

Appendix C: Useful Conversions and Information

Length

- 1 meter = 100 centimeters
- 1 meter = 1000 millimeters
- 1 meter = 3.28083989501 International feet
- 1 meter = 3.28083333333 U.S. survey feet
- 1 kilometer = 1000 meters
- 1 kilometer = 0.62137 miles
- 1 mile = 5280 feet

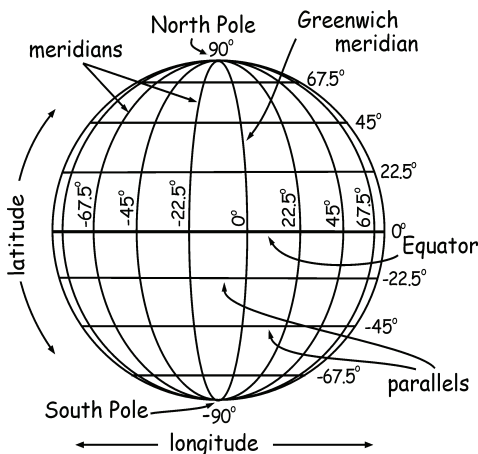
Area

- 1 hectare = 10,000 square meters
- 1 square kilometer = 100 hectares
- 1 acre = 43,560 square feet
- 1 square mile = 640 acres
- 1 hectare = 2.47 acres
- 1 square kilometers = 0.3861 square miles

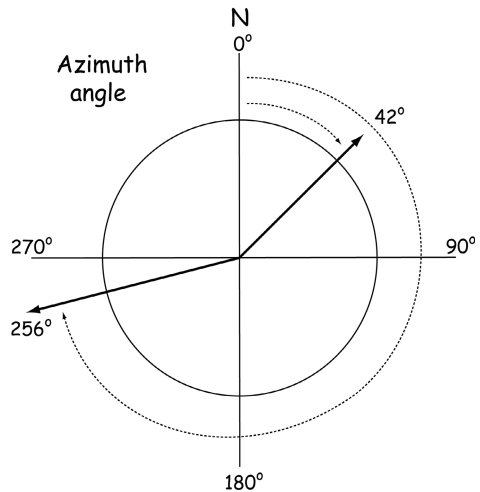
Angles

- 1 degree = 60 minutes of arc
- 1 minute = 60 seconds of arc
- decimal degrees =
degrees + minutes/60+seconds/3600
- 180 degrees = 3.14159 radians
- 1 radian = 57.2956 degrees

Spherical angles on a globe:



Horizontal angles in a projected coordinate system - Azimuth on a flat map:



Scale

1 centimeter distance on map equals a distance

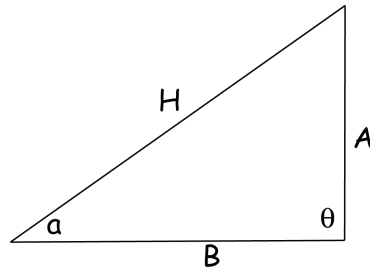
Scale value	on the ground of:
1:5,000	50 meters
1:10,000	100 meters
1:25,000	250 meters
1:50,000	500 meters
1:100,000	1000 meters

1 inch distance on a map equals a distance

Scale value	on the ground of:
1:6,000	500 feet
1:15,840	1,320 feet
1:24,000	2,000 feet
1:62,500	5,208 feet
1:100,000	8,333 feet

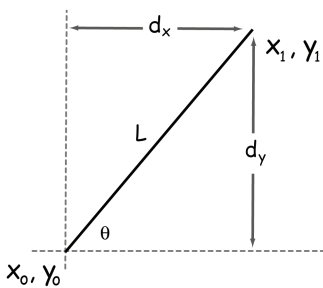
Trigonometric Relationships

- sine (a) = A/H
- cosine (a) = B/H
- tangent (a) = A/B
- cotangent (a) = B/A
- secant (a) = H/A
- cosecant (a) = H/B



Coordinate Geometry

Coordinate geometry (COGO)



$$x_1 = x_0 + dx$$

$$y_1 = y_0 + dy$$

$$dx = L \cdot \cos(\theta)$$

$$dy = L \cdot \sin(\theta)$$

therefore

$$x_1 = x_0 + L \cos(\theta)$$

$$y_1 = y_0 + L \sin(\theta)$$

If we know the location of a point, x_n, y_n , and have measured the azimuth and distance to another point x_u, y_u . What are the coordinates for the unknown point, x_u, y_u ?

Suppose $x_n = 12, y_n = 3, D = 6.8$, and azimuth = 242°

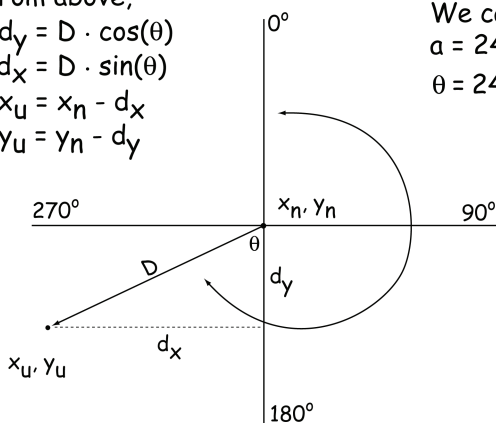
From above,

$$d_y = D \cdot \cos(\theta)$$

$$d_x = D \cdot \sin(\theta)$$

$$x_u = x_n - d_x$$

$$y_u = y_n - d_y$$



We can calculate θ from the azimuth,
 $a = 242^\circ$
 $\theta = 242 - 180$ (see figure)

So

$$d_y = 6.8 \cdot \cos(62) = 3.2$$

$$d_x = 6.8 \cdot \sin(62) = 6.0$$

$$x_u = 12 - 6 = 6$$

$$y_u = 3 - 3.2 = -0.2$$