

Map Terminology

aeronautical chart

A chart or map used for air navigation, which provides the aircraft pilot with important information about flight paths, airport approaches and facilities, as well as landmark features. In Canada, the federal government agency responsible for the supply of aeronautical information is the Aeronautical Charts Service URL, of Geomatics Canada, Natural Resources Canada.

Antarctic Circle

A line of latitude at 66° 33' South, when shown as a fixed position on a map, delineates a region, which at the time of the winter solstice (in the Northern Hemisphere), the Sun is above the horizon at local midnight time at all points in this region. (Also the complement of the Tropic of Capricorn, which lies at latitude 23° 27' South).

Arctic Circle

A line of latitude at 66° 33' North, when shown as a fixed position on a map, delineates a region, which at the time of the summer solstice (in the Northern Hemisphere), the Sun is above the horizon at local midnight time at all points in this region. Also the complement of the Tropic of Cancer, which lies at latitude 23° 27' North.

aspect

The orientation or position of a map projection graticule in respect to the lines of latitude and longitude on the globe they are representing. For example, the planar family of projections may be grouped into three aspects: polar, equatorial and oblique. (The term "case", is also used in cartographic literature).

axis

(1) A line about which the Earth or a globe rotates. (2) In respect to a spherical coordinate system, the line to which directions are related and from which angles are measured. (3) Also, a line along which measurements are made in order to determine the coordinates of a location.

azimuth

From the Arabic, "al-samt" meaning the way, the direction or the arc. A horizontal angle of direction calculated clockwise from the meridian plane. Azimuthal compass direction is expressed in terms of all 360° of a circle. The term can also be called magnetic azimuth, when calculated using the North or South magnetic poles.

azimuth degree

A unit of direction, representing 1/360 of a full circle.

base line

(1) A surveyed line of great accuracy which serves as the basis for measurement of other lines or of the angles between them. (2) In a land survey system an East-West line passing through the origin from which township, section, and quarter-section corners are established.

bearing

The horizontal angle measured from a point on a line of known direction (usually North) to another line extending from the same point of observation. If the angle is measured clockwise from the North it is called bearing East and when measured counter-clockwise it is called bearing West. For the mariner's and surveyor's compass, direction is measured in terms of the quadrant, and is never greater than 90°. Bearings can be measured from true North, grid North or magnetic North. The terms bearing and heading have the same definition, except bearing should refer to a fixed position, whereas, heading refers to the direction in which an object moves.

bench mark

A usually round, inscribed disk, made of brass or bronze set in a concrete base, bedrock or other practically permanent structure, which marks an accurately surveyed elevation measured above or below an adopted datum. (See datum).

boundary monument

A ground located structure marking an accurately surveyed position on a boundary line separating two defined regions.

British system of measurement

A system of measurement based on the Imperial Standard Yard as the basic unit of length, the pound as the unit of weight and the second as the unit of time. (Also called the English or Imperial system).

cardinal direction

A verbal expression of direction. One of the astronomical directions on the Earth's surface: North, South, East, or West.

cartography

The art, science, and technology of map design and production. Cartography applies the fundamental scientific procedures of accurate measurement, classification, and the identification of relationships, to create visual models of our complex world. Traditional or conventional cartography refers to the preparation of maps through manually prepared overlays. Computer assisted (automated) cartography is less precisely defined but involves the extensive use of computer software and hardware in the preparation of map overlays. (See automated cartography).

census map

A map showing the boundaries of census divisions, subdivisions, or enumeration areas. Used in the collection of statistical information for the study of human population (demography). This information is used as a basis for many thematic maps. (See choropleth map).

central meridian

A line running North and South, at the centre of a graticule, along which all points have the same longitude. Also the axis of symmetry for the geometric properties of the graticule. (See meridian).

chart

A class of map designed primarily for use in air or water navigation. The term also applies to astronomical maps.

compass

(1) An instrument, which indicates the direction of magnetic North, by means of a pivoting magnetic needle mounted on a circular dial or card. The dial or card indicates the cardinal directions, and can also have directions shown as compass points (up to 32) or in degrees (360°).

(2) An instrument for drawing and measuring circles, consisting of two legs connected at one end by a movable joint. (See cardinal direction, compass point and compass rose).

compass bearing

The horizontal angle of direction measured from magnetic north as indicated by a compass and expressed in terms of cardinal direction, and degrees of a quadrant, (no greater than 90°). This term indicates a direction which is not corrected for magnetic declination.

compass point

A unit of compass direction. One of the 32 divisions of the circular dial or card of a compass, equal to 11°15' or 11.25° of a circle.

compass rose

A circle drawn on a map, (usually a navigational chart) which is subdivided in a clockwise direction from 0° to 360° , with 0° indicating true North. On older maps and charts, it was a decorated diagram of cardinal directions, divided into 32 points, originally called rosa ventorum, or "rose of the winds".

contour interval

The difference in elevation between two adjacent contour lines.

contour line

A line drawn on a map so that all points on it are at the same elevation above or below a specific datum. (See isopleth).

coordinates

Numerical or angular values that identify the location of points on a surface in terms of distance from a fixed reference. The reference point is often known as the origin. A set of latitude and longitude values in a geographic coordinate system, an "x,y" location in a Cartesian coordinate system or an "x,y,z" location in a 3-dimensional coordinate system. (See Cartesian coordinate system and origin).

coordinate system

A system, based on mathematical rules, used to measure horizontal and vertical distance on a surface, in order to identify the location of points by means of unique sets of numerical or angular values.

datum

(1) In general terms, a single isolated piece of information. (2) A fixed reference point or basis to which other information is related. (3) A set of accurately surveyed horizontal control points that define the shape of the Earth as a spheroid and form the basis for a 2-dimensional coordinate system. (4) A vertical datum is a level surface of reference (usually mean sea level or the geoid) from which elevations are measured. (See North American Datum 1983 (NAD 83) and spheroid).

dead reckoning

The calculation of a ship or aircraft's location by using the last recorded location and the measurement of its speed and drift. Dead reckoning is used when no other observations are possible.

declination

- (1) In geometry, for a spherical coordinate system, the angle at the centre of a sphere between the equatorial plane and a line to a point on the sphere.
- (2) The arc between the Equator and a point on a great circle perpendicular to the Equator.
- (3) In astronomy, the angular distance of a star or planet above or below the celestial Equator.
- (4) Magnetic declination is the angle between true (geographic) north and magnetic North (the direction of the magnetic compass needle), from the point of observation. This angle varies for different locations and continually changes with time due to the wandering of the magnetic north pole.
- (5) Grid declination is the angle between grid north on a grid reference system (e.g. U.T.M. Grid or Military Grid) and true (geographic) north. (In navigation, the term variation is also used).

degree

- (1) A unit of angular or circular-arc measurement equal to $1/90$ of a right angle or $1/360$ of a circle.
- (2) A unit of measurement used to express latitude and longitude in a spherical grid reference system.
- (3) An arbitrary unit of measurement also used in scales of temperature, hardness, and other phenomena.

demographic map

A thematic map depicting the phenomena of human population, such as size, distribution, density, and condition.

depression contour

An isoline drawn on a map, inside of which the land is at a lower elevation than the land area outside this line. Depression contours are usually drawn with tick marks spaced out along their length on the inside of the lower area.

direction (see bearing)**distance**

The fundamental spatial concept of the amount of space between non-connected points. Not to be confused with length, as length always implies a physical connection.

drainage

In cartography, all features on a map associated with water, for example, rivers, lakes, shoreline or marshes.

elevation

The vertical distance of a point or object above or below a reference surface or datum (usually mean sea level). Also referred to as altitude or height.

equator

- (1) The central line of latitude, or parallel of reference "0°" which divides the Earth in half.
- (2) In a spherical coordinate system, the great circle of a sphere which is perpendicular to the polar axis.

foot

A unit of length in the British system of measurement, equal to 0.3048 metre (exactly).

GIS, Geographic Information System

A computer-based information system designed to handle georeferenced data which has, also the capability to efficiently capture, store, update, manipulate, analyze, display and output a full range of geographical data. Output can be in many forms: either as tables, graphics, or maps.

GPS, Global Positioning System

A surveying method that uses a set of 24 satellites in geostationary position high above the Earth. Specially designed GPS receivers, when positioned at a point on Earth, can measure the distance from that point to three or more orbiting satellites. The coordinates of the point are determined through the geometric calculations of triangulation. GPS provides accurate geodetic data for any point on the Earth.

gradient

An expression of slope or an angle of slope. Gradient may be expressed as a fraction or percentage, for example, $1/50$ (1 in 50) metres indicates that the elevation changes (rises or falls) by one metre in a horizontal distance of 50 metres (or a 2% grade).

Greenwich Meridian

The meridian, or line of longitude adopted by international agreement (in 1884) to be the 0° meridian from which all longitudes worldwide would be calculated. (Also called the prime or international meridian).

grid

A network of regularly spaced straight lines intersecting at right angles and used as a basis for rectangular coordinate map reference systems.

grid reference system

A locational reference system consisting of a grid and a method of referring to points on the grid so that locations can be provided coordinates.

index contour line

A contour line on a map shown in a heavier line, usually labelled in a gap in the line with the corresponding value of elevation, or depth it represents. On topographic maps, usually every fifth contour line starting at zero elevation is designated as an index contour line.

intermediate contour line

A contour line which is drawn between index contour lines and shown as a thinner line. There are usually four intermediate contour lines between index contour lines on a topographic map.

International Date Line

A hypothetical line on the Earth running from the North to South Pole generally following the 180° meridian, measured from Greenwich. It divides neighbouring regions so that the date differs by one day.

kilometre

A unit of length in the metric system of measurement (SI) equal to 1 000 metres or approximately 0.62 of a mile.

landmark feature

A prominent feature on land used to communicate location or direction. For example, a building, an electricity transmission tower or a boundary monument. Landmark features are usually symbolized on topographic maps.

latitude

Part of a spherical reference system used to locate positions on the surface of the Earth. The angular distance in degrees, minutes, and seconds measured from the centre of the Earth to a point north and south of the Equator. (See longitude and parallel).

legend

A description or explanation of the symbology and other information printed on a map, chart or diagram, to provide a better understanding and interpretation of the data portrayed. Usually located in the margin.

linear feature

A geographic feature that can be symbolized by a line or set of lines. Examples are roads, rivers, railways and boundaries.

longitude

Part of a spherical reference system used to locate positions on the surface of the Earth. The angular distance in degrees, minutes, and seconds measured from the centre of the Earth to a point east and west of the Greenwich Meridian (prime or international meridian). (See latitude and meridian).

lot

In a large scale legal land survey, the smallest geographical unit of land. Lots are differentiated from each other by numbers (thus, Lot 15 of the 3rd Concession, "Geomatics" township). Lots are usually 100 acres in size, their boundaries (which may often correspond to property boundaries) are called lot lines.

map scale

A ratio representing the relationship between a specified distance on a map and the actual distance on the ground. For example, at the scale of 1:50 000, 1 unit of measurement on the map equals 50 000 units of the same measurement on the ground. Map scale is frequently expressed as a representative fraction and graphically as a bar scale. (See bar scale, representative fraction and verbal scale).

meridian

A line of longitude on a spherical grid reference system. Meridians also form great circles passing through the North and South Poles. Meridian is often used as a synonym for "line of longitude" thus, 100th meridian, or Greenwich Meridian. (See central meridian and Greenwich Meridian).

metre

The basic unit of length in the metric system of measurement. A metre is equal to approximately 3.28 feet or 1.09 yards.

minute

(1) A unit of angular or circular-arc measurement equal to 1/60 of a degree and containing 60 seconds, used to express latitude and longitude in a spherical grid reference system. (2) A unit of time equal to 1/60 of an hour and containing 60 seconds.

nautical mile

A unit of length used to express distances over water. The international nautical mile is equal to 6 076.1 feet or 1 852 metres. Its value is defined by the length of one minute of arc, measured along the Equator (or 1/60 of a degree of a great circle) on a spheroid representing the Earth. It is the unit of length used to define the knot (a speed of one nautical mile per hour) which is also used in both marine and air navigation.

North American Datum 1983, (NAD 83)

The North American Datum 1983 is a new datum based on a newly defined spheroid (GRS80); it is an Earth-centred datum having no initial point or initial direction. It replaces the North American Datum of 1927. Surveys and maps are being revised to use NAD 83. (See datum).

North Pole

The geographical location at 90°N latitude in the northern hemisphere where the Earth's axis of rotation intersects the surface of the Earth.

orientation

(1) The position of features on a map in relation to the neatline of the map.
(2) A map is said to be in orientation or oriented when it is rotated so that north and south on the map correspond to north and south on the ground. It is a cartographic standard that north is located towards the top of a map sheet.

orthographic map projection

A planar map projection which is tangent to the globe at a single point, but may be oriented at any aspect. The projection views the Earth from an infinite point in space. In the polar case, parallels are represented by a system of concentric circles sharing a common point of origin from which radiate the meridians, spaced at true angles. This projection shows true direction, but only between its centre and other locations on the same map.

orthophoto map

A map produced from a mosaic of orthophotographs, to which has been added a grid, cartographic symbology and sometimes colour. (See grid).

planimetric map

A map which represents only the horizontal positions of geographic features as opposed to a topographic map which also shows vertical data or relief. Features usually shown on a planimetric map include roads, railways, rivers, populated places and boundaries.

prime meridian (see Greenwich meridian)

quadrangle

A four-sided area bounded by lines of longitude and latitude which define the extent of a map sheet, usually are in a map series. For example, a 30' longitude x 15' latitude quadrangle is used as the standard dimensions for the 1:50 000 scale National Topographic System map series of Geomatics Canada.

quadrant

(1) One-fourth of a full circle, or a sector of a circle having an arc of 90°.
(2) A map of an area on the Earth's surface which is a quadrangle having the dimensions 15' longitude x 15' latitude.

second

(1) A unit of angular measurement equal to 1/60 of an angular minute. There are 3600 seconds in one degree of a circle.
(2) A unit of time, equal to 1/60 of a minute of time.

slope

An angle of inclination from the horizontal, appearing as a tilted plane of land. Slope may be expressed as a numerical ratio, percentage, or in degrees. Slope is represented on maps by contour lines, relief shading and hachures; the closer together the contour lines, the steeper the slope.

South Pole

The geographical location at 90°S latitude in the southern hemisphere where the Earth's axis of rotation intersects the surface of the Earth.

statute mile

A unit of distance in the British system of measurement defined by law to be exactly 5 280 feet or approximately 1.60935 kilometres.

time zone

A geographical region in which the time used is the same everywhere within that region. Sir Sandford Fleming, Canadian railway surveyor and construction engineer, advocated the establishment of an international system of standard time zones and was instrumental in convening an International Prime Meridian Conference in Washington, in 1884. At this meeting, 24 World standard time zones with a time spacing of one hour were defined. Each zone is 15° of longitude in width, centred on standard meridians 15° apart and referenced to the Greenwich Meridian. Additional time zones have been introduced some using divisions of 7° 30' longitude and a time spacing of one half hour difference from adjacent zones (e.g., Newfoundland Standard Time). Due to political, socio-economic, or physiographic realities, most time zone boundaries have been displaced considerably. Each country is responsible for the designation and location of time zones within its own boundaries.

topographic map

A class of map designed primarily for the purpose of depicting elevation (relief), as opposed to a planimetric map which only shows the horizontal location of geographic features. Topographic maps show vertical data with contour lines, hypsometric tints, spot heights, and relief shading. Also shown is fundamental information about the Earth's surface such as landforms, vegetation, and drainage. Cultural and landmark features, such as roads, railways, populated places, and buildings are often included. Topographic maps are usually available as a series, such as the 1:50 000 and 1:250 000 scale National Topographic System (NTS) maps, produced by the Centre for Topographic Information (URL), Geomatics Canada, Natural Resources Canada.

topography

The configuration or shape of features on the Earth's land surface. Topography is depicted on maps by contour lines, hypsometric tints, and relief shading. Also called landforms and relief. In oceanography this term refers to the characteristics of shape and surface of the ocean bottom, (or the bottom of other water bodies). (See topographic map).

triangulation

An accurate method of surveying based on the geometric principle that if the measurements of one side and two angles of a triangle are known then the other dimensions of the triangle can be calculated. Starting with a known base line, a network of known horizontal positions on the Earth's surface may be established by expanding a network of triangles, for once the other sides of the first triangle are calculated then one of them can be used as the base line for the next triangle. This process establishes horizontal control.

USGS, United States Geological Survey

The federal government agency of the United States responsible for their national mapping program, (URL). The USGS began publishing topographic maps in 1886 as an aid to scientific studies. Today as the U.S.A.'s largest civilian mapping agency, the USGS has produced more than 85 000 different maps and digital products. The most familiar product is the 1:24 000 scale topographic (7' 30" format) quadrangle map series.

UTM Grid System, Universal Transverse Mercator

A metric grid reference system which can provide a unique coordinate reference to any position on the Earth's surface between 84° N latitude and 80° S latitude. This grid reference system is commonly used on most large scale military and civilian topographic maps around the World and is based on the transverse Mercator map projection. The UTM Grid coordinates of a point location may be expressed to the nearest metre as a 15 character alphanumeric value, but are usually defined to the nearest 100 metres.

For this grid system, the World is divided into 60 longitudinal zones, each zone being 6° wide and containing 22 latitudinal belts 8° high lettered from "C" to "X" starting in the south. Zone 1 begins between 180° and 174° E the other zones continue eastward through to zone 60. A transverse Mercator map projection is calculated and drawn for each zone therefore, each having its own central meridian. For each zone a rectangular, square kilometre grid is drawn and positioned over the map projection, the origin being the intersection of the equator and the central meridian. The grid measures 1 000 000 metres east-west and 20 000 000 metres north-south, with the central meridian represented by the 500 000 metre line. Every grid square in every zone is the same shape and size (hence the name "Universal"). Reference coordinates are given first by identifying the zone number "1" to "60", then the letter representing the belt "C" to "X". Next, two letters are added to identify the nearest 100 km square, and finally, easting and northing values are measured from the south-west corner within the 100 km square.

A roamer is used as a guide in determining these values. Depending on the map scale, coordinates may be given to within one metre. For example, to identify a point on a map to the nearest metre, the location may be expressed as: "11U NF 84000/55400", "11U" being the zone and belt, "NF" the 100 000 metre square identifier, "84000" the easting and "55400" the northing (always read in this order).

In order to identify the location of points in the polar regions outside the UTM coverage area, the Universal Polar Stereographic (UPS) Grid System may be used. (See roamer).