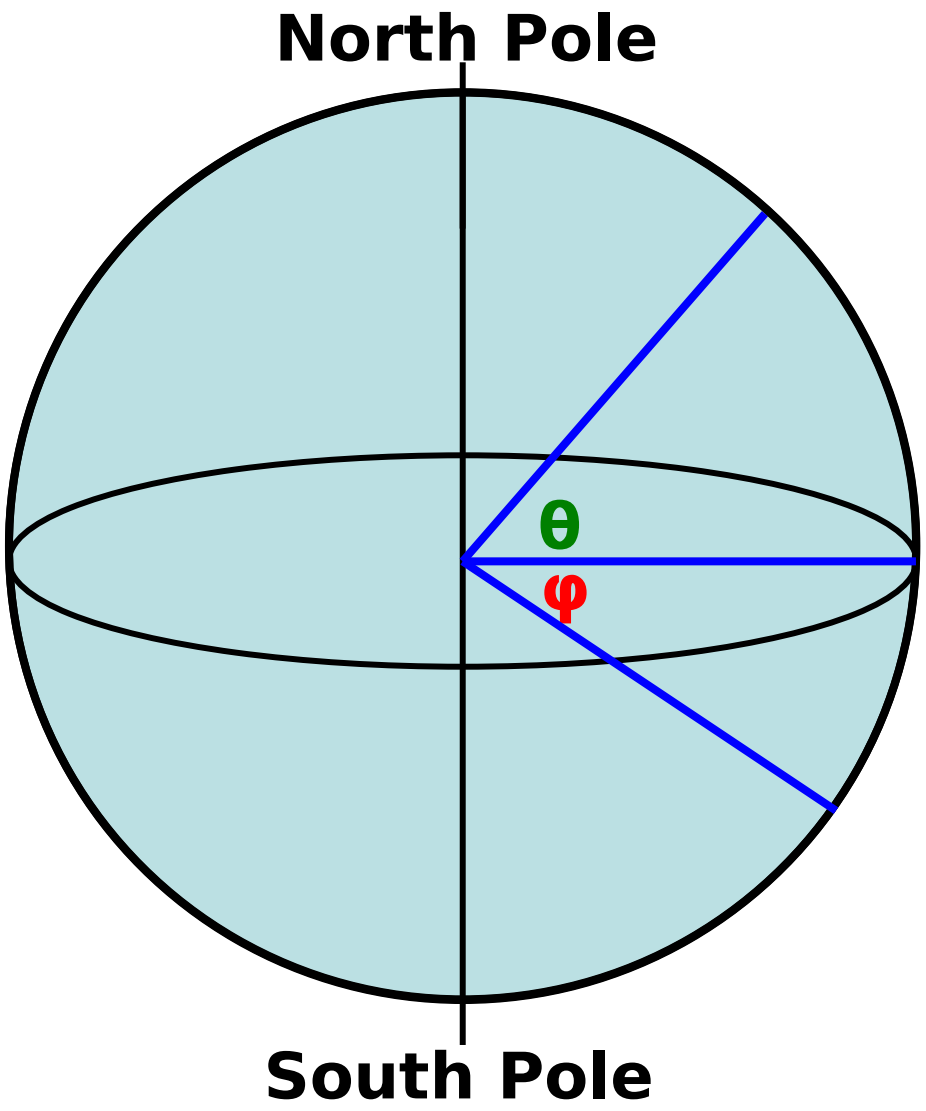
LATITUDES AND LONGITUDES

Angular Distance – Latitude (1/11)



Latitude is the angle of a point

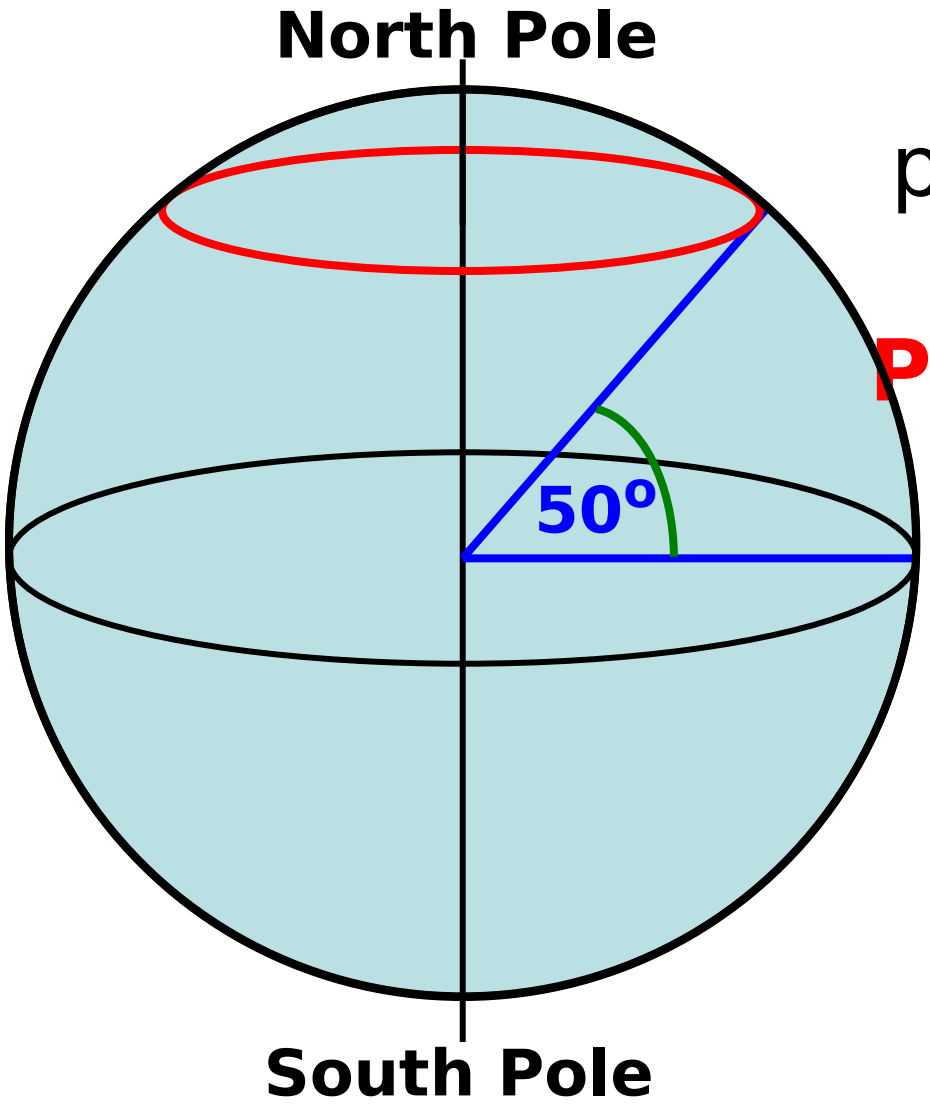
above

or

below

the equator

Latitude (2/11)

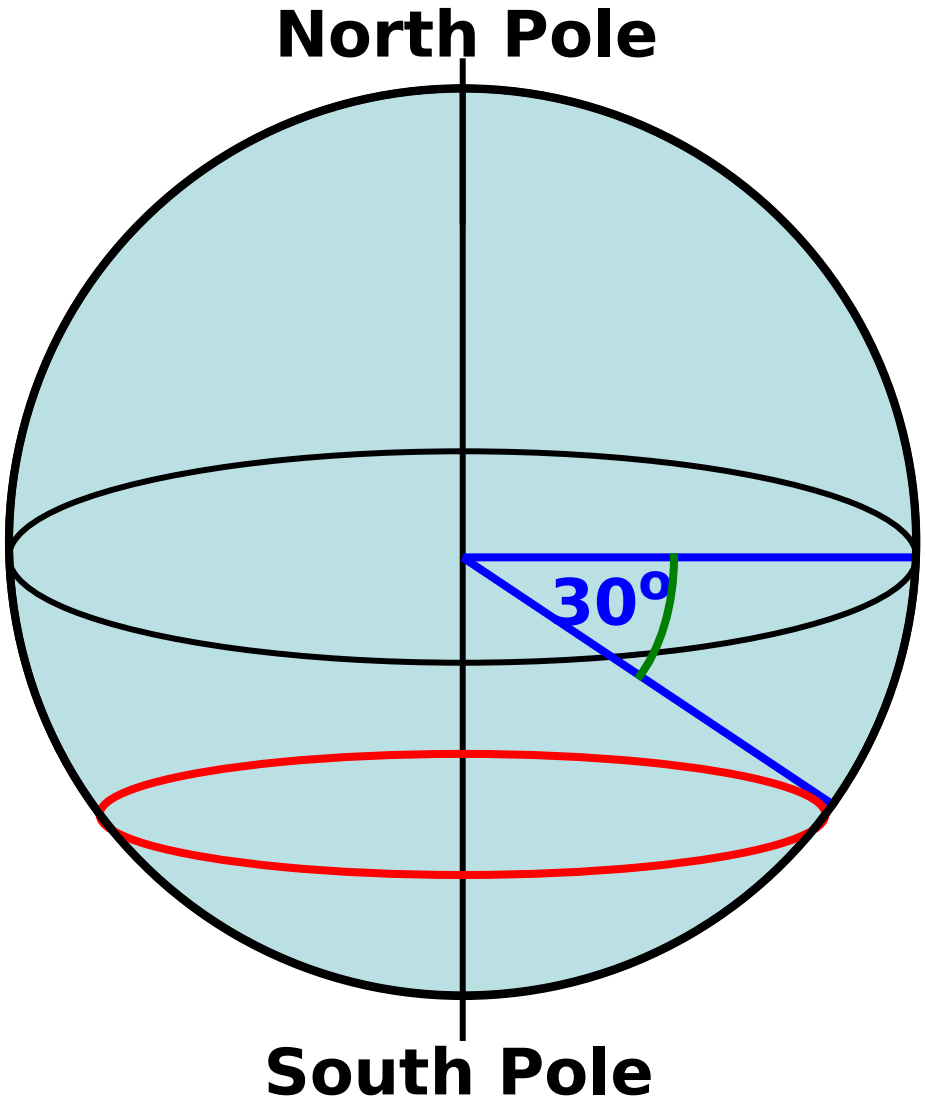


Small circles parallel to the equator are called **Parallels of Latitude**.

They are the **angle** between the **small circle** and The **equator**.

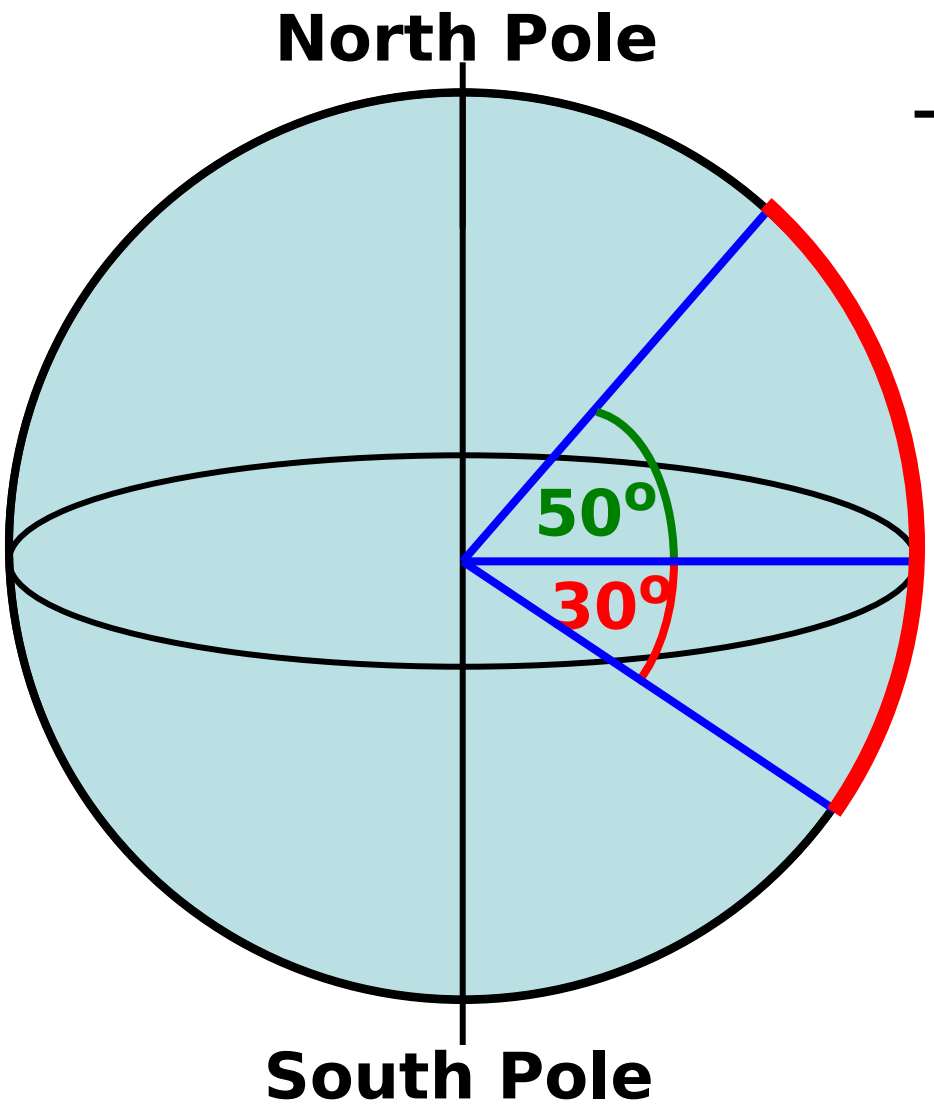
Latitude = 50ºN

Latitude (3/11)



Latitude = 30ºS

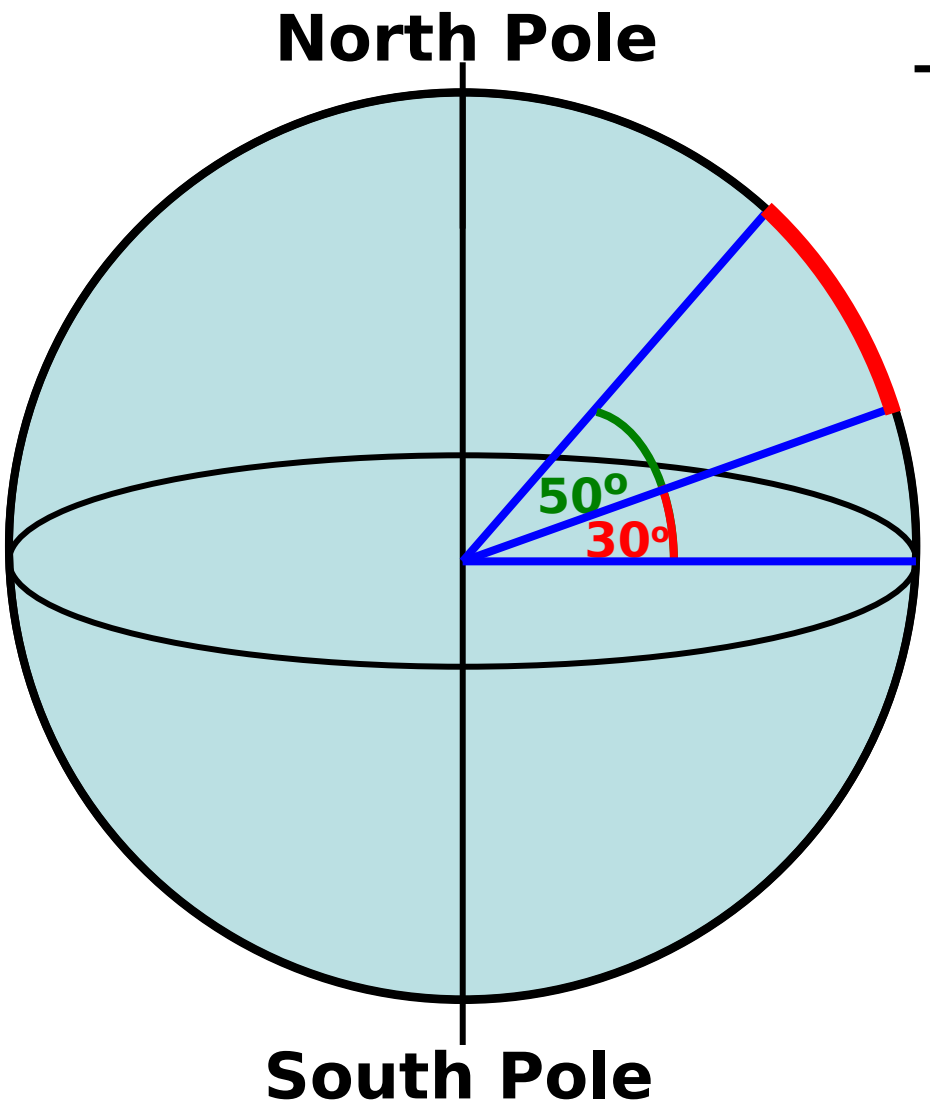
Angular Distance – Opposite Sides (4/11)



The angular distance for angles **on opposite sides of the equator** can be found by **adding the angles**

50ºN + 30ºS = 80º

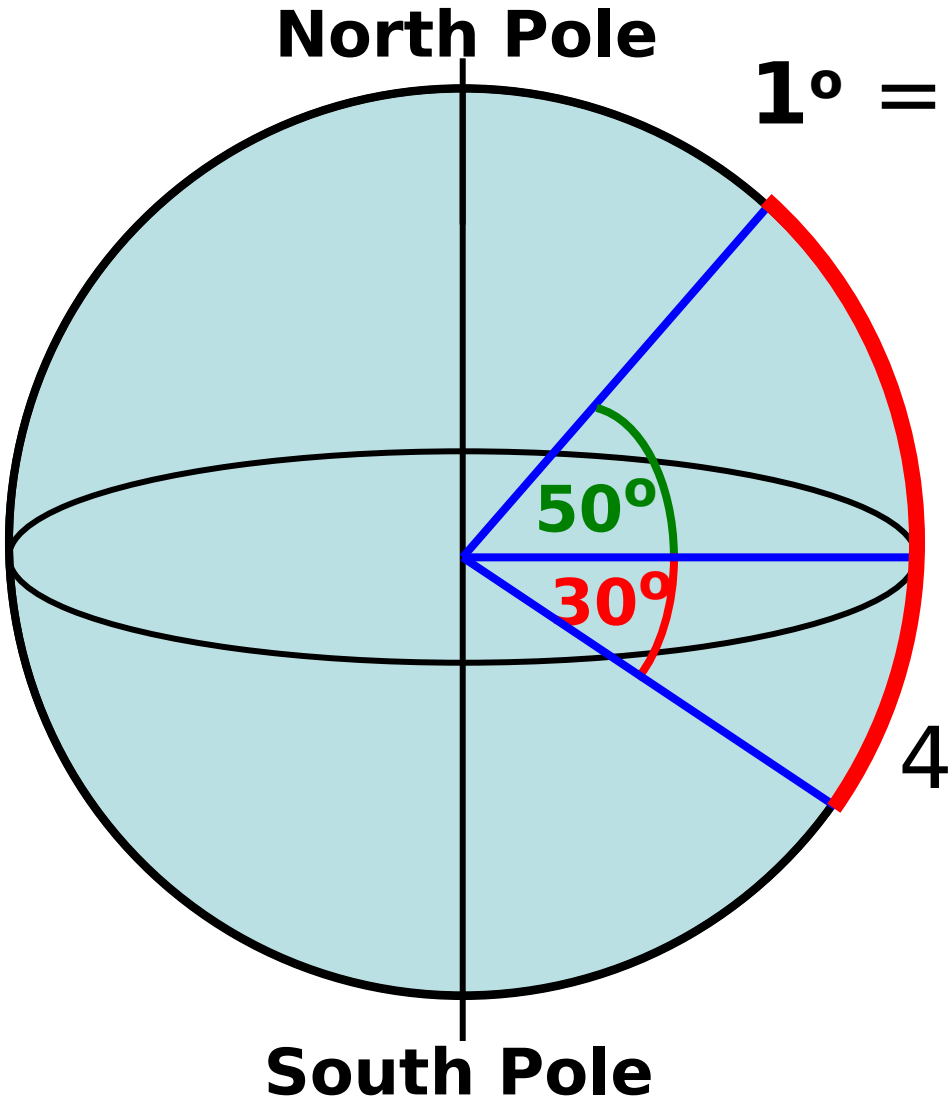
Angular Distance – Same Side (5/11)



The angular distance for angles **on the same side of the equator** can be found by **subtracting the angles.**

50ºN - 30ºS =20º

Distance - Nautical Miles – Opposite Sides (6/11)



1° = 60 Nautical Mile (M)

50°N + 30°S = 80°

$80^{\circ} = 80 \times 60M$

$= 4800\ M$

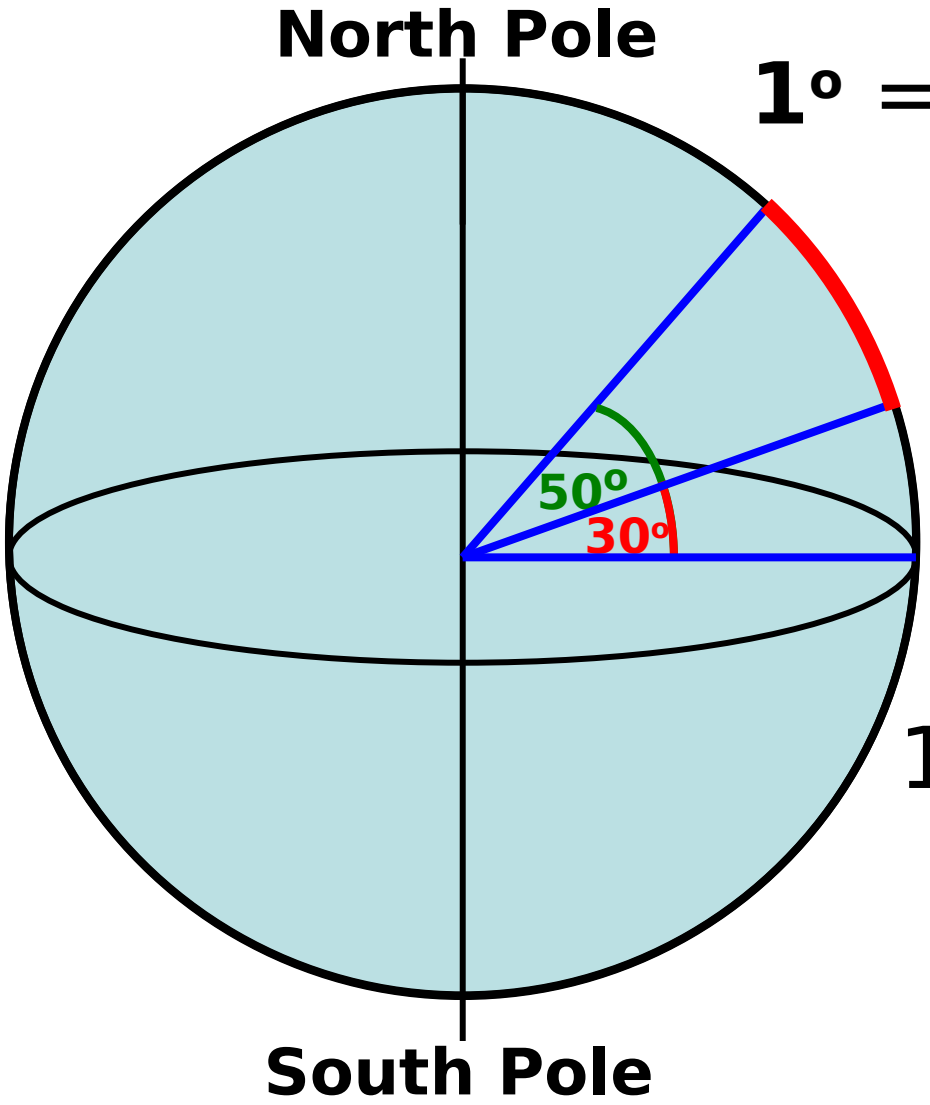
$[1M \approx 1.853\ km]$

$4800M \approx 4800 \times 1.853$

$= 8894.4$

$= 8900\ km$

Distance - Nautical Miles – Same Side (7/11)



1° = 60 Nautical Mile (M)

50°N - 30°S = 20°

$20^{\circ} = 20 \times 60M$

$= 1200\ M$

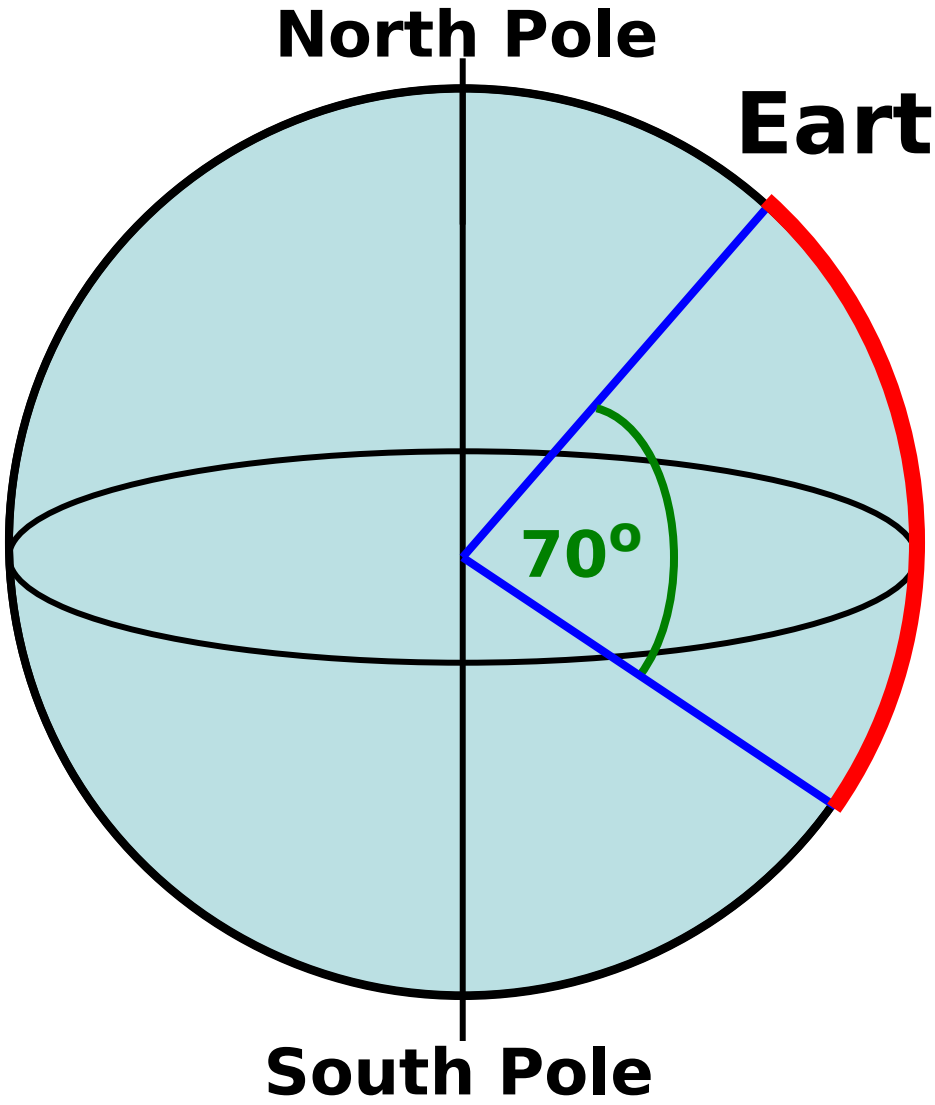
$[1M \approx 1.853\ km]$

$1200M \approx 1200 \times 1.853$

$= 2223.6$

$= 2200\ km$

Distance - Great Circle (8/11)



Earth Radius ≈ 6400 km

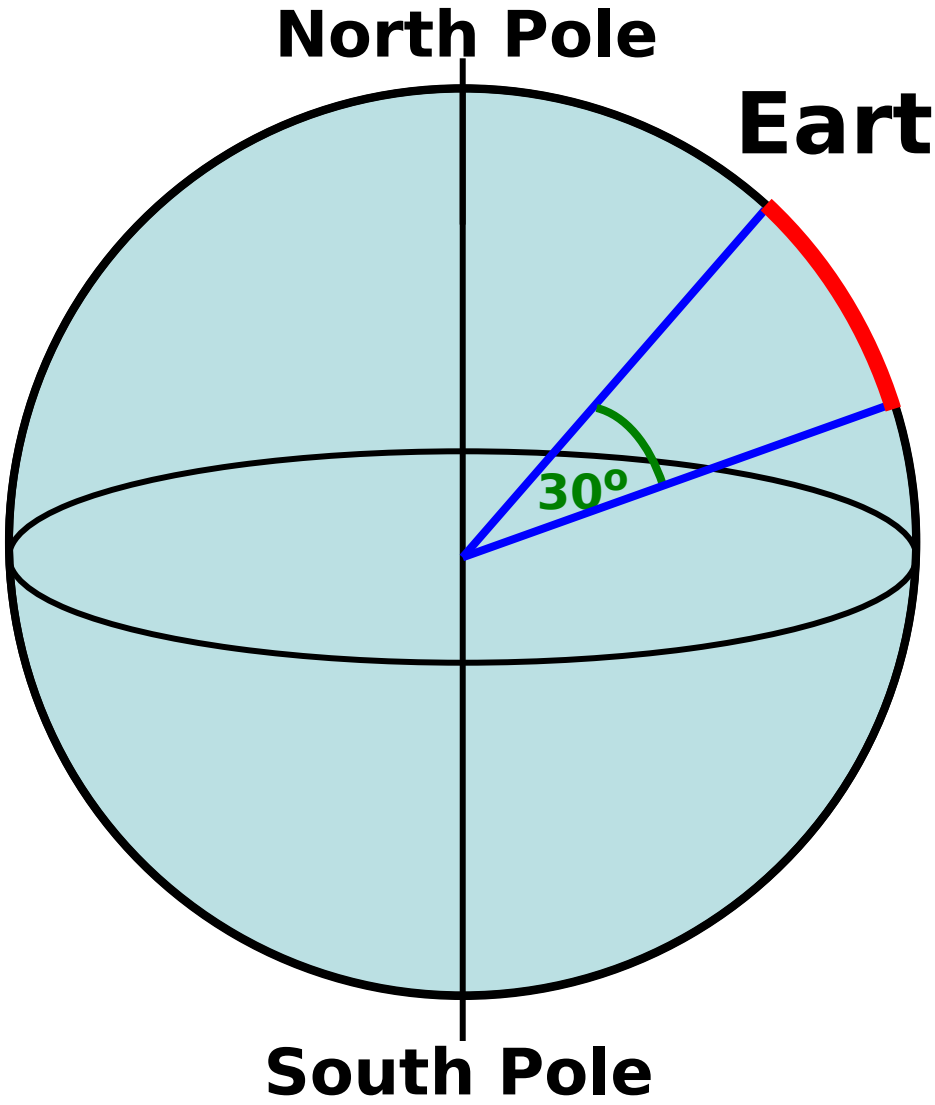
$$D = \frac{\theta}{360} \times 2\pi r$$

$$\approx \frac{70}{360} \times 2\pi \times 6400$$

$$\approx 78190.075049$$

$$\approx 78{,}200 \text{ km}$$

Distance – Great Circle (9/11)



Earth Radius ≈ 6400 km

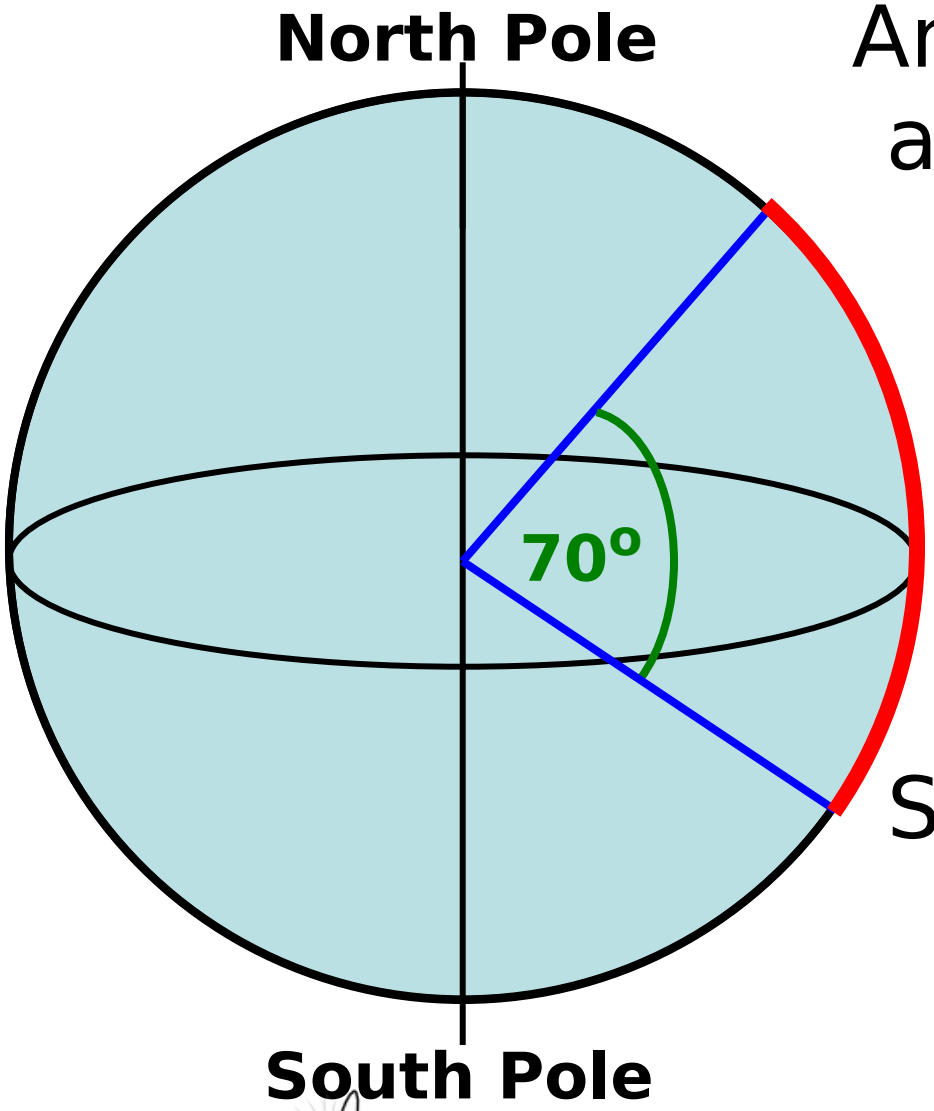
$$D = \frac{\theta}{360} \times 2\pi r$$

$$\approx \frac{30}{360} \times 2\pi \times 6400$$

$$\approx 3{,}351.032164$$

$$\approx 3{,}400 \text{ km}$$

Distance - Speed (10/11)



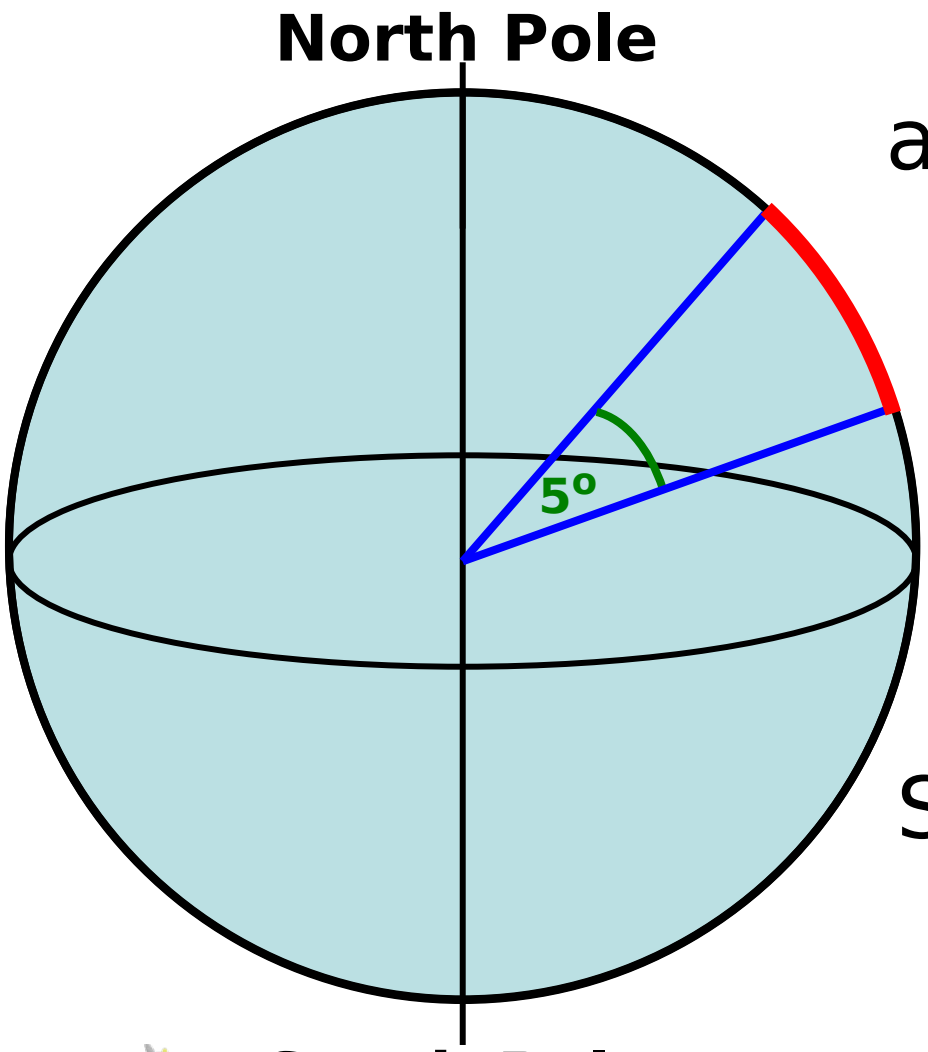
An airplane travels 70º along a great circle in 10 hours.
What is its speed?

1 knot = 1 M/hr

D = 70 x 60 M
= 4200 M

Speed = 4200 ÷ 10
= 420 M/hr
= 420 knots

Distance – Great Circle (11/11)



An ship travels 5º along a great circle in 5 hours.
What is its speed?

1 knot = 1 M/hr

D = 5 x 60 M
= 300 M
Speed = 300 ÷ 5
= 60 M/hr
= 60 knots