at high latitudes because of the low angle of the sun's slanting path.

Twilight, the period of daylight before sunrise and after sunset, is not taken into account in the definition of length of day or in the information portrayed on the maps or graph. Twilight is caused by the scattering of the sun's rays by particles of dust and moisture in the atmosphere and can extend the length of daylight to a significant extent according to the time of year and latitude. This effect is particularly evident at high latitudes.

Sunrise, Sunset: The times at which the upper edge of the sun's disc appears or disappears on a level plain. At these times, the centre of the sun's disc is 50 minutes below the horizon allowing 34 minutes for the apparent elevation of the sun by atmospheric refraction, and 16 minutes for the semi-diameter of the sun. (Thompson, 1970). The times of sunrise and sunset are expressed in local time and are calculated for mean sea level, assuming an unobstructed horizon and normal meteorological conditions. Corrections for altitude may be carried out with the use of tables prepared for this purpose (*The Air Almanac*, 1977).

The times of sunrise and sunset are valid on the standard meridian for each time zone. To determine the exact time of sunrise or sunset for any location not on the standard meridian, first determine the difference in degrees of longitude between the location and the standard meridian of the appropriate time zone. If the location is east of the standard meridian, subtract four minutes from the time of sunrise or sunset for every degree of longitude. If the location is west of the standard meridian, add four minutes to the time of sunrise or sunset for every degree of longitude. Time zone boundaries reflect legislated standard time, which may vary from the observed time in some localities. Adjustment should also be made for daylight saving time, where applicable.

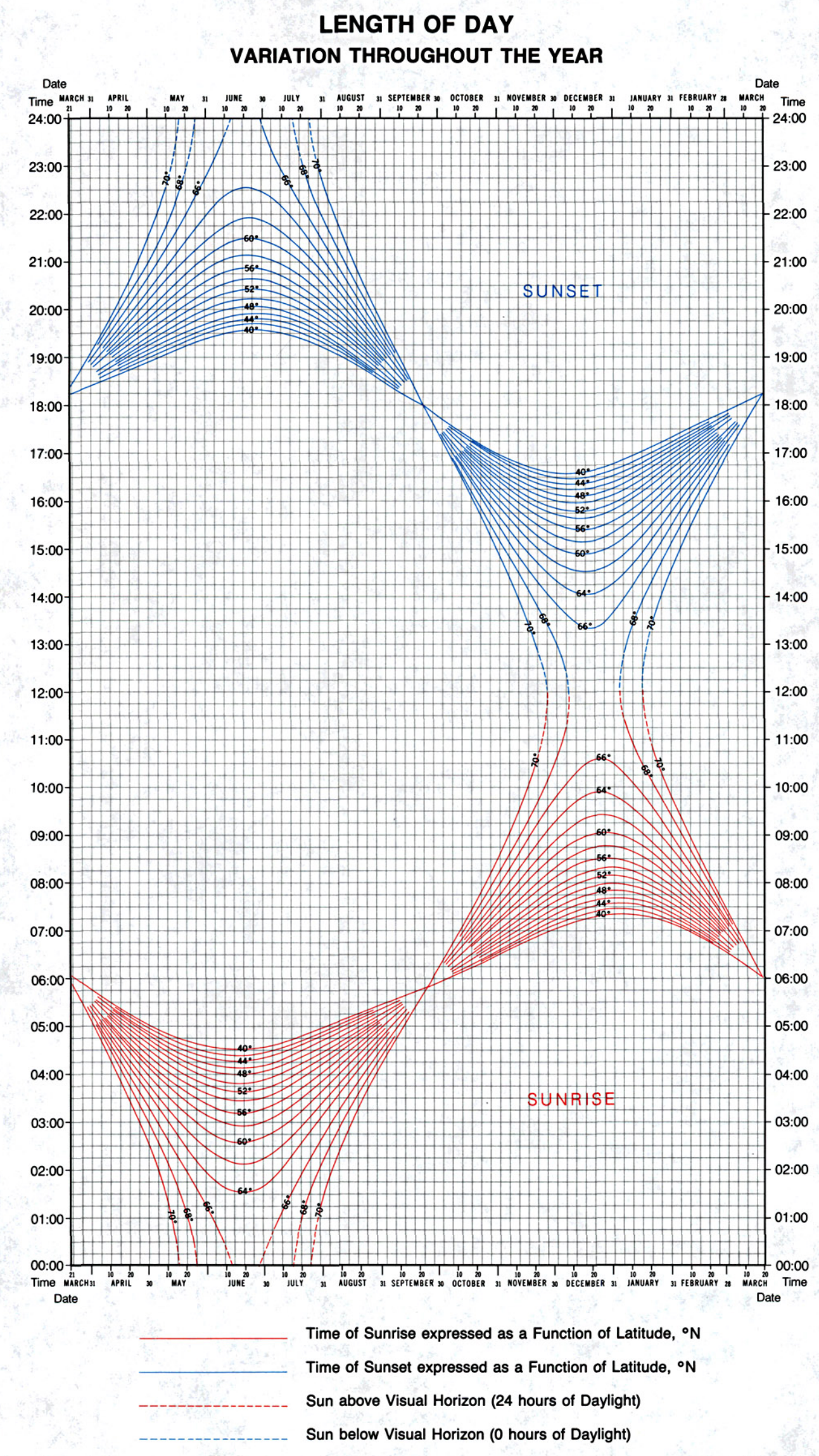
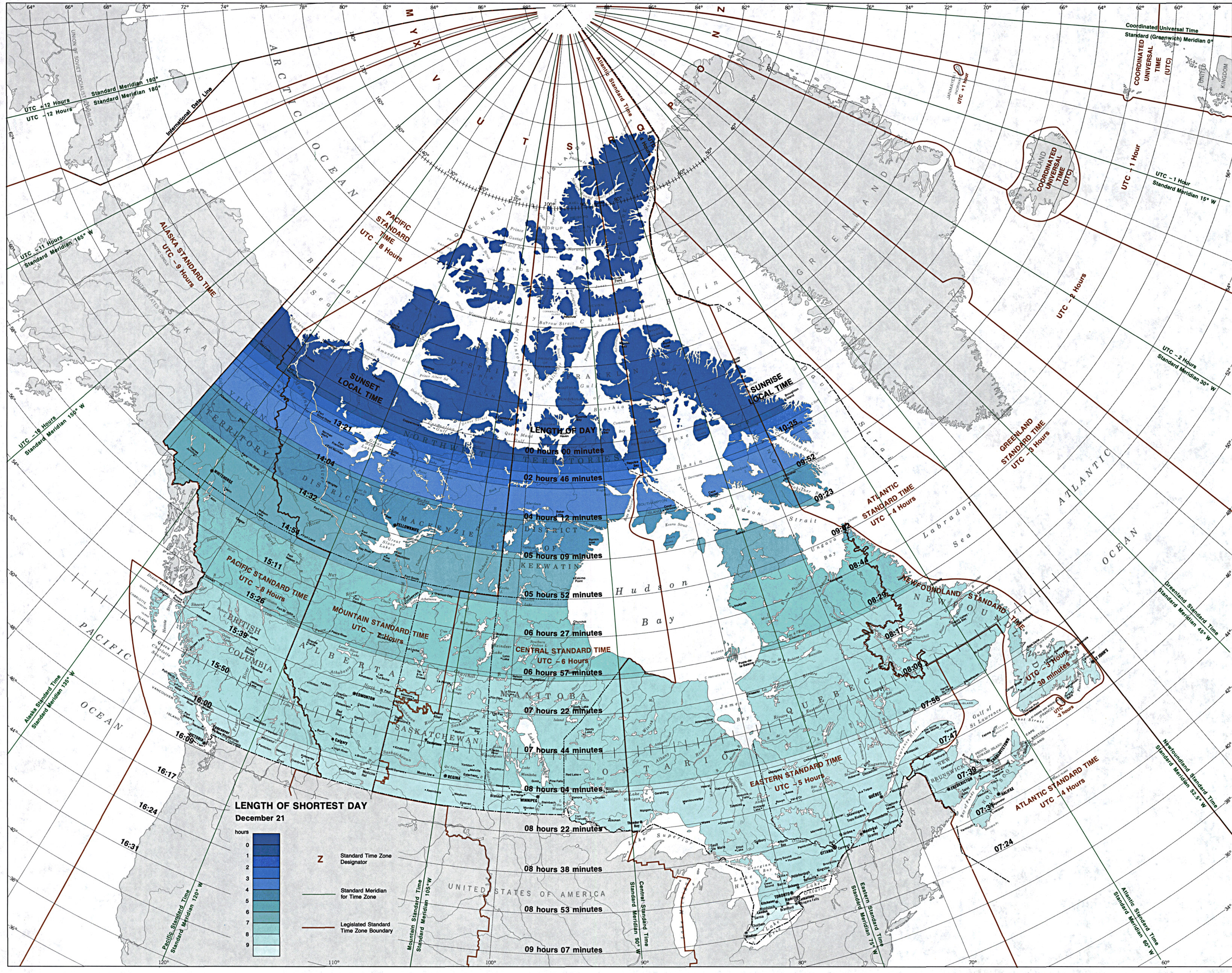
Information displayed on the maps and graph was derived from tables calculated for the longitude 90° W (an average longitude for Canada) and for the year 1966. Data for 1966 which lies halfway between leap years, is directly applicable to every fourth year (i.e. 1970, 1974, 1978, 1982, 1986, etc.). Since the variation in times of sunrise or sunset is less than five minutes within the four-year cycle, for most purposes, the times shown on the maps and graph may be directly applied to all years.

Legislated Time Zone Boundaries: Standard time zone boundaries as defined by provincial and territorial legislation. In some regions and localities, particularly in British Columbia and Labrador, observed time varies from legislated time. For socio-economic reasons, these areas have generally adopted the time of an adjacent standard time zone.

Standard Meridian: A meridian that establishes the standard time for a particular zone on the basis of its longitudinal distance from the Greenwich Meridian of 0°.

Daylight Saving Time: A time system one hour in advance of standard time.
Daylight saving time is legislated and observed throughout most of Canada for the six-month period between the last Sunday in April and the last Sunday in October. Although Ontario and the Northwest Territories have no daylight saving time legislation, daylight saving time is observed over most of these areas. In Saskatchewan only a small number of communities observe daylight saving time. Most of these communities are located within the Mountain Standard Time Zone.

Time zone boundary and daylight saving time information are current to 1983.



The graph expresses the variation in day length throughout the year as a function of latitude. For any particular date and latitude, the length of day may be derived by calculating the time interval between sunrise and sunset. To find the local time of sunrise or sunset, locate the required date at the top or bottom of the graph. Follow the line corresponding to the date until it intersects with the desired latitude. At the intersection point, follow the line perpendicular to the date line to the side of the graph to determine the time of sunrise or sunset. Intermediate latitudes, dates and times should be interpolated. To convert local time to standard time, use the procedure outlined under *Sunrise, Sunset*.

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