Cartography

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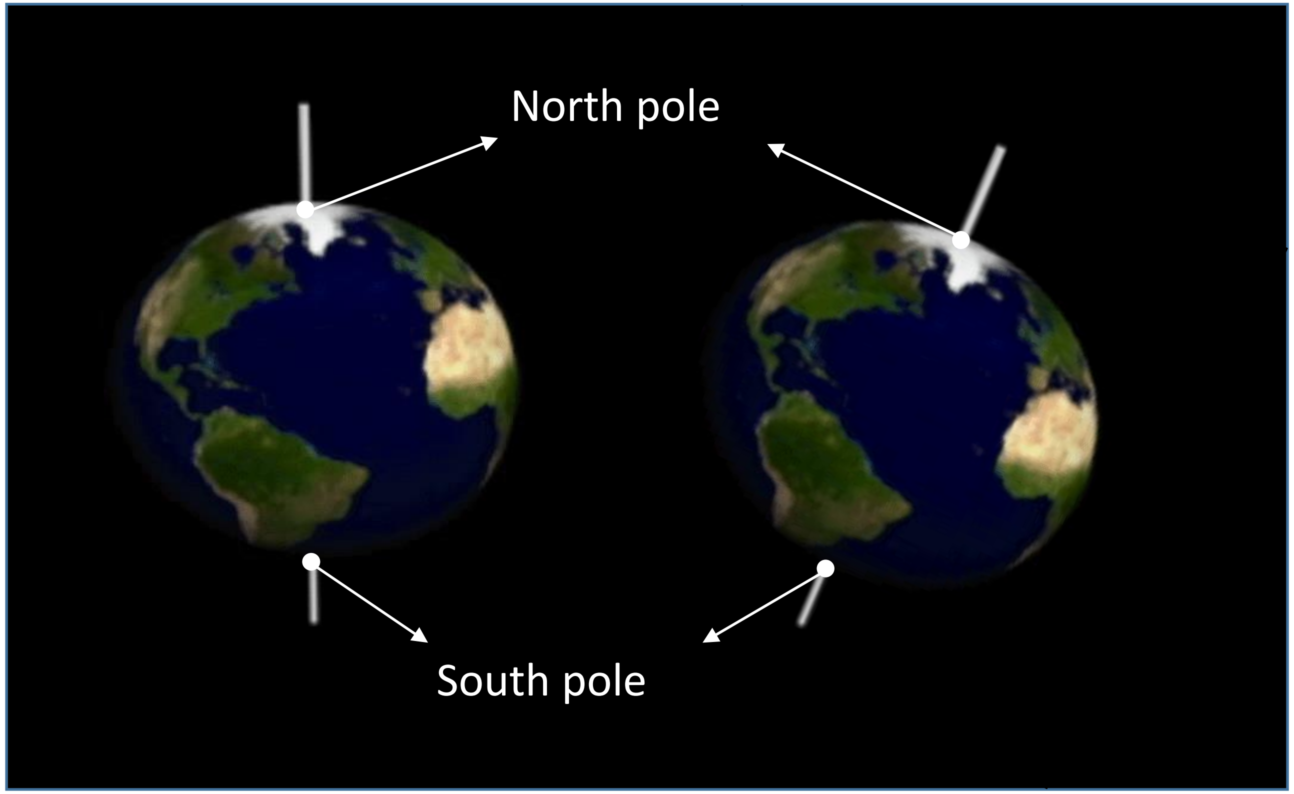
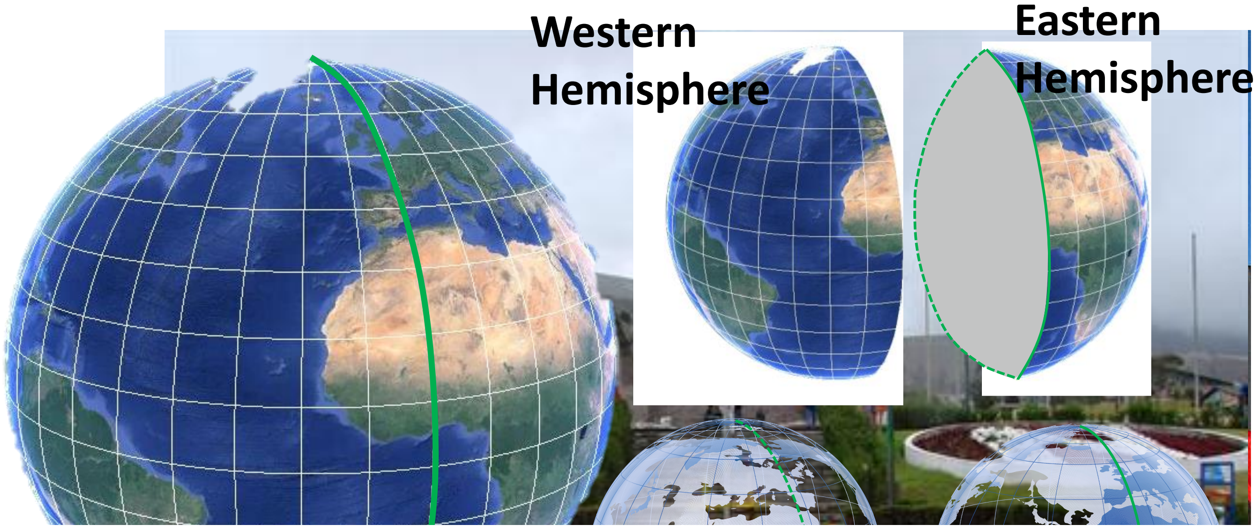
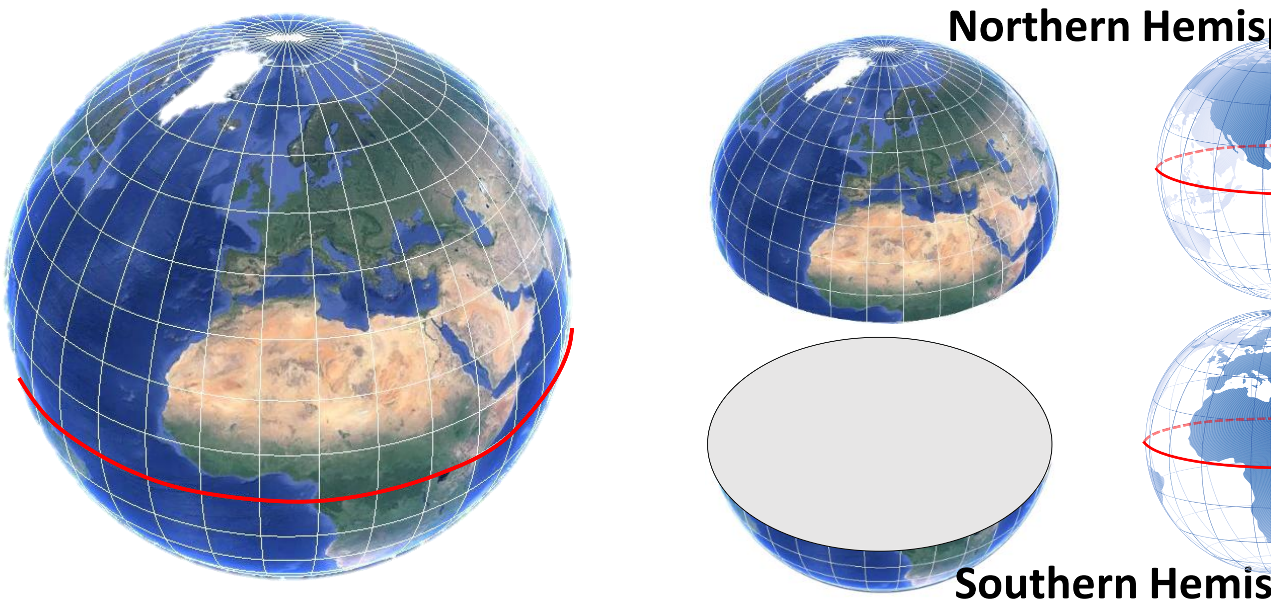
Poles
Equator
Prime Meridian
Equator Plane
Prime Meridian and Timeline plane
Latitude, Parallel
Longitude, Meridian

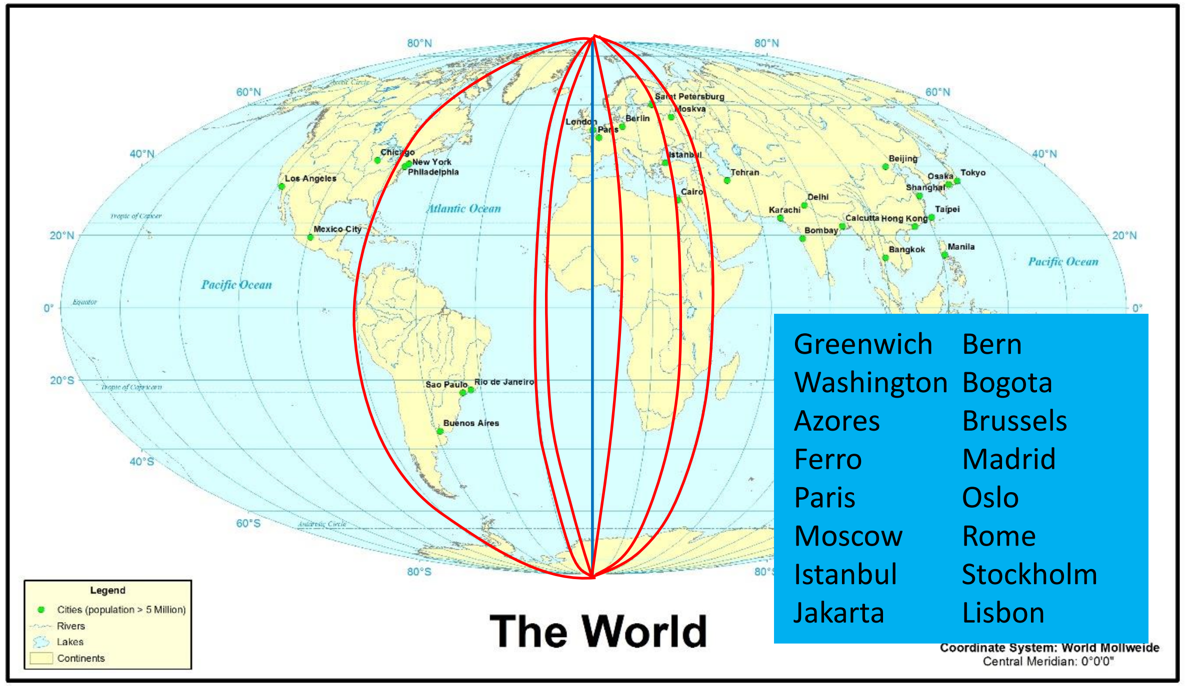
Projections
Trigonometric Functions, Usage of the table
Perpendicular and parallel drawings
Distance units
Scale
Projections and geo
Planar projections

Poles
Equator
Prime Meridian, Date Line

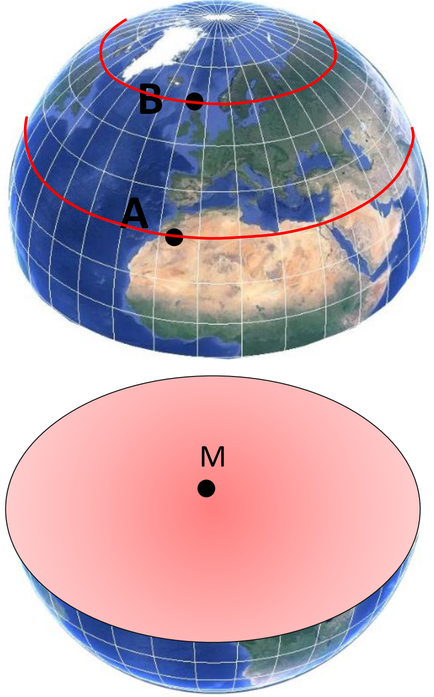




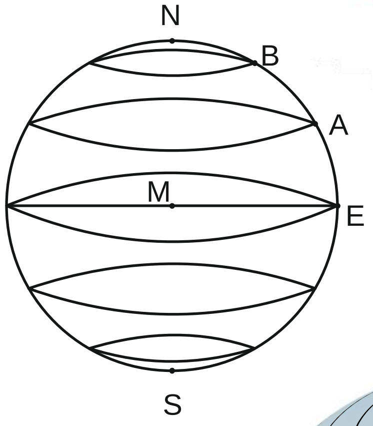


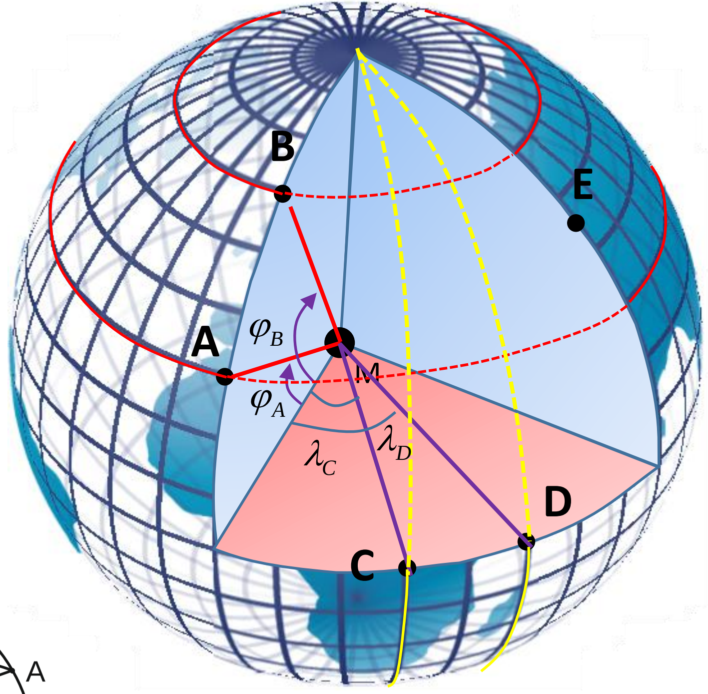


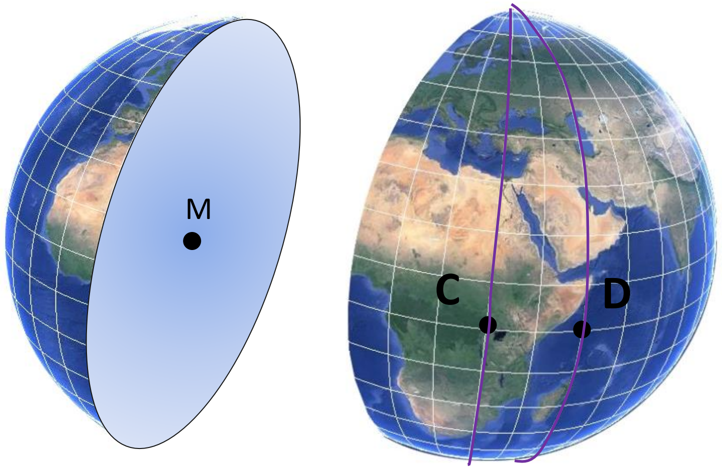
- Equator plane
- Latitude, Parallel.
- Plane of Pr. Mer.
- Longitude, Meridian



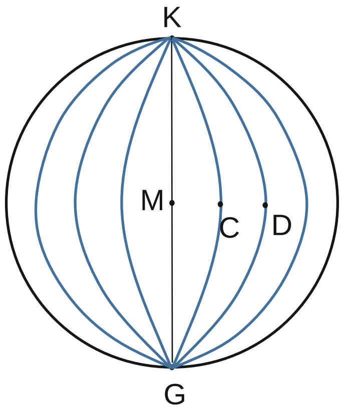
φ



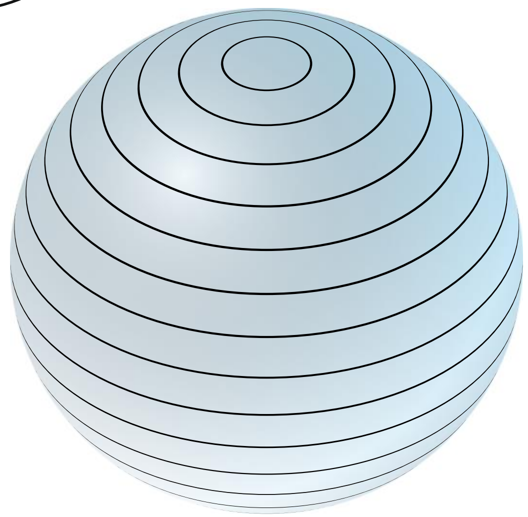




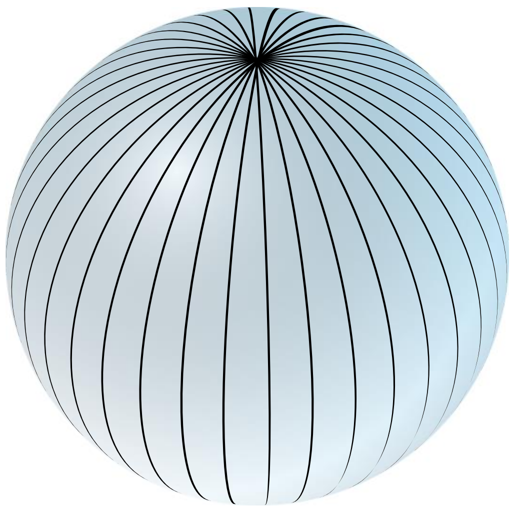
λ



Parallels



Meridians



Latitude
Latitude is the angle of the distance of a point on the earth to the equatorial plane. Latitude is the angle between the plumb line of a point on the earth (the line joining the point and the center of the earth) and the equatorial plane.

Parallel
Circle that are thought to pass parallel to the equator according to the determined latitude values are called parallel.

Longitude
Longitude is the angle of the distance of a point on the earth from the determined meridian plane. Longitude is the angle between the plumb line of a point on the earth (the line joining the point and the center of the earth) and the determined meridian l plane.

Meridian
According to the determined longitude values, semicircular arcs that are thought to pass from one pole to the other pole are called meridians.

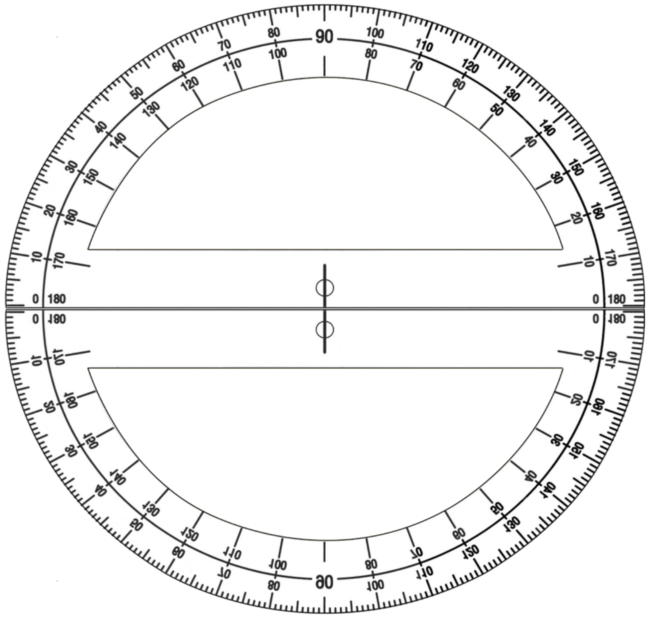
Degree

Minute

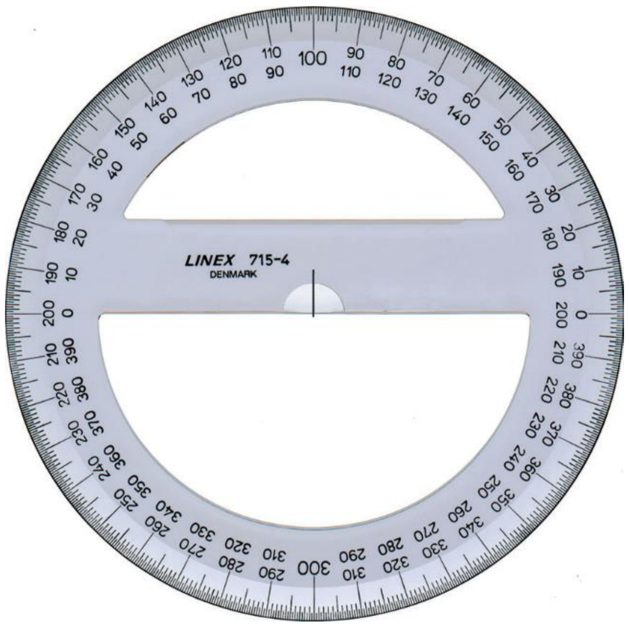
Second

1 cycle = 360 degree (360°)
1 degree = 60 minutes (60')
1 minute = 60 seconds (60")

Degree



Grad



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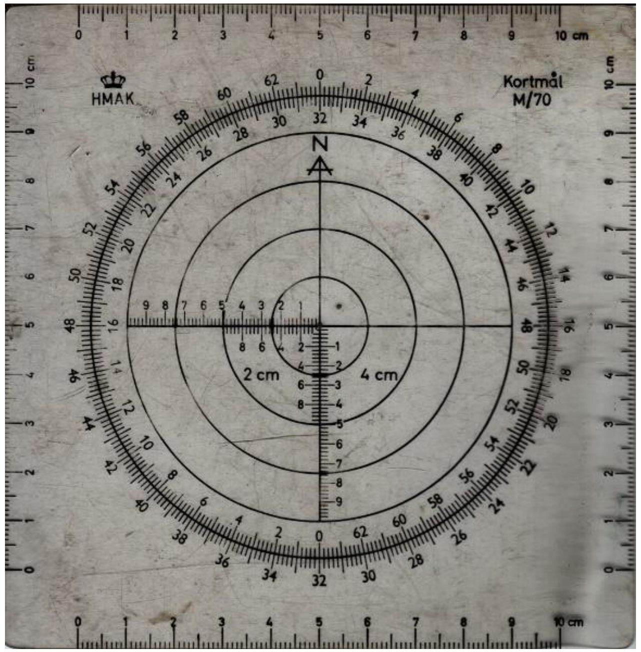
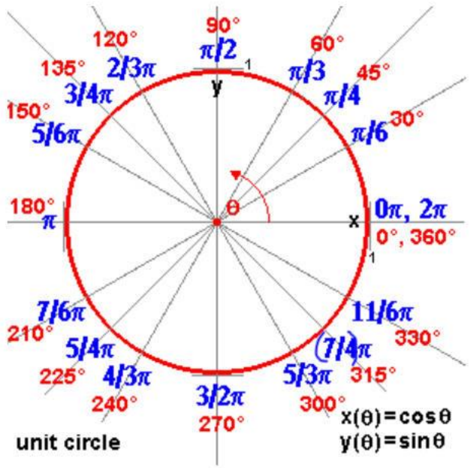
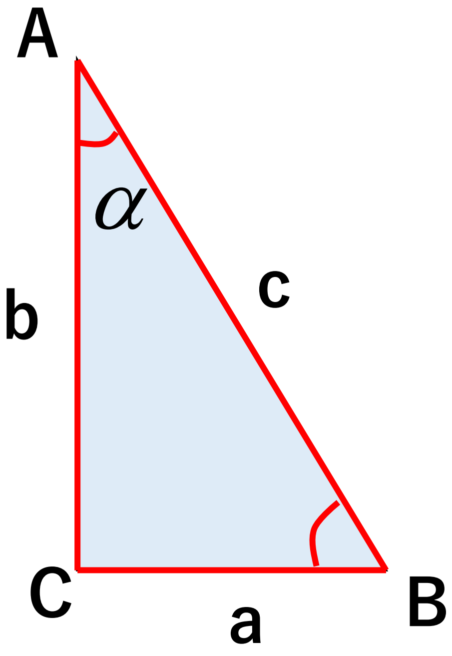


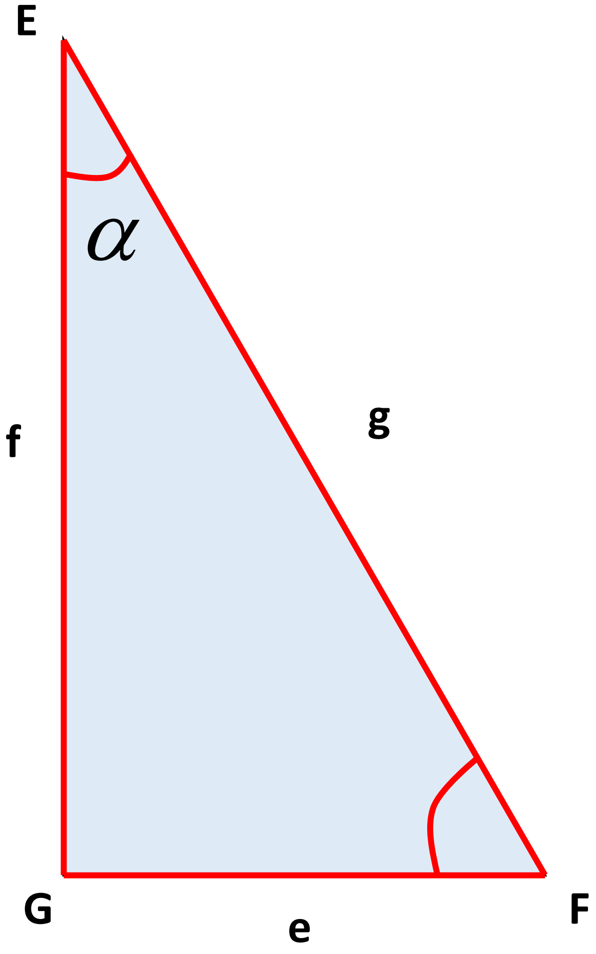
Radian

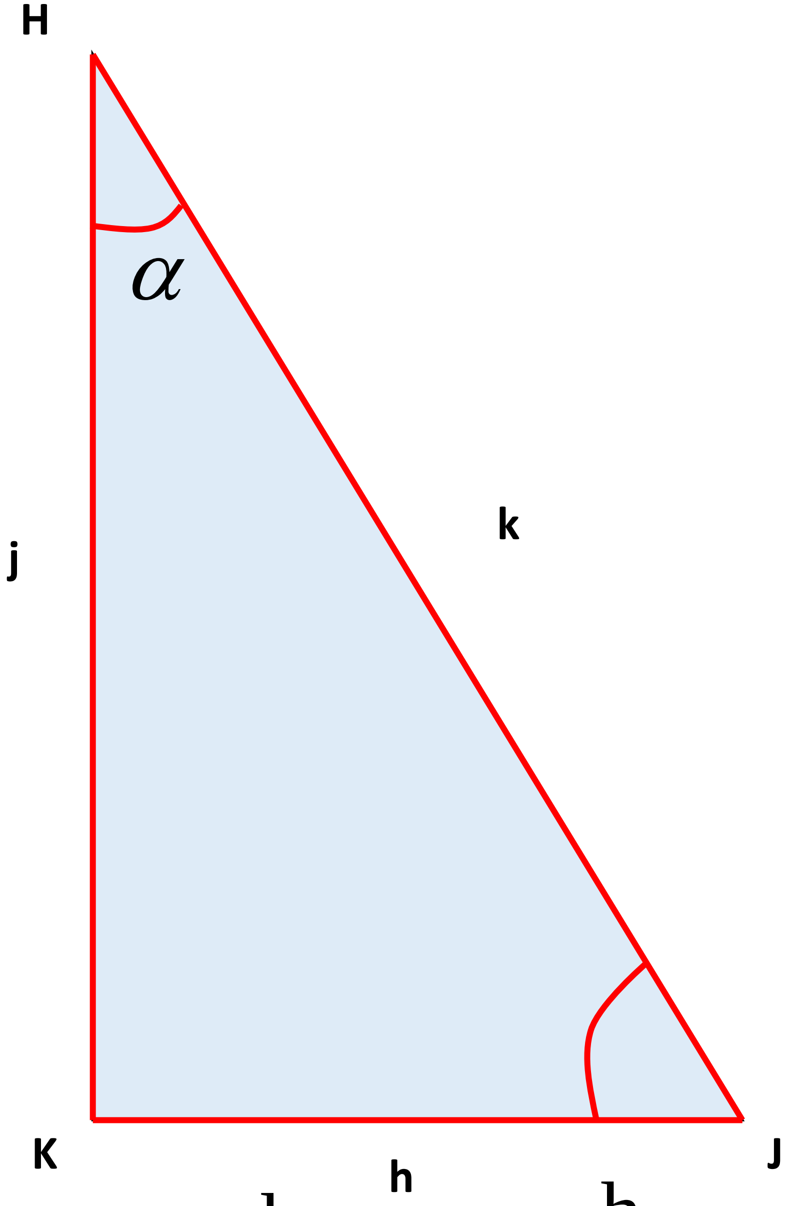


Why Trigonometry?



$$a = \overline{CB}$$





$$\frac{a}{b} \quad \frac{a}{c} \quad \frac{b}{a} \quad \frac{b}{c}$$

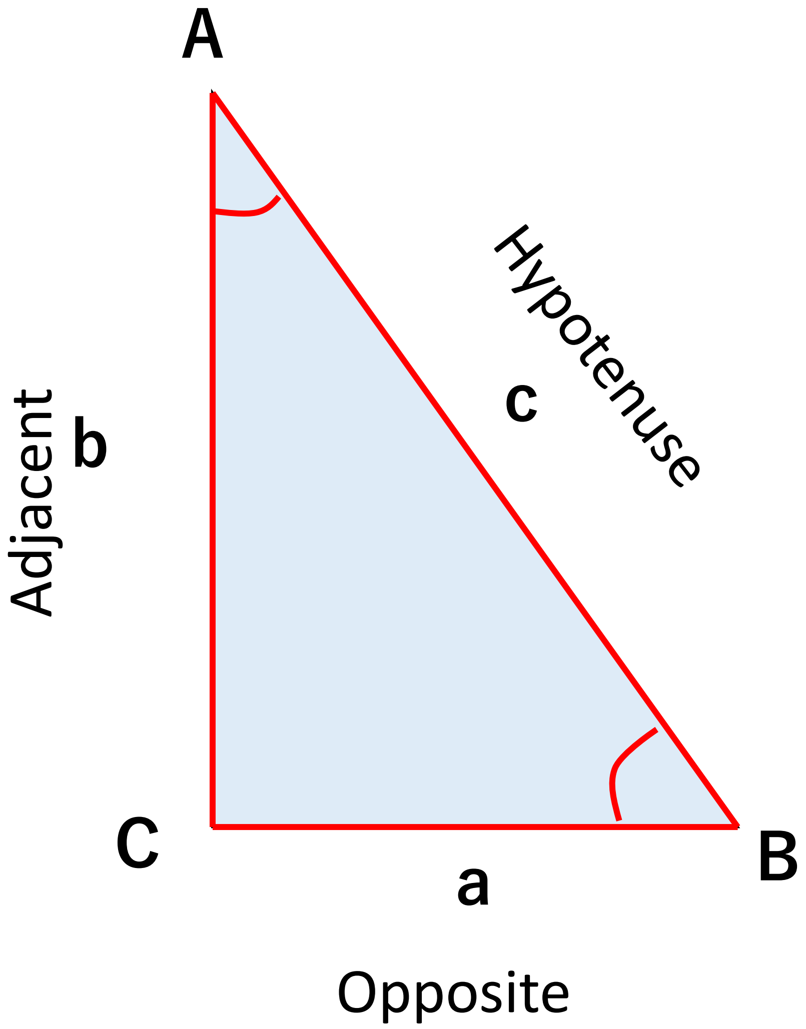
$$\frac{e}{f} \quad \frac{e}{g}$$

$$\frac{h}{j} \quad \frac{h}{k}$$

$$\frac{a}{b} = \frac{e}{f}$$

$$\frac{a}{b} = \frac{e}{f} = \frac{h}{j}$$

Trigonometric function for A angle



$$\sin A = \frac{opp}{hyp} = \frac{a}{c}$$

$$\cos A = \frac{adj}{hyp} = \frac{b}{c}$$

$$tg A = \frac{opp}{adj} = \frac{a}{b}$$

$$cotg A = \frac{adj}{opp} = \frac{b}{a}$$

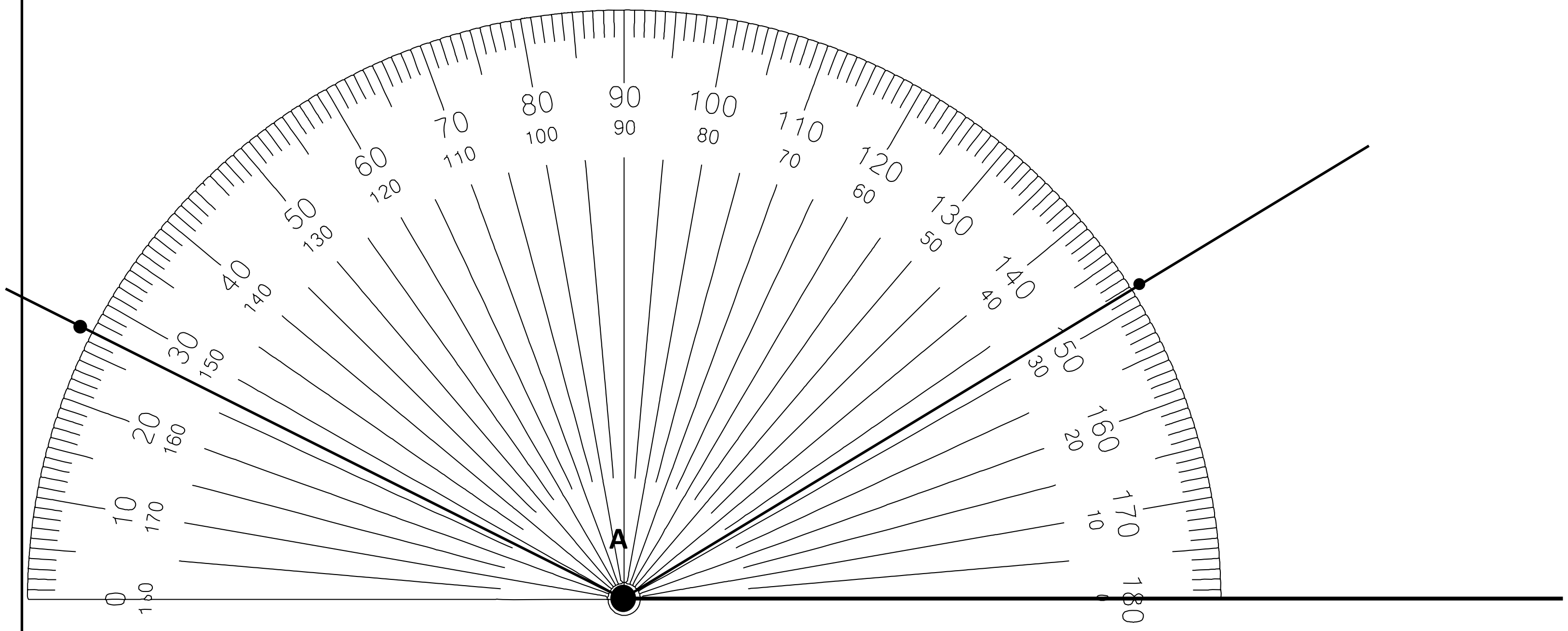
Enlem φ	Sin	Tg	Cotg	Cos	Enlem φ
0	0,0000	0,0000	∞	1,0000	90
1	0,0174	0,0175	57,290	0,9998	89
2	0,0349	0,0349	28,636	0,9994	88
3	0,0523	0,0524	19,081	0,9986	87
4	0,0698	0,0699	14,301	0,9976	86
5	0,0872	0,0875	11,430	0,9962	85
6	0,1045	0,1051	9,514	0,9945	84
7	0,1219	0,1228	8,144	0,9925	83
8	0,1392	0,1405	7,115	0,9903	82
9	0,1564	0,1584	6,314	0,9877	81
10	0,1736	0,1763	5,671	0,9848	80
11	0,1908	0,1944	5,145	0,9816	79
12	0,2079	0,2126	4,705	0,9781	78
13	0,2249	0,2309	4,331	0,9744	77
14	0,2419	0,2493	4,011	0,9703	76
15	0,2588	0,2679	3,732	0,9659	75
16	0,2756	0,2867	3,487	0,9613	74
17	0,2924	0,3057	3,271	0,9563	73
18	0,3090	0,3249	3,078	0,9511	72
19	0,3256	0,3443	2,904	0,9455	71
20	0,3420	0,3640	2,747	0,9397	70
21	0,3584	0,3839	2,605	0,9336	69
22	0,3746	0,4040	2,475	0,9272	68
23	0,3907	0,4245	2,356	0,9205	67
24	0,4067	0,4452	2,246	0,9135	66
Enlem φ	Cos	Cotg	Tg	Sin	Enlem φ

sin
cos
tg
cotg

(Elibüyük, 2000)

Enlem φ	Sin	Tg	Cotg	Cos	Enlem φ
25	0,4226	0,4663	2,144	0,9063	65
26	0,4384	0,4877	2,050	0,8988	64
27	0,4540	0,5095	1,963	0,8910	63
28	0,4695	0,5317	1,881	0,8829	62
29	0,4848	0,5543	1,804	0,8746	61
30	0,5000	0,5773	1,732	0,8660	60
31	0,5150	0,6009	1,664	0,8572	59
32	0,5299	0,6249	1,600	0,8480	58
33	0,5446	0,6494	1,540	0,8387	57
34	0,5592	0,6745	1,483	0,8290	56
35	0,5736	0,7002	1,428	0,8191	55
36	0,5878	0,7265	1,376	0,8090	54
37	0,6018	0,7535	1,327	0,7986	53
38	0,6157	0,7813	1,280	0,7880	52
39	0,6293	0,8098	1,235	0,7771	51
40	0,6428	0,8391	1,192	0,7660	50
41	0,6561	0,8693	1,150	0,7547	49
42	0,6691	0,9004	1,111	0,7431	48
43	0,6820	0,9325	1,072	0,7313	47
44	0,6947	0,9657	1,035	0,7193	46
45	0,7071	1,0000	1,000	0,7071	45
Enlem φ	Cos	Cotg	Tg	Sin	Enlem φ

Drawing Angles (with Protractor)



Distance (The Metric System)

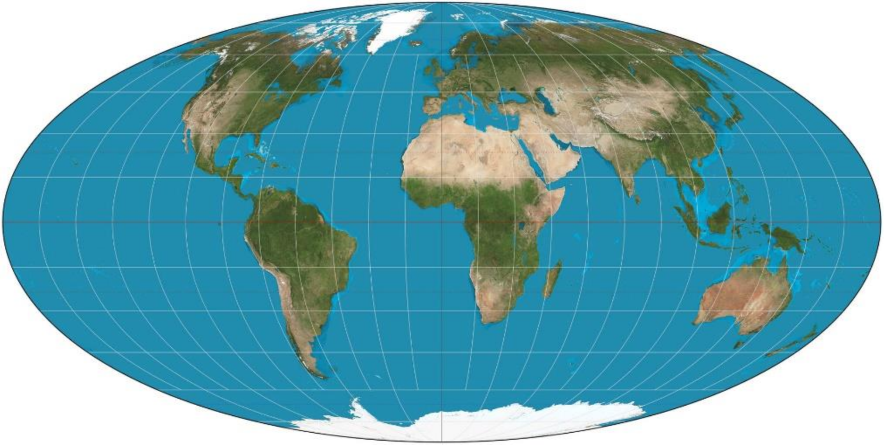
French scientists established an international measurement system in 1791. In this system, meters, kilograms and seconds

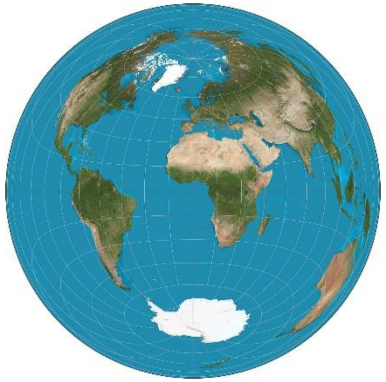
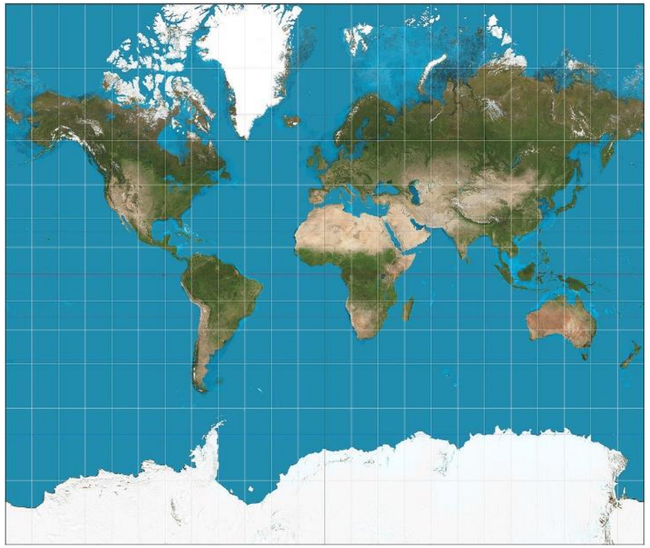
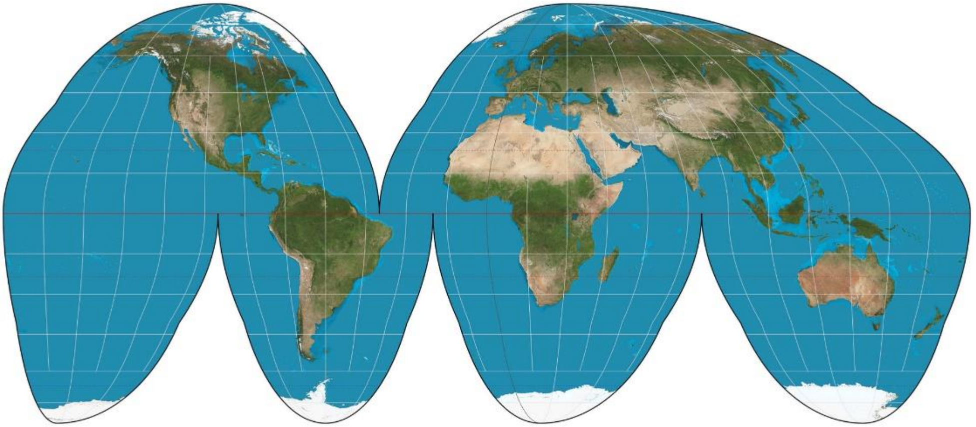
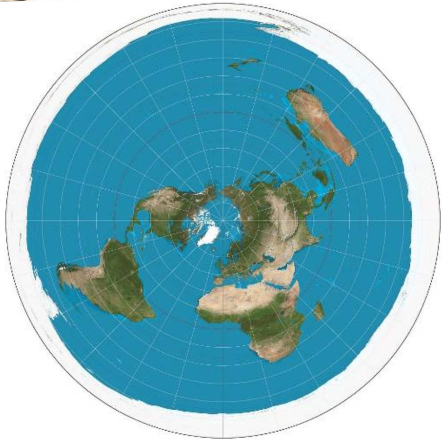
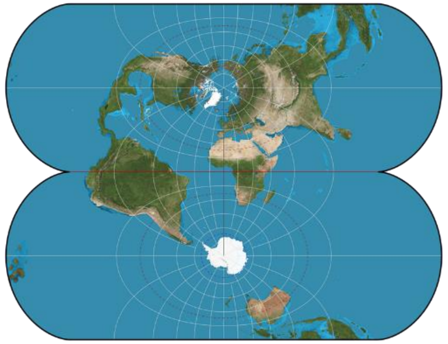
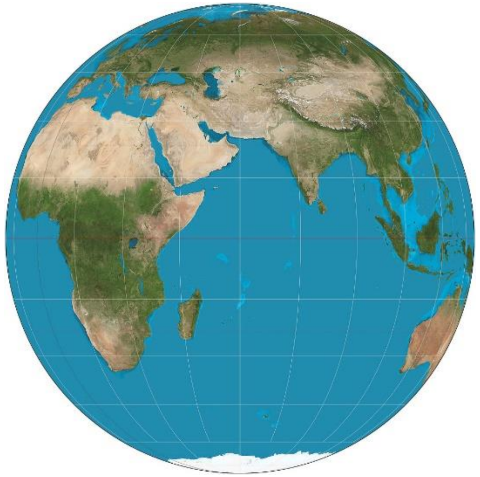
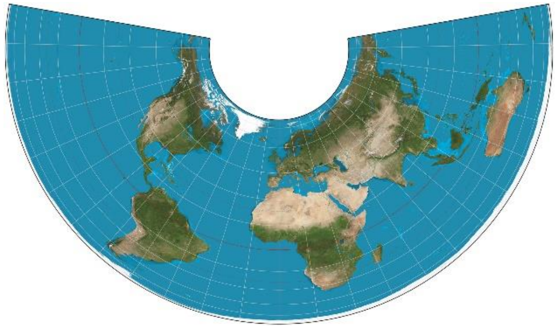
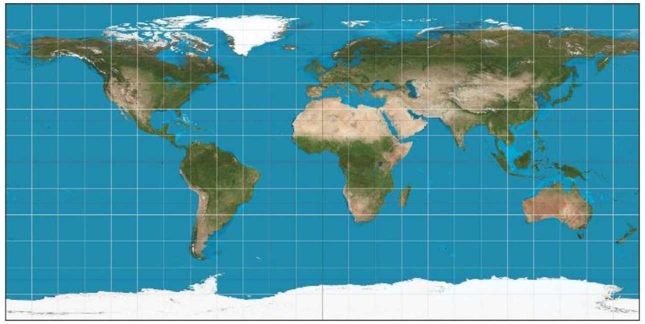
A meter is one ten-millionth (10-7) of the distance along the meridian between the equator and the north pole;second, 1/86,400 of the mean solar day;kilogram, mass of a given amount of waterIn 1960, this organization named its unit system based on the meter, kilogram, and second the International System, denoted by the abbreviation SI (corresponding to the French words Systeme International). The system is also known as the metric system or the mks system (meters, kilograms and seconds).

Örnek	*Sembol*	*Çarpan*
Eksa†	E	10^{18}
peta†	P	10^{15}
tera	T	10^{12}
giga	G	10^{9}
mega	M	10^{6}
kilo	k	10^{3}
hecto†	h	10^{2}
deka†	da	10^{1}
desi†	d	10^{-1}
santi	c	10^{-2}
mili	m	10^{-3}
mikro	μ	10^{-6}
nano	n	10^{-9}
piko†	f	10^{-15}
atto†	a	10^{-18}

Extra
Peta
Tera
Giga
Mega
Kilometer
Haktometer
Decameter
Meter
Decimeter
Centimeter
Millimeter
Micro
Nano
Pico
Atto

The definition of the meter has been changed many times. In 1889, a meter was defined as the length between two finely engraved marks on a platinum-iridium rod found in a museum near Paris. Although several mates of this stick have been distributed around the world, the drawbacks of accepting such a standard have emerged over time. For example, with the advancement of optical techniques, it has been seen that the scratches on the rod are unclear and inaccurate. In 1960, the length standard was tied to the wavelength of orange-red light emitted from the Krypton (86Kr) isotope. Length measurement has required (and we need) greater precision over time; this Standard has also become inadequate. So in 1983, the 17th General Conference on Weights and Measures linked the standard length to the speed of light in vacuum (denoted c). One meter (m) is defined as the distance light travels in vacuum in 1/299,792,458 seconds.




Why?

Projections

According to the Used Surface

- Planar (Azimuthal)
- Cylindric
- Conic
- Other

By Axis Status

- Normal
- Transversal
- Oblique

According to Protection Feature

- Angle
- Area
- Distance
- Shape
- No Protection Feature

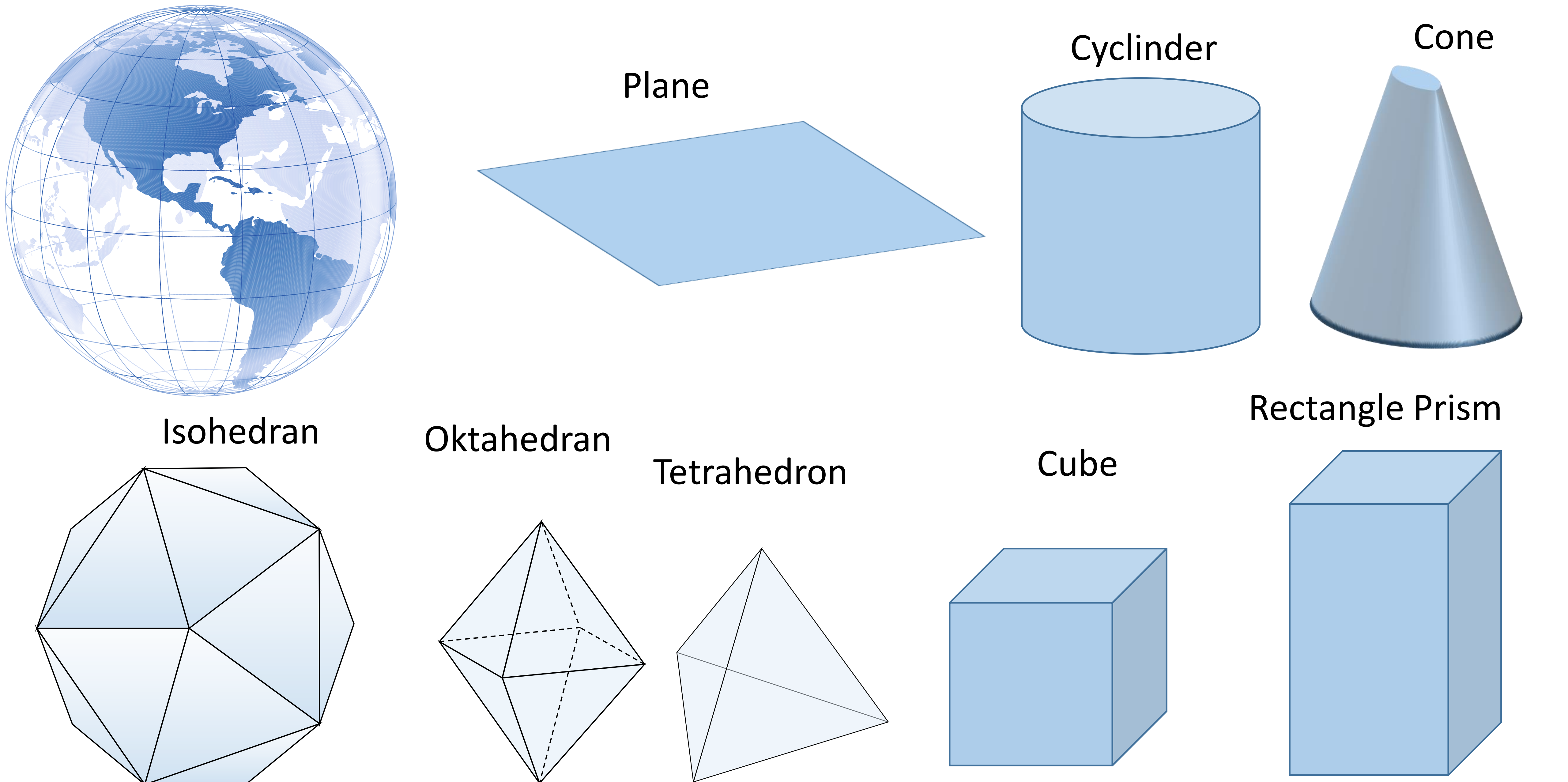
By Field of View

- Perspective
- Non-Perspective

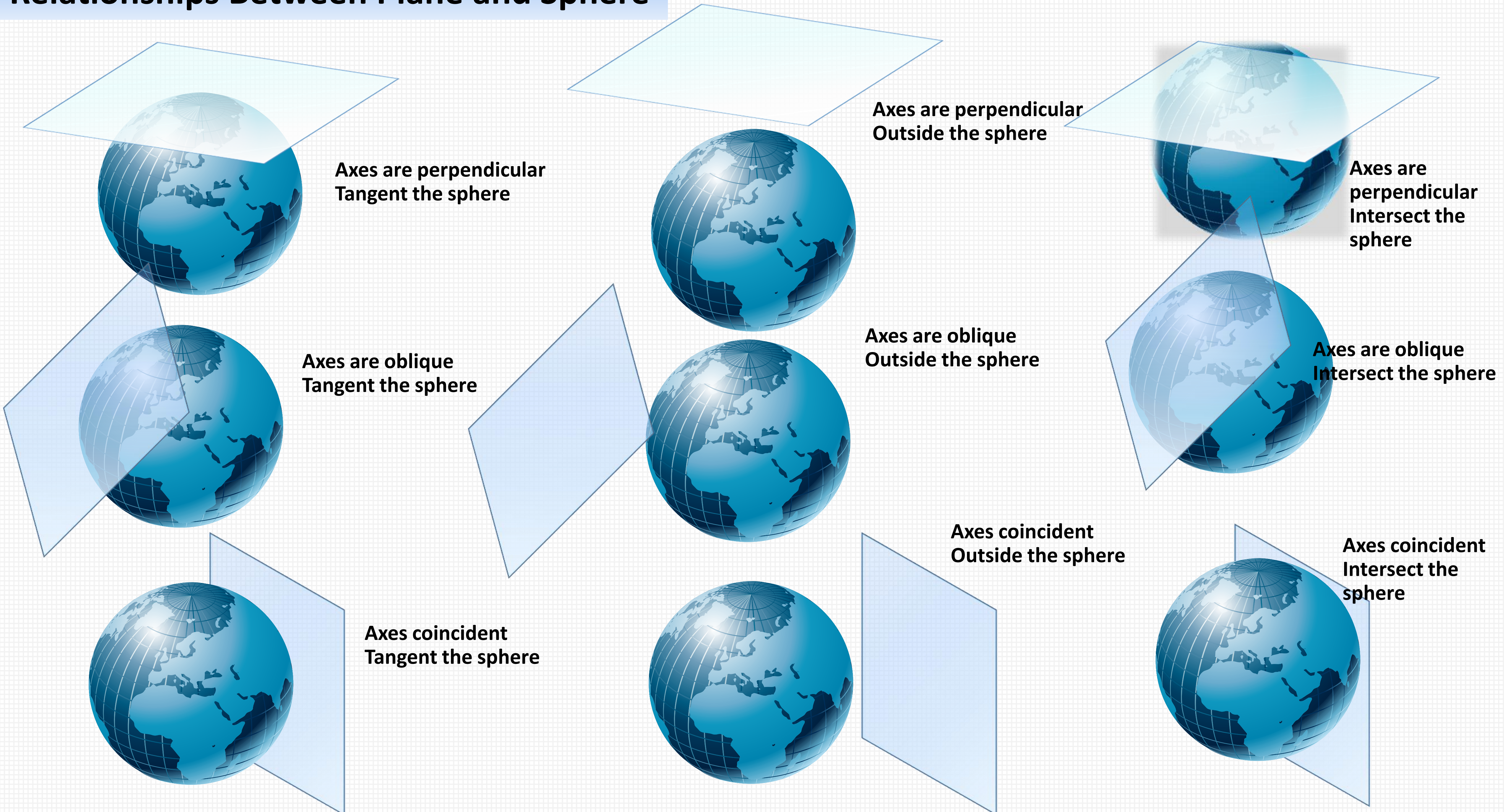
To Reality State

- Real
- Pseudo

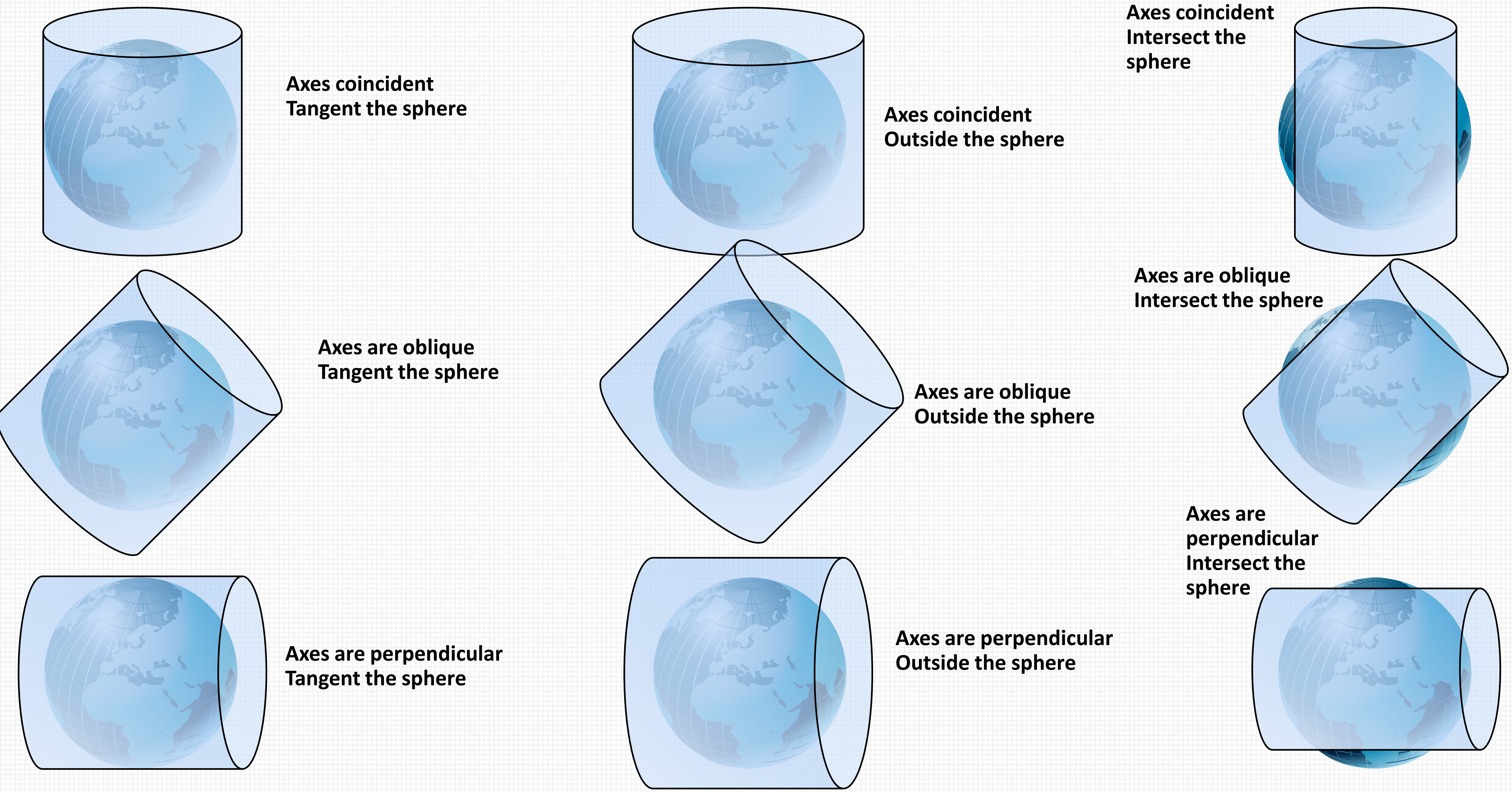
Projections According to Used Surfaces



Relationships Between Plane and Sphere

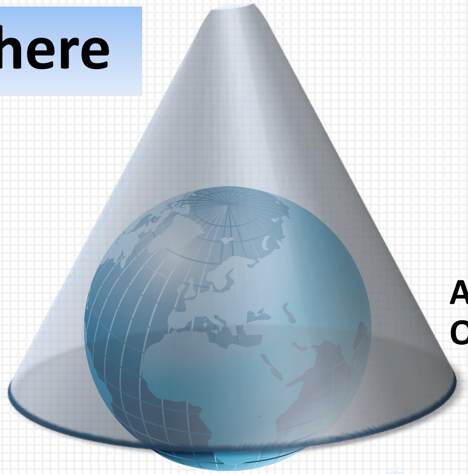


Relationships Between Cylinder and Sphere



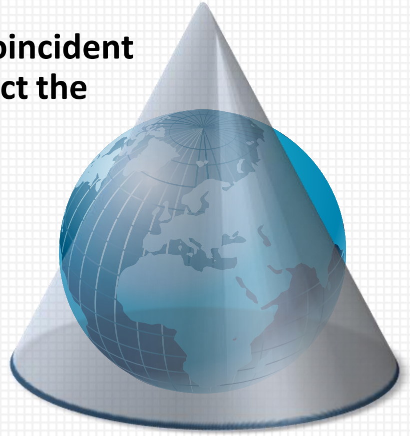
Relationships Between Cone and Sphere

Axes coincident
Tangent the sphere



Axes coincident
Outside the sphere

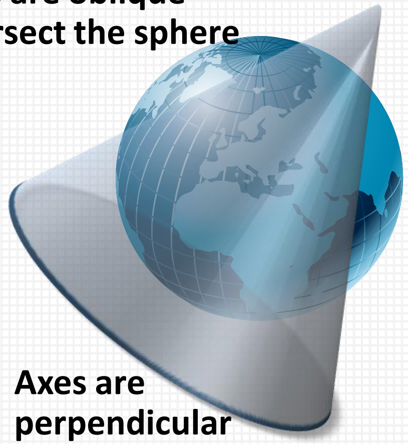
Axes coincident
Intersect the
sphere



Axes are oblique
Tangent the sphere

Axes are oblique
Outside the sphere

Axes are oblique
Intersect the sphere



Axes are perpendicular
Tangent the sphere

Axes are perpendicular
Outside the sphere

Axes are
perpendicular
Intersect the
sphere

RADIUS OF EARTH
R = 6,370 km
CALCULATION OF THE EARTH RADIUS FOR DRAWING ACCORDING TO THE GIVEN SCALE

SAMPLE:
SCALE 1/100,000,000
R = 6,370 km
This value is first converted to cm and then multiplied by the specified scale.

R = 637.000.000 cm
R = 637.000.000 x 1/100.000.000
R = 6.37 cm

This is how the radius to be used in the drawing is found.

HOMEWORKS
SCALE 1/200.000.000
R = 6,370 km

R = 637.000.000 cm
R = 637.000.000 x 1/200.000.000
R = 3.185cm

PLANAR PROJECTIONS

1. **Equidistant Projection**
2. **Gnomic Projection**
3. **Orthographic Projection**
4. **Stereographic Projection**
5. **Lambert Planar Projection**

6. **Stab-Werner Projection**
7. **Globular Projection**