Latitude, longitude, and scale

The Earth is a small, blue planet. Seen from space it has no right way up.

Latitude

Parallels of latitude are concentric circles that diminish in diameter from the Equator to the Poles. They are used to determine locations either north or south in relation to the Equator. North of the Equator parallels are designated north (N), while those south of the Equator are labelled south (S). The Equator is at latitude 0°. The Poles are at latitudes 90°N and 90°S.

Longitude

Meridians of longitude pass through both Poles intersecting all parallels of latitude at right angles. The meridian through Greenwich, England was chosen in 1884 as the Prime Meridian and given the value 0°.

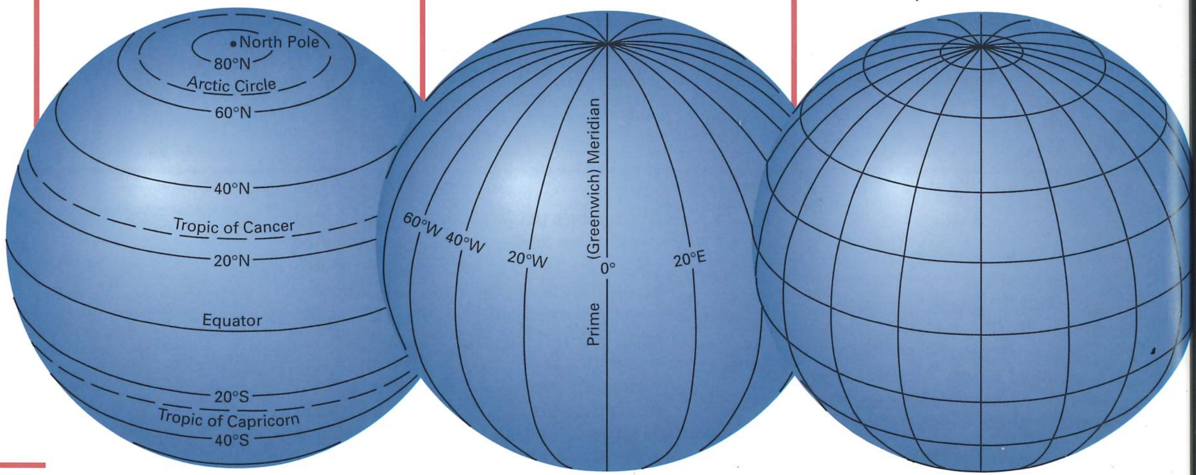
Meridians determine locations east (E) or west (W) of the Prime Meridian. The 180° meridian of longitude was designated the International Date Line and has a special role in the operation of Standard Time.

The Equator divides the Earth into halves: the Northern Hemisphere and the Southern Hemisphere. The Prime Meridian and the 180° meridian together also divide the Earth into halves: the Western Hemisphere and the Eastern Hemisphere.

The Tropics of Cancer (23°26′N) and Capricorn (23°26′S) are parallels of latitude that represent the northern and southern limits of the overhead sun. The Arctic (66°33′N) and Antarctic Circles (66°33′S) are also parallels of latitude. The sun is not visible poleward of these parallels during their respective winter solstices.

An imaginary grid is used to pinpoint the position of any place on Earth.

The grid consists of two sets of lines. Those running east and west are called parallels of latitude and those extending north and south are called meridians of longitude. Both are measured in degrees.



Scale

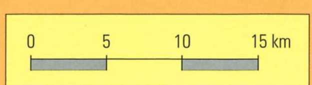
Maps or globes are devices used to represent all or part of the surface of the Earth. Every map has a scale to indicate how much the area on the map has been reduced from its actual size on the Earth's surface. Thus the map scale indicates the proportion (or ratio) between a distance on a map and the corresponding distance on the Earth's surface.

Scale can be shown in three ways :

The scale statement: **1 cm to 5 km** — which means 1 centimetre on the map represents five kilometres on the Earth's surface.

The representative fraction (RF): **1: 500 000** — which means 1 centimetre on the map represents 500 000 centimetres on the Earth's surface, or one of any unit of measurement represents 500 000 of the same units.

The linear scale:



which is a measured line divided into units representing distances on the earth.

When used together, lines of latitude and longitude form a grid. The position of places on the surface of the Earth can be located accurately using this grid.

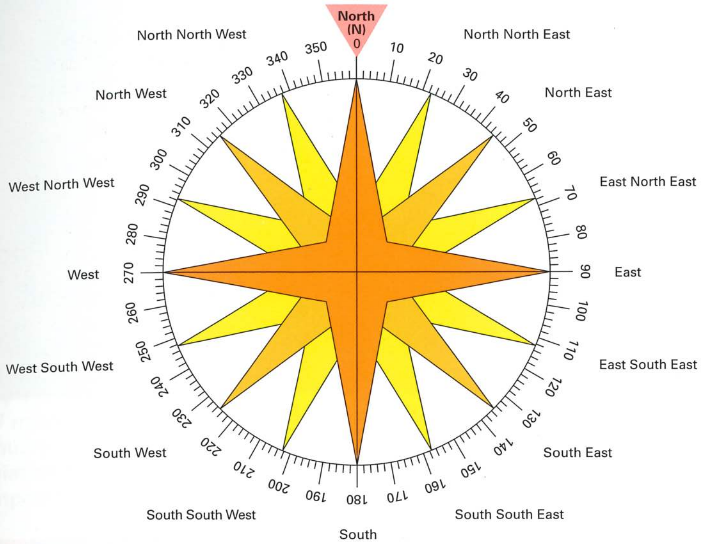
To locate places really accurately, each degree of latitude and longitude can be divided into 60 minutes and each minute into 60 seconds. A location specified in degrees, minutes, and seconds (for example, 44° 25' 14" N, 80° 45' 36" W) will describe a location accurately to within a few metres.

It is important to understand the **relationship between scale and area**. In this atlas Canada is shown mainly on maps that have a larger scale than the rest of the World.

For example:
All of northern Africa appears on page 100 at a scale of 1: 26 000 000, while British Columbia, on pages 38–39, has a scale of 1: 5 000 000. We know from the scale that the African map shows a greater area, but how much greater?

The table shows that as the scale doubles, the area it represents increases four times. Thus a square centimetre on the Africa map represents an area more than twenty-seven times larger than a square centimetre on the British Columbia map.

Scale	Scale statement	Area of 1 cm^2
1: 10 000	1 cm to 0.1 km	0.01 km^2
1: 20 000	1 cm to 0.2 km	0.04 km^2
1: 100 000	1 cm to 1 km	1 km^2
1: 200 000	1 cm to 2 km	4 km^2
1: 5 000 000	1 cm to 50 km	2500 km^2
1: 10 000 000	1 cm to 100 km	10 000 km^2
1: 20 000 000	1 cm to 200 km	40 000 km^2



Direction

A direction can be expressed either in terms of north, east, south, and west and various intermediate positions as shown on the diagram of the compass rose, or in degrees as a bearing. Direction by bearing ranges from 0° (north) to 359° (one degree west of north).

The North Pole, where all meridians of longitude converge, is referred to as true or geographic north. Conversely, the South Pole is known as the true or geographic south. By convention, most maps are oriented so that true (geographic) north occurs toward the top of the map. Thus, when we refer to north and south on most maps, we are speaking of these poles.

There is also a magnetic North and South Pole. The north magnetic pole is presently located to the north of Ellef Ringnes Island in the Canadian Arctic *(see pages 10–11)* and is moving about 24 km a year in a north-easterly direction. When using a magnetic compass, the north arrow points to this pole.

In the atlas, the cardinal points (north, east, south, and west) can be determined from the parallels and meridians. Thus all parallels run north and south, and meridians east and west. Intermediate directions require the application of the compass rose or the use of bearings. Direction using bearings can be accomplished using a protractor.

Satellite imagery

Satellite images are found on a number of pages throughout this atlas. These images are taken by satellites orbiting the Earth at high altitudes. For example, most of the images in this atlas were produced by Landsat satellites which orbit the Earth 14.5 times each day at an altitude of approximately 900 km. As a satellite travels, it is continuously scanning an area 185 km wide. In order to be visible, objects on the Earth must be at least 30 m^2 in size.

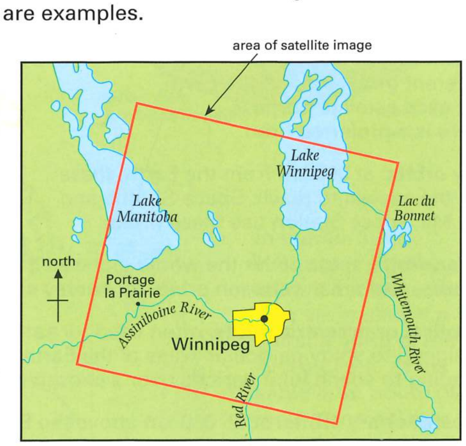
Most cameras are sensors that operate only in the "visible" part of the electromagnetic spectrum and thus produce a record of what the eye can see. The images that are normally described as satellite images are produced by instruments that use a multi spectral scanning system to record reflected energy from different parts of the electromagnetic spectrum from microwaves, through infrared, and visible light to the near ultraviolet sections. The scanner sends the radiation received in specifically designated bands to a set of detectors on the satellite. The signal is digitized and then transmitted back to Earth. It is then transformed into images such as the ones shown in this atlas.

The various objects that make up the Earth's surface such as rocks, soil, vegetation, crops, and building materials such as concrete or asphalt absorb and reflect radiation differently (each has its own spectral signature) and so can be easily recognized on satellite images. Even within any surface category there are different spectral signatures; thus, one crop can be distinguished from another and different types of wetland can be recognized. Because these surfaces reflect one part of the electromagnetic spectrum better than others, the colours we see on the images are false colours. For example, green vegetation reflects better in the red than the blue-green, urban areas are blue-grey, and bare soil will show as black to green to white depending on its moisture, and organic content.

Satellite images can also be shown in true colour when false colour images are converted to produce realistic land surface colours. Most of the Canadian satellite images in this atlas are examples.

Satellite image of the area around Winnipeg, Manitoba.

0 15 30 km



The number of uses that have been developed for satellite imagery is very great and beyond the scope of this brief description. Some of the non-military applications include: weather prediction, land-use planning, crop and forest inventories, changes in sea ice, surveillance of fishing fleets, and monitoring air pollution.
New uses are continually being found.


World Political
Equatorial scale 1: 95 000 000 (main map)
Political World
international boundary
capital city
Arctic Circle
Tropic of Cancer
Equator
Tropic of Capricorn
Antarctic Circle
Greenland (Denmark)
CANADA
USA
UNITED STATES OF AMERICA
MEXICO
Ottawa
Washington D.C.
Mexico City
Havana
CUBA
THE BAHAMAS
Bermuda (UK)
Hawaiian Islands (USA)
JAMAICA
HAITI
DOMINICAN REPUBLIC
ANTIGUA AND BARBUDA
DOMINICA
ST. LUCIA
BARBADOS
GRENADA
TRINIDAD AND TOBAGO
ST. KITTS AND NEVIS
ST. VINCENT AND THE GRENADINES
BELIZE
GUATEMALA
HONDURAS
EL SALVADOR
NICARAGUA
COSTA RICA
PANAMA
VENEZUELA
Caracas
COLOMBIA
Bogotá
GUYANA
SURINAME
French Guiana (France)
ECUADOR
Quito
Galapagos Islands (Ecuador)
PERU
Lima
BRAZIL
Brasília
BOLIVIA
La Paz
PARAGUAY
Asunción
CHILE
Santiago
ARGENTINA
Buenos Aires
URUGUAY
Montevideo
Falkland Islands (UK)
South Georgia (UK)
Easter Island (Chile)
Pitcairn Island (UK)
French Polynesia (France)
Papeete
Cook Islands (New Zealand)
Rarotonga
TONGA
Nuku'alofa
American Samoa
KIRIBATI
Chatham Islands (NZ)
PACIFIC OCEAN
NORTH ATLANTIC OCEAN
SOUTH ATLANTIC OCEAN
INDIAN OCEAN
SOUTHERN OCEAN
ANTARCTICA
Reykjavík
ICELAND
Nuuk
Jan Mayen (Norway)
Faeroes (Denmark)
REPUBLIC OF IRELAND
Dublin
UNITED KINGDOM
London
NORWAY
Oslo
SWEDEN
Stockholm
FINLAND
Helsinki
ESTONIA
LATVIA
LITHUANIA
DENMARK
GERMANY
Berlin
POLAND
Warsaw
BELARUS
Minsk
UKRAINE
Kiev
MOLDOVA
ROMANIA
BULGARIA
GREECE
Athens
ALBANIA
ITALY
Rome
FRANCE
Paris
ANDORRA
SPAIN
Madrid
PORTUGAL
Lisbon
Azores (Portugal)
Madeira (Portugal)
Canary Islands (Spain)
RUSSIAN FEDERATION (RUSSIA)
Moscow
TURKEY
Ankara
GEORGIA
Tbilisi
ARMENIA
AZERBAIJAN
KAZAKHSTAN
Astana
UZBEKISTAN
Tashkent
TURKMENISTAN
Ashgabat
KYRGYZSTAN
Bishkek
TAJIKISTAN
Dushanbe
AFGHANISTAN
Kabul
PAKISTAN
Islamabad
IRAN
Tehran
IRAQ
Baghdad
SYRIA
Damascus
LEBANON
Beirut
ISRAEL
Jerusalem
JORDAN
Amman
KUWAIT
SAUDI ARABIA
Riyadh
QATAR
BAHRAIN
UNITED ARAB EMIRATES
Abu Dhabi
OMAN
Muscat
YEMEN REPUBLIC
Sana
CYPRUS
MALTA
MONGOLIA
Ulan Bator
CHINA
Beijing
NORTH KOREA
Pyongyang
SOUTH KOREA
Seoul
JAPAN
Tokyo
INDIA
New Delhi
NEPAL
Kathmandu
BHUTAN
Thimphu
BANGLADESH
Dhaka
SRI LANKA
Colombo
MALDIVES
MYANMAR
Yangon
LAOS
Vientiane
THAILAND
Bangkok
CAMBODIA
Phnom Penh
VIETNAM
Hanoi
TAIWAN
Taipei
PHILIPPINES
Manila
MALAYSIA
Kuala Lumpur
SINGAPORE
BRUNEI
Bandar Seri Begawan
INDONESIA
Jakarta
EAST TIMOR
Dili
PAPUA NEW GUINEA
Port Moresby
AUSTRALIA
Canberra
NEW ZEALAND
Wellington
SOLOMON ISLANDS
Honiara
VANUATU
New Caledonia (France)
Northern Mariana (USA)
Guam (USA)
Saipan
FEDERATED STATES OF MICRONESIA
Palikir
PALAU
Koror
Christmas Island (Aust.)
Cocos Islands (Aust.)
Chagos Arch. (UK)
Socotra (Yemen Republic)
MOROCCO
Rabat
ALGERIA
Algiers
TUNISIA
Tunis
LIBYA
Tripoli
EGYPT
Cairo
WESTERN SAHARA
Laayoune
MAURITANIA
Nouakchott
MALI
Bamako
NIGER
Niamey
CHAD
Ndjamena
SUDAN
Khartoum
ERITREA
Asmara
DJIBOUTI
Djibouti
ETHIOPIA
Addis Ababa
SOMALIA
Mogadishu
CAPE VERDE
SENEGAL
Dakar
THE GAMBIA
GUINEA-BISSAU
GUINEA
Conakry
SIERRA LEONE
Freetown
LIBERIA
Monrovia
CÔTE D'IVOIRE
Yamoussoukro
BURKINA
Ouagadougou
GHANA
Accra
TOGO
Lomé
BENIN
Porto-Novo
NIGERIA
Abuja
CAMEROON
Yaoundé
CENTRAL AFRICAN REPUBLIC
Bangui
EQUATORIAL GUINEA
GABON
Libreville
CONGO
Brazzaville
DEMOCRATIC REPUBLIC OF CONGO
Kinshasa
Cabinda (Angola)
UGANDA
Kampala
KENYA
Nairobi
RWANDA
Kigali
BURUNDI
Bujumbura
TANZANIA
Dodoma
ANGOLA
Luanda
ZAMBIA
Lusaka
MALAWI
Lilongwe
MOZAMBIQUE
Maputo
ZIMBABWE
Harare
NAMIBIA
Windhoek
BOTSWANA
Gaborone
SOUTH AFRICA
REPUBLIC OF SOUTH AFRICA
Pretoria
LESOTHO
Maseru
SWAZILAND
Mbabane
MADAGASCAR
Antananarivo
COMOROS
Moroni
SEYCHELLES
Victoria
MAURITIUS
Réunion (France)
Ascension Island (UK)
St. Helena (UK)
Tristan da Cunha (UK)
Kerguelen (France)
NORWAY
Antarctic Circle
Prime Meridian
ANTARCTICA
AUSTRALIA
FRANCE
NEW ZEALAND
SWEDEN
DENMARK
Copenhagen
Kaliningrad (Russia)
LITHUANIA
Vilnius
NETHERLANDS
Amsterdam
BELGIUM
Brussels
LUXEMBOURG
Luxembourg
GERMANY
Berlin
POLAND
Warsaw
CZECH REPUBLIC
Prague
SLOVAKIA
Bratislava
AUSTRIA
Vienna
HUNGARY
Budapest
LIECHTENSTEIN
Vaduz
SWITZERLAND
Bern
FRANCE
SLOVENIA
Ljubljana
CROATIA
Zagreb
BOSNIA-HERZEGOVINA
Sarajevo
Belgrade
ITALY
Rome
San Marino
SAN MARINO
MONACO
Monaco
ALBANIA
Tirane
1: 35 000 000

British Columbia

Land area: 925 186km²
Total area: 944 735km²
(9.5% of Canada)

Census Population

1871	36 247
1891	98 173
1911	392 480
1931	694 263
1951	1 165 210
1971	2 184 620
1991	3 282 061
2001	3 907 738
Rural	15.3%
Urban	84.7%

Census Metropolitan Areas, 2001

Abbotsford	147 370
Vancouver	1 986 965
Victoria (capital)	311 902

Other important urban centres, 2001

Chilliwack	69 776
Kamloops	86 491
Kelowna	147 739
Nanaimo	85 664
Prince George	85 035
Vernon	51 530

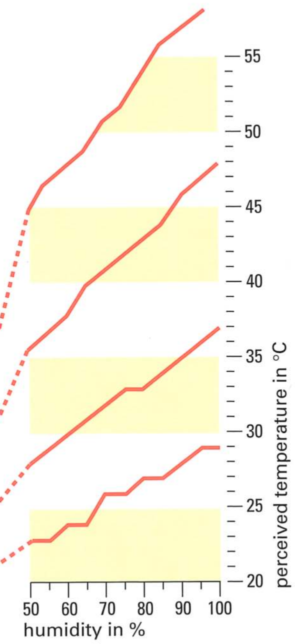
Gross Domestic Product
(2001 $113 849 million)

goods producing	%
Agriculture	1.0
Forestry	3.2
Fishing, Hunting, & Trapping	0.2
Mining incl. oil & gas	3.0
Utilities	2.1
Construction	5.1
Manufacturing	10.5
service producing	**%**
Wholesale & Retail trade	10.5
Transportation & Warehousing	5.8
Information & Cultural industries	4.7
Finance, Insurance, & Real estate	22.7
Other services	25.4
Public administration	5.2

Canada Climate

idex

midex was developed in
a in 1965. Its purpose is to
ne temperature and humidity
ne number to reflect how
mid weather is perceived by
erage person.

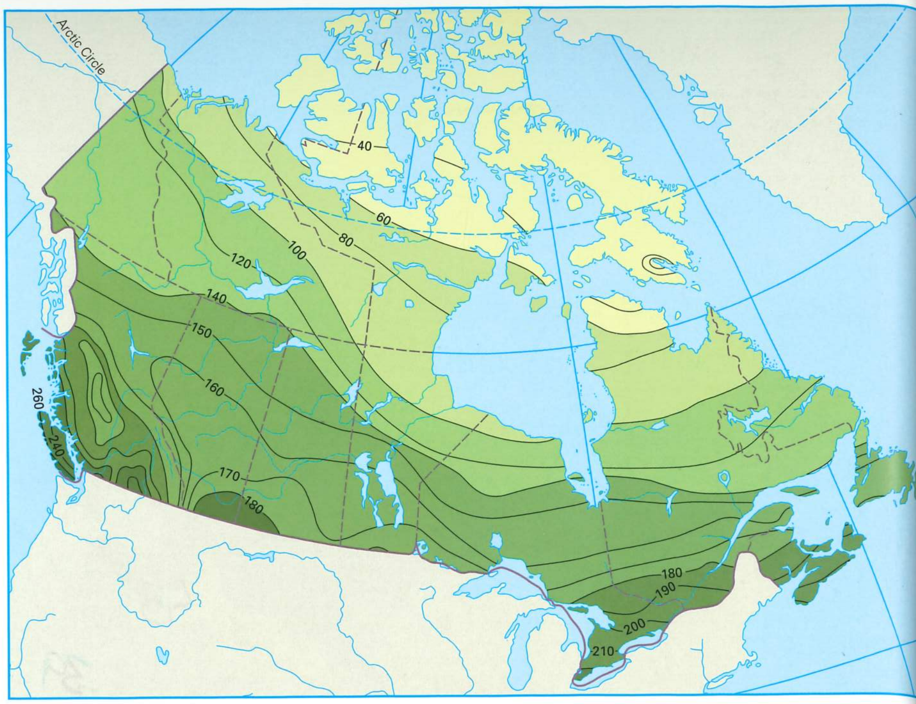


index	Degree of discomfort
r 54	*heat stroke imminent*
54	*dangerous*
45	*great discomfort*
40	*some discomfort*
er 30	*no discomfort*

Growing season

average number of days with an average temperature over 5°C

- over 260
- 220–260
- 180–220
- 140–180
- 100–140
- 60–100
- under 60

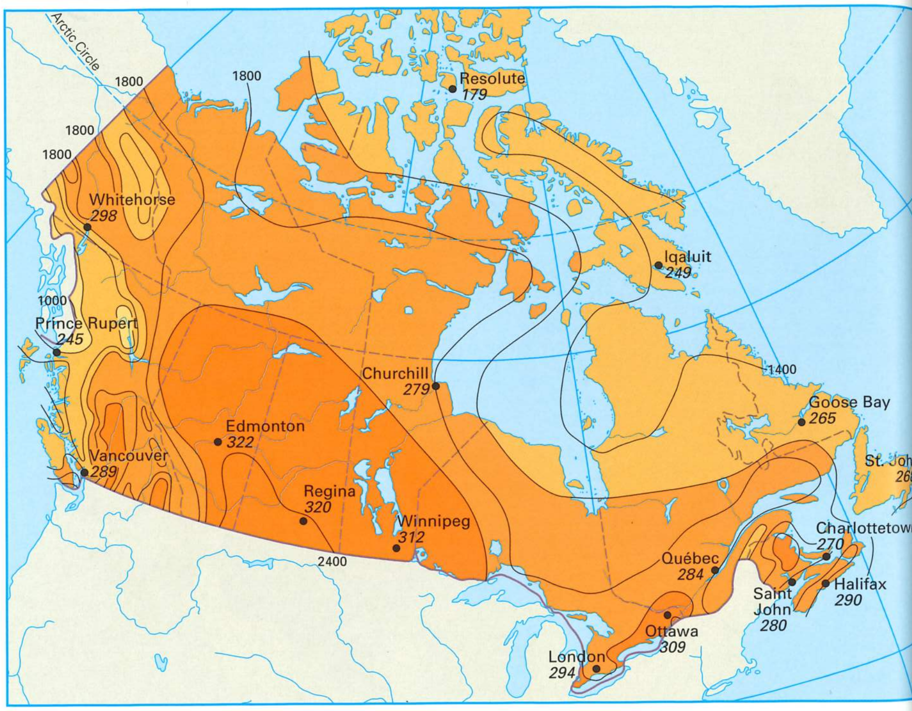


Sunshine

average annual hours

- 2000
- 1600
- 1200

253 number of days with some sun



Scale 1: 45 000 000
Zenithal Equidistant Projection

adian weather records

highest air temperature	45°C Midale and Yellow Grass, Sask. *July 5, 1937*
lowest air temperature	-63°C Snag, Y.T. *February 3, 1947*
coldest month	-47.9°C Eureka, N.W.T. *February, 1979*
highest sea-level pressure	107.96 kPa Dawson Y.T. *February 2, 1989*
lowest sea-level pressure	94.02 kPa St. Anthony, Newfoundland *January 20, 1977*
atest precipitation in 24 hours	489.2 mm Ucluelet Brynnor Mines, B.C. *October 6, 1967*
atest precipitation in one month	2235.5 mm Swanson Bay, B.C. *November 1917*
atest precipitation in one year	8122.6 mm Henderson Lake, B.C. *1931*
greatest average nual precipitation	6655 mm Henderson Lake, B.C.
least annual precipitation	12.7 mm Arctic Bay, N.W.T. *1949*
greatest snowfall in one season	2446.5 cm Revelstoke, B.C.
highest average annual number of hunderstorm days	34 days London, Ontario

UV Index

The UV Index (ranges from 0 to 10) is a measure of the intensity of the sun's ultraviolet radiation in the sunburning spectrum. As the index increases, the sun's rays do more harm to skin, eyes, and the immune system, and it becomes necessary to take more precautions to protect exposed skin. In Canada, the UV forecast is issued daily for 48 locations.

The risks from exposure to ultraviolet radiation have increased in recent years due to the thinning of the ozone layer. This thinning has meant that, on average, ultraviolet radiation has increased by about 7 per cent since 1982. *(Environment Canada)*

UV Index	Category	Sunburn time
over 9	Extreme	*less then 15 minutes*
7–9	High	*about 20 minutes*
4–7	Moderate	*about 30 minutes*
0–4	Low	*more than one hour*

Wind chill equivalent temperature

Wind chill is a measure of the wind's cooling effect, as felt on expos flesh. So as not to confuse it with actual temperature, wind chill is expressed as a temperature-like index, without the degree symbol.

actual air temperature in °C (columns); wind speed at 10 metres in km/h (rows)

	5	0	-5	-10	-15	-20	-25	-30	-35	-40
5	4	-2	-7	-13	-19	-24	-30	-36	-41	-47
10	3	-3	-9	-15	-21	-27	-33	-39	-45	-51
15	2	-4	-11	-17	-23	-29	-35	-41	-48	-54
20	1	-5	-12	-18	-24	-31	-37	-43	-49	-56
25	1	-6	-12	-19	-25	-32	-38	-45	-51	-57
30	0	-7	-13	-20	-26	-33	-39	-46	-52	-59
35	0	-7	-14	-20	-27	-33	-40	-47	-53	-60
40	-1	-7	-14	-21	-27	-34	-41	-48	-54	-61
45	-1	-8	-15	-21	-28	-35	-42	-48	-55	-62
50	-1	-8	-15	-22	-29	-35	-42	-49	-56	-63
55	-2	-9	-15	-22	-29	-36	-43	-50	-57	-63
60	-2	-9	-16	-23	-30	-37	-43	-50	-57	-64


50°E
F
55°E
G
60°E
H
65°E
J
70°E
K
75°E
L
6
5
4
3
35°N
30°N
25°N
20°N
15°N
Kara-Bogaz Gol
Sumqayit
Baku
Krasnovodsk
Nebitdag
Gyzylarbat
TURKMENISTAN
Kara Kum
Chardzhev
Bukhara
Navoi
Kattakurgan
Kagan
Samarkand
UZBEKISTAN
Karshi
Dushanbe
TAJIKISTAN
Pamirs
CHINA
Khorog
Vakhsh
Amudar'ya (Oxus)
Termez
Feyzabad
JAMMU
AND
KASHMIR
K2 8611
Gilgit
Indus
8126
7690
Chitral
Dir
Caspian Sea
Ashgabat
Mary
Kerki
Andkhvoy
Mazar-e Sharif
Kondūz
Khānābad
Sheberghān
Baghlān
Sar-e Pol
Hindu Kush
3147
Tedzhen
Murgab
Sarakhs
Meymaneh
Atrek
Bandar-e Torkeman
Gorgān
Sabzevār
Mashhad
Neyshābūr
Emāmrūd
Elburz Mountains
Damavand 5671
Damāvand
Qazvin
Karaj
Tehran
Semnān
Gushgy
Bālā Morghāb
Charikār
Kābul
Jalalabad
Khyber Pass
5143
Mardan
Peshawar
Islamabad
Rawalpindi
Srinagar
Wah
Kohat
Jammu
Sialkot
Herāt
Hari Rud
Chaghcharān
AFGHANISTAN
Ghazni
Gardēz
Bannu
Jhelum
Gujrat
Gujranwala
Batala
Miram Shah
Mianwali
Dera Ismail Khan
Sargodha
Lahore
Amritsar
Kasur
Dasht-e-Kavir
Qom
Hamadān
Kāshān
Tabas
Shīndand
Koh-i-Mazar 3788
Faisalabad
Jhang Maghiana
Okara
PUNJAB
Arāk
Khorramābād
IRAN
Bīrjand
Farah Rud
Farāh
Kandahār
Zhob
Sahiwal
Ravi
Esfahān
Dasht-e-Lut
Khash
Dōri
Chaman
Qila Saifullah
Dera Ghazi Khan
Multan
Sutlej
Ganganagar
Dezful
4548
Qomisheh
Yazd
Bāfq
Zābol
Dasht-i-Margo
Helmand
Registan
2641
Zargun 3578
Quetta
Bahawalpur
Sulaiman Range
PAKISTAN
Zagros Mountains
Ahvāz
Zarand
Kermān
Chagai Hills
Nushki
Sibi
Rahimyar Khan
Bikaner
Khorramshahr
Behbehān
Bandar Khomeynī
Rafsanjān
Dalbandin
Kalat
Kharan
Jacobabad
Sukkur
Shikarpur
Khairpur
Thar Desert
RAJASTHAN
Shīrāz
4420
Bam
Zāhedān
Larkana
Jaisalmer
Kāzerūn
Neyrīz
Baluchistan
Khāsh
2293
Nal
Jodhpur
Kuwait
Al Fuhayhil
KUWAIT
Khārg
Būshehr
Jahrom
Saravan
Īrānshahr
Sind
INDIA
Luni
Hab
Bela
Mirpur Khas
Indus
The Gulf
Kangan
Lār
Bandar-e 'Abbās
Kech
Kotri
Hyderabad
Str. of Hormuz
Bandar-e Lengeh
Makran
Karachi
Mouths of the Indus
Rann of Kachchh
Patan
GUJARAT
Al Jubayl
Ad Dammām
Dhahran
BAHRAIN
Manama
G. of Bahrain
QATAR
Al Mubarraz
Al Hufūf
Doha
OMAN
Jāsk
Chāh Bahār
Sharjah
Dubai
Gulf of Oman
Tropic of Cancer
Bhuj
Kandla
Morbi
Jamnagar
Rajkot
G. of Kachchh
Bhavnagar
Abu Dhabi
Al Ayn
Al Buraymī
Maṭraḥ
Muscat
Porbandar
Kathiawar
Veraval
Diu
Harad
UNITED ARAB EMIRATES
Ibrī
Jabal Akhdar 3018
Nazwá
Ṣūr
Ra's al Hadd
ARABIAN SEA
SAUDI ARABIA
Umm as Samim
OMAN
Masīrah
Ra's Madrakah
Rub' al Khali
Kuria Muria Is.
Ṣalalah
Say'ūn
Hadramaut
W. al Masilah
Ra's Fartak
YEMEN REPUBLIC
2112
Mukalla
Gulf of Aden
Hadiboh
Socotra (Yemen)
'Abd al Kūrī
E
50°E
F
55°E
G
H
65°E
J
70°E
K
2
1
boundaries
international
disputed
internal
communications
expressway
major road
railway
canal
major airport
settlements
over 1 million inhabitants
more than 100 000 inhabitants
smaller cities
physical features
river, lake
seasonal river
seasonal lake
marsh
salt lake
salt pan
ice cap
sand dunes
sea ice
unnavigable
pack ice – fall minimum
– spring maximum
land height and sea depth
metres
5000
3000
2000
1000
500
300
200
100
0
sea level
200
3000
6000
spot height in metres