

Eratosthene, Solstice december 2011

Friday 16th December 13:00 Universal Time

Viernes 16 de diciembre

Vendredi 16 décembre

Școala Regina Maria, Sibiu, Roumania

Primary School "Bubanjski heroji", Niš, Serbia

Gozo College, Xewkija Primary, Malte

Ecole Les Anémones, Lyon, France

Collège Antonin Perbosc, Lafrançaise, France

Lycée Jules Verne, Limours, France

Escuela de Santa Eulàlia de Riuprimer, España

Lycée Fodie Maguiraga, Nioro, Mali

Colegio Republica de Chile, Monte Patria, Chile

Escuela Ludmila Yivkova, Ciudad de Mexico



December Solstice at noon, if you are at the Tropic of Capricorne

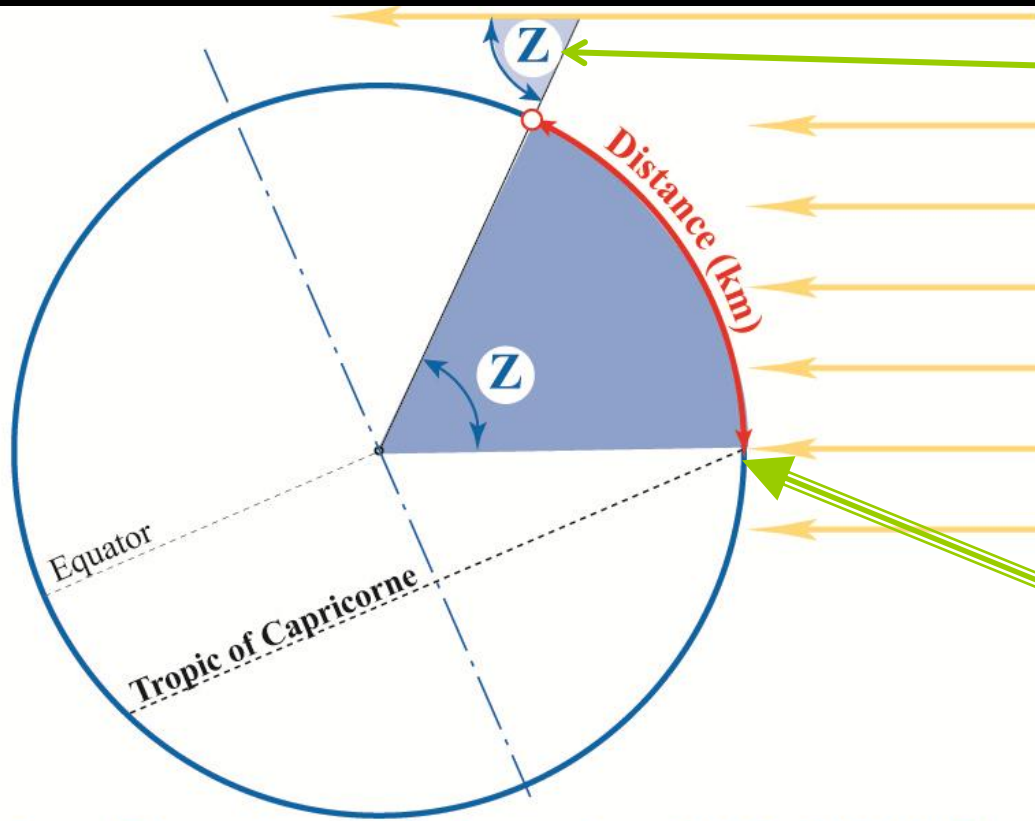
The gnomon has no shadows: the sun's rays are vertical

Por el solsticio de diciembre a mediodía, en el Trópico de Capricornio

El gnomon no tiene sombra: los rayos del sol son vertical



Solstice on 22th December 2011 5h29 UTC



Z (°)

- Zenithal distance
- Distância zenital
- Distance zénithale

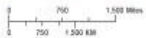


Z=0°

$$C_{\text{irconference}} = (360/Z) * D_{\text{istance}}$$

The sun's zenithal distance, **Z**, don't change a lot days around the solstice...
La distância zenital del sol, **Z**, no varia mucho los dias cercanos del solsticio...
La distance zénithale du soleil, **Z**, varie peu les jours proches du solstice...

ROUMANIA



Roumania

Școala “Regina Maria”, Sibiu



- Latitude: 45°47' North
- Longitude: 24°09' East



Roumania, Sibiu



Școala "Regina Maria"



Eratosthenes' measurement



Gnomon=247,5 cm

Time : 10:17 UTC

13th december

Shadows= 592 cm



14th december

Shadows= 600,5cm

Eratosthenes' measurement



Latitude: 45°48' North

Longitude: 24°09' East

Time : 10:17 UTC

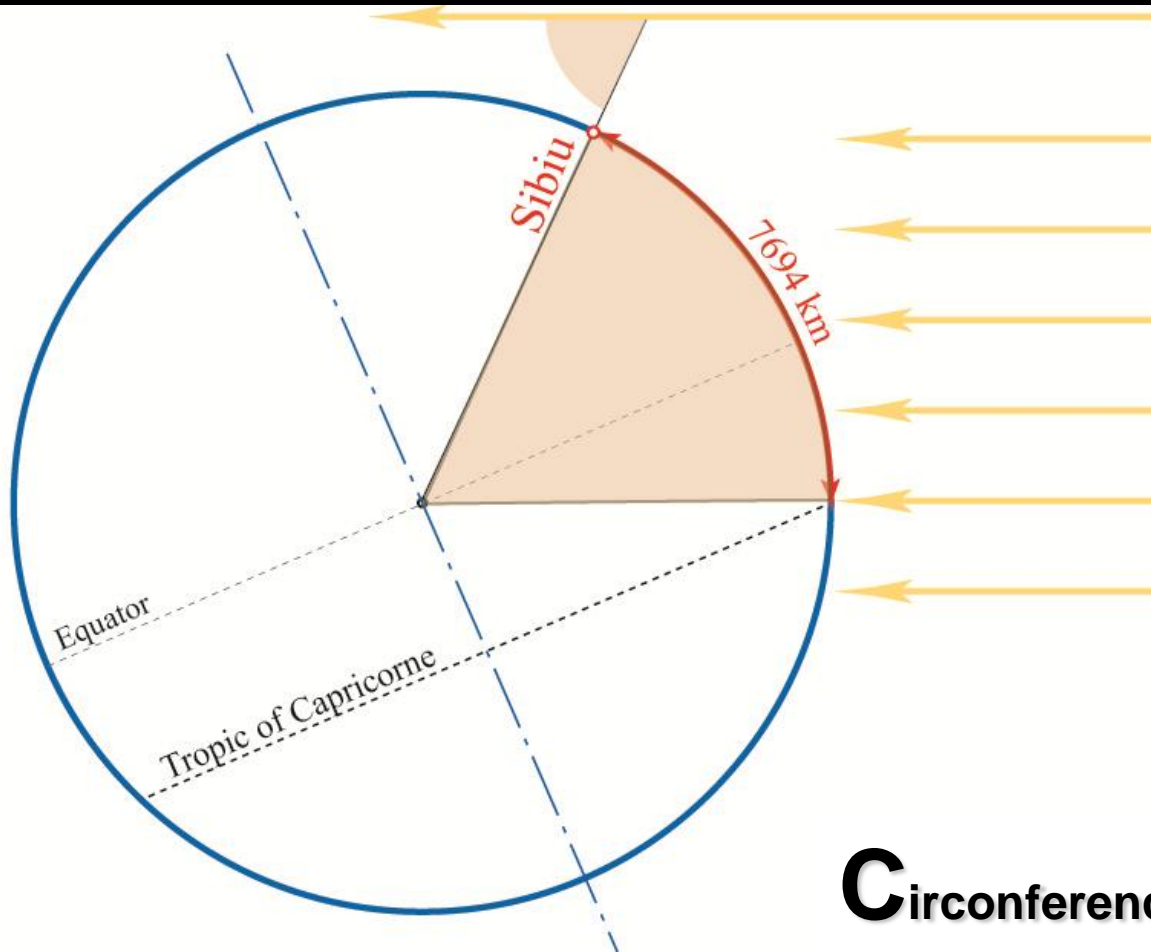
13th december

Z= 67,3°

14th december

Z=67,6°

C= km



$$C_{\text{irconference}} = (360/Z) * D_{\text{istance}}$$

SERBIA



0 750 1500 Miles
0 750 1500 Kilometers

Niš Primary School "Bubanjski heroji"



- Latitude: $43^{\circ}19'$ North
- Longitude: $21^{\circ}54'$ East

Time : 10:26 UTC

9th december

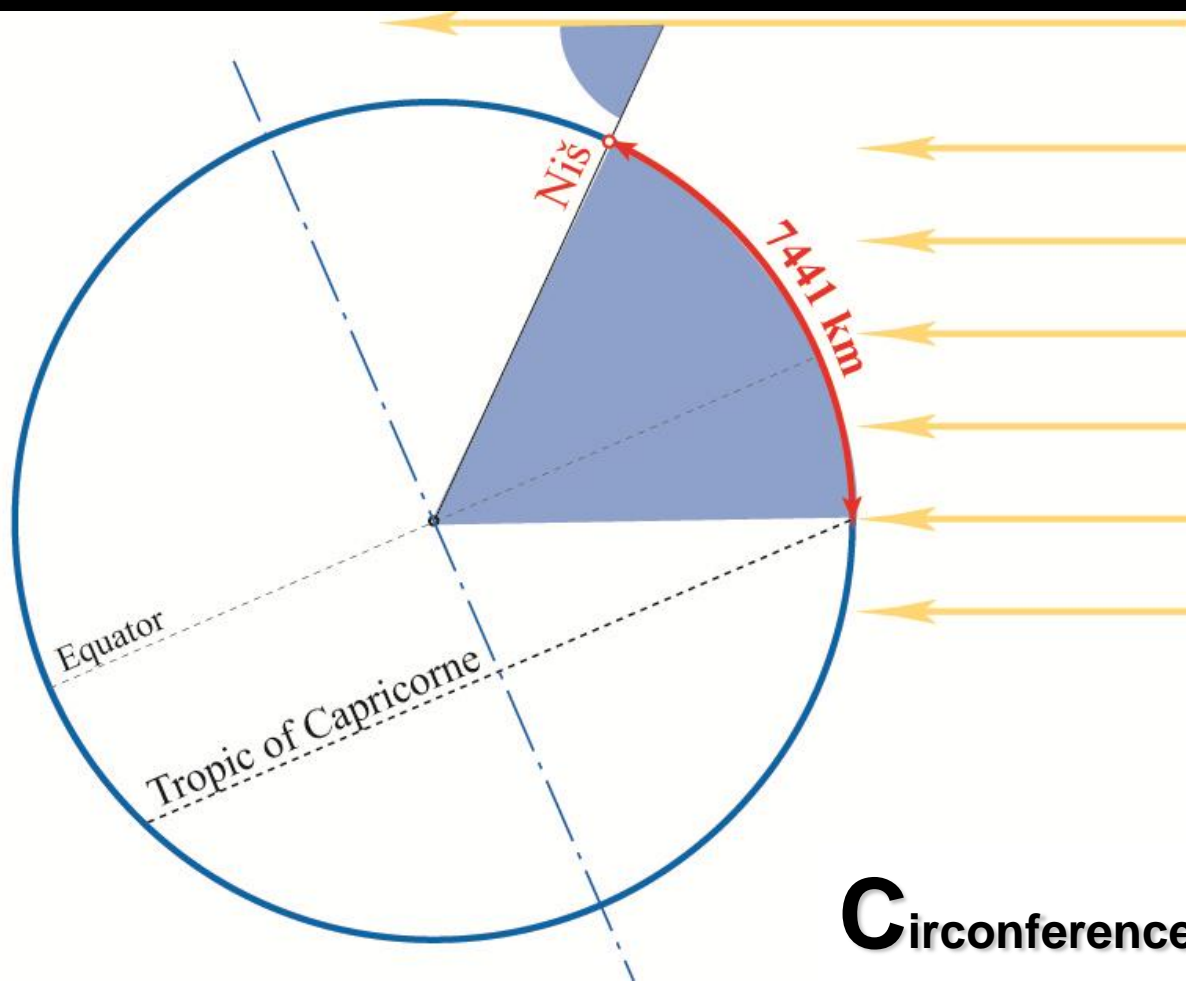
Z = $65^{\circ}35'$



Niš Primary School "Bubanjski heroji"



- Latitude: 43°19' North
- Longitude: 21°54' East



Thursday 9th dec.

$$Z = 65^{\circ} 35'$$

$$\text{Circumference} = \left(\frac{360}{Z}\right) * \text{Distance}$$

MALTA



0 750 1500 Miles
0 750 1500 Kilometers

Gozo College



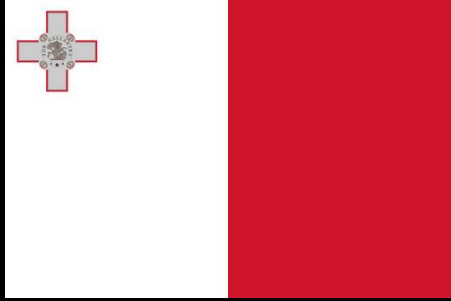
Gozo College
Xewkija Primary



Malta



Eratosthenes' measurement



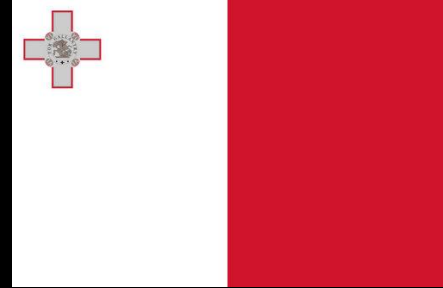
- Latitude: $36^{\circ}02'$ N
- Longitude: $14^{\circ}15'$ E

Monday 12th dec.
10:56 UTC

$G_{\text{nomon}} = 100 \text{ cm}$
 $S_{\text{shadows}} = 168,8 \text{ cm}$

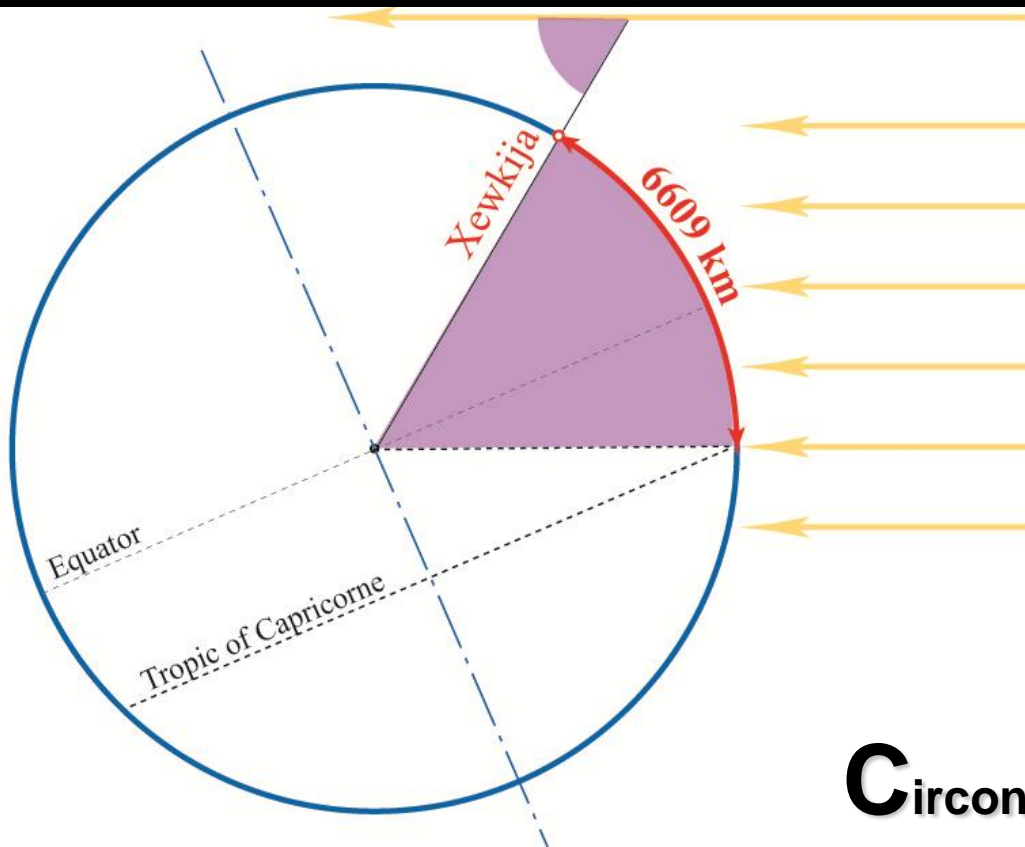


Eratosthenes' measurement



- Latitude: 36°02' N
- Longitude: 14°15'E

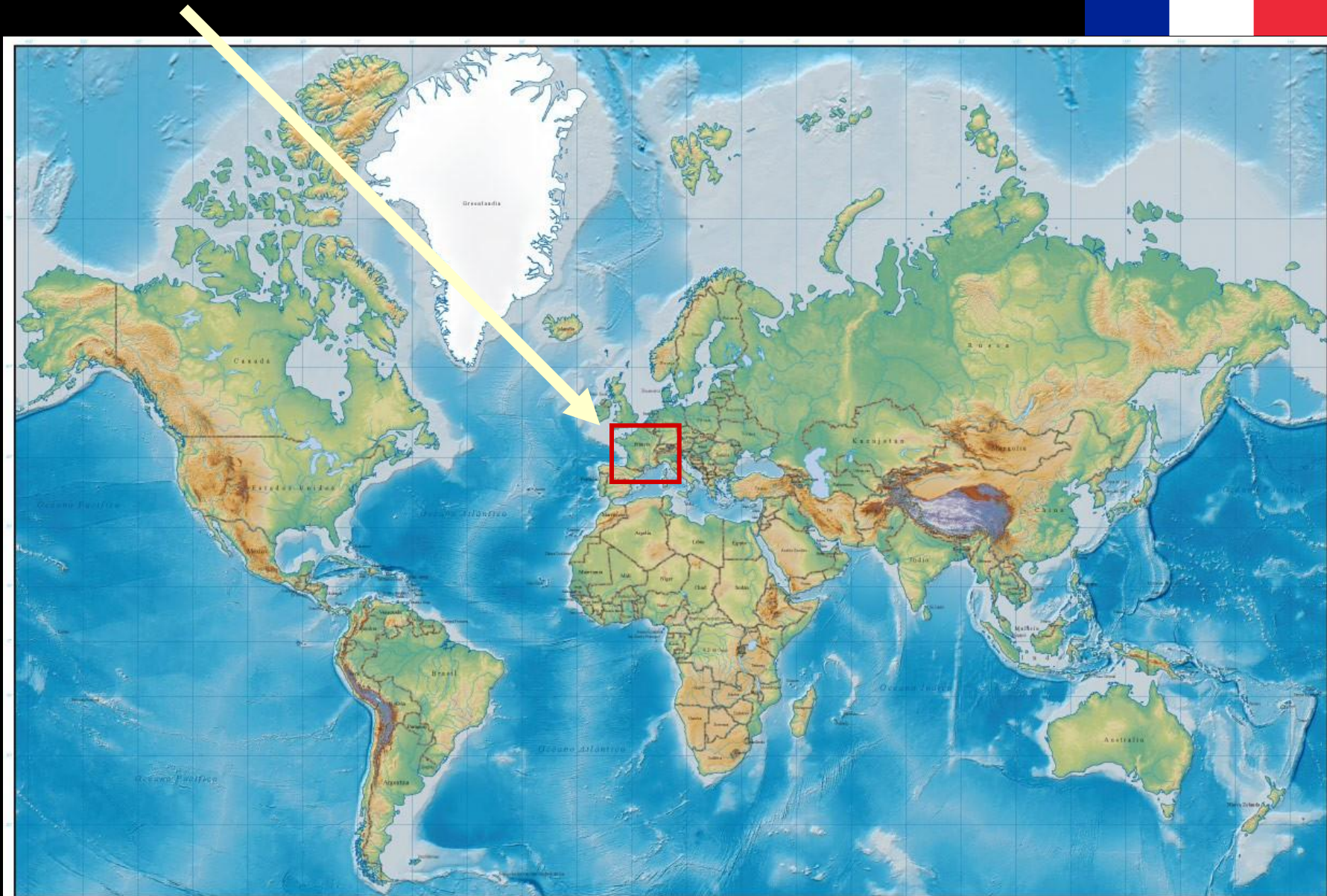
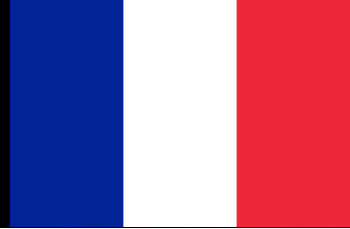
Monday 12th dec.
10:56 UTC



Z = 59°03'
C = **km**

$$C_{\text{ircumference}} = (360/Z) * D_{\text{istance}}$$

FRANCE



0 750 1 500 Miles
0 750 1 500 Kilometers

Lyon, France



Ecole « Les Anémones »



Notre classe



Eratostrhenes' measurement



Monday 12th dec.
Time 11:34 UTC

Gnomon : 10 cm
Shadows : 25,6 cm

Eratostrhenes' measurement

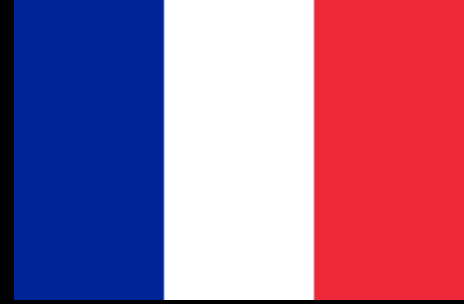


Monday 12th dec.
Time 11:34 UTC

Gnomon : 100 cm
Shadows : 262 cm

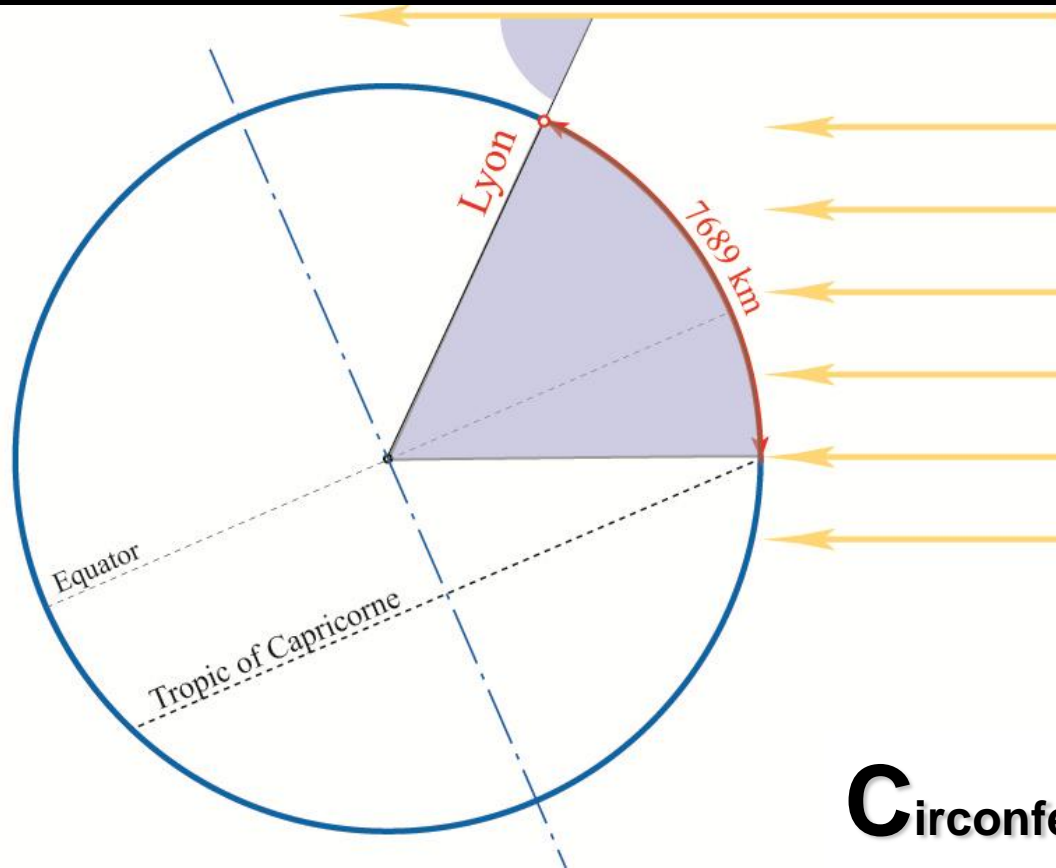
France

Ecole Les Anémones, Lyon



- Latitude: 45°47' Nord
- Longitude: 04°48' Est

Monday 12th dec.
Time 11:34 UTC



$$Z = 68^{\circ} 39' \quad (\text{G10cm})$$

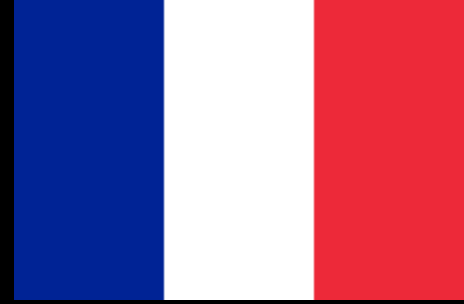
$$Z = 69^{\circ} 06' \quad (\text{G100cm})$$

$$C = \quad \text{km}$$

$$C_{\text{irconference}} = (360/Z) * D_{\text{istance}}$$

France

Lycée Jules Verne, Limours

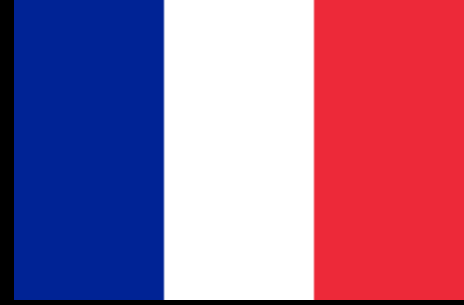


- Latitude: 48°39' Nord
- Longitude: 02°06'Est



France

Lycée Jules Verne, Limours

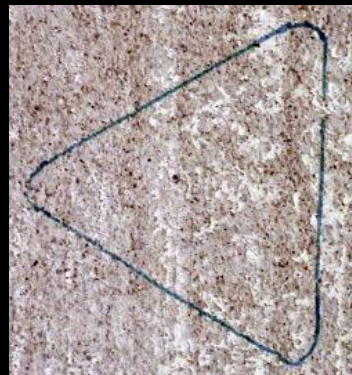


- Latitude: $48^{\circ}39'$ Nord
- Longitude: $02^{\circ}06'$ Est

11:45 UTC

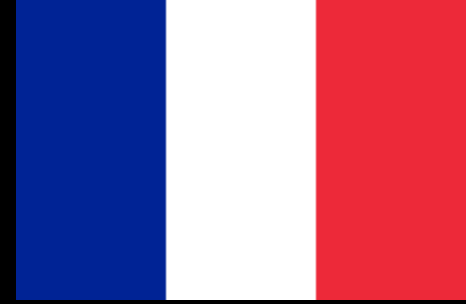
$G_{\text{nomon}}=72\text{cm}$

$S_{\text{shadows}}=215\text{cm}$



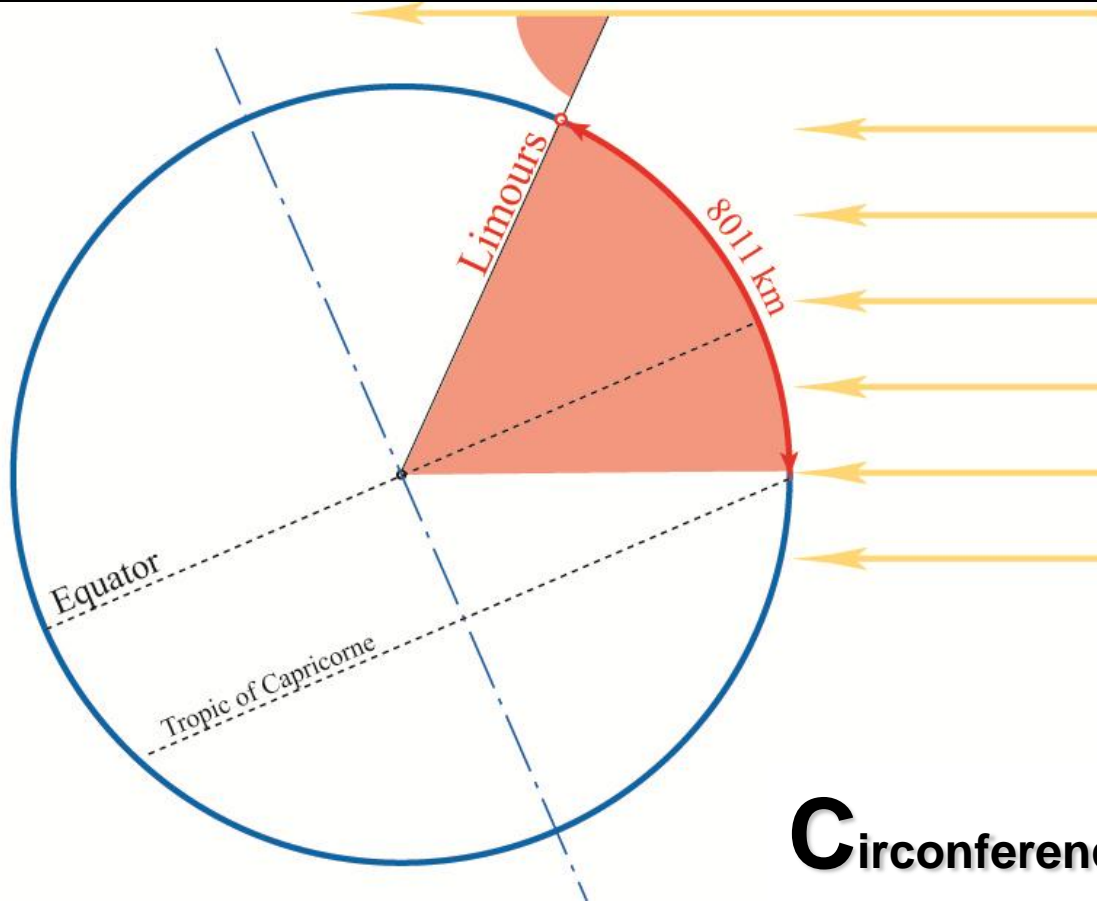
France

Lycée Jules Verne, Limours



- Latitude: 48°39' Nord
- Longitude: 02°06'Est

Monday 12th Dec.
11:45 UTC



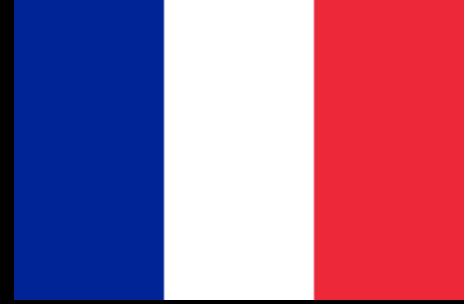
Z = 71°29'

C = km

$$\text{Circumference} = \left(\frac{360}{Z}\right) * \text{Distance}$$

France

Collège Antonin Perbosc, Lafrançaise



Latitude: $44^{\circ}07'$ North

Longitude: $01^{\circ}14'$ East

Monday 12th dec.
11:50 UTC

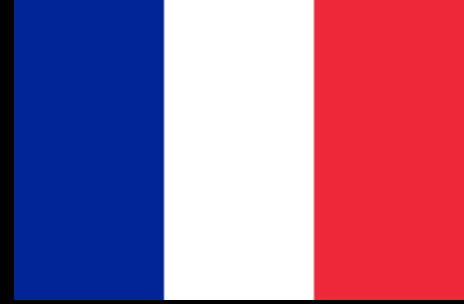
Gnomon= 100 cm

Shadows= 240 cm



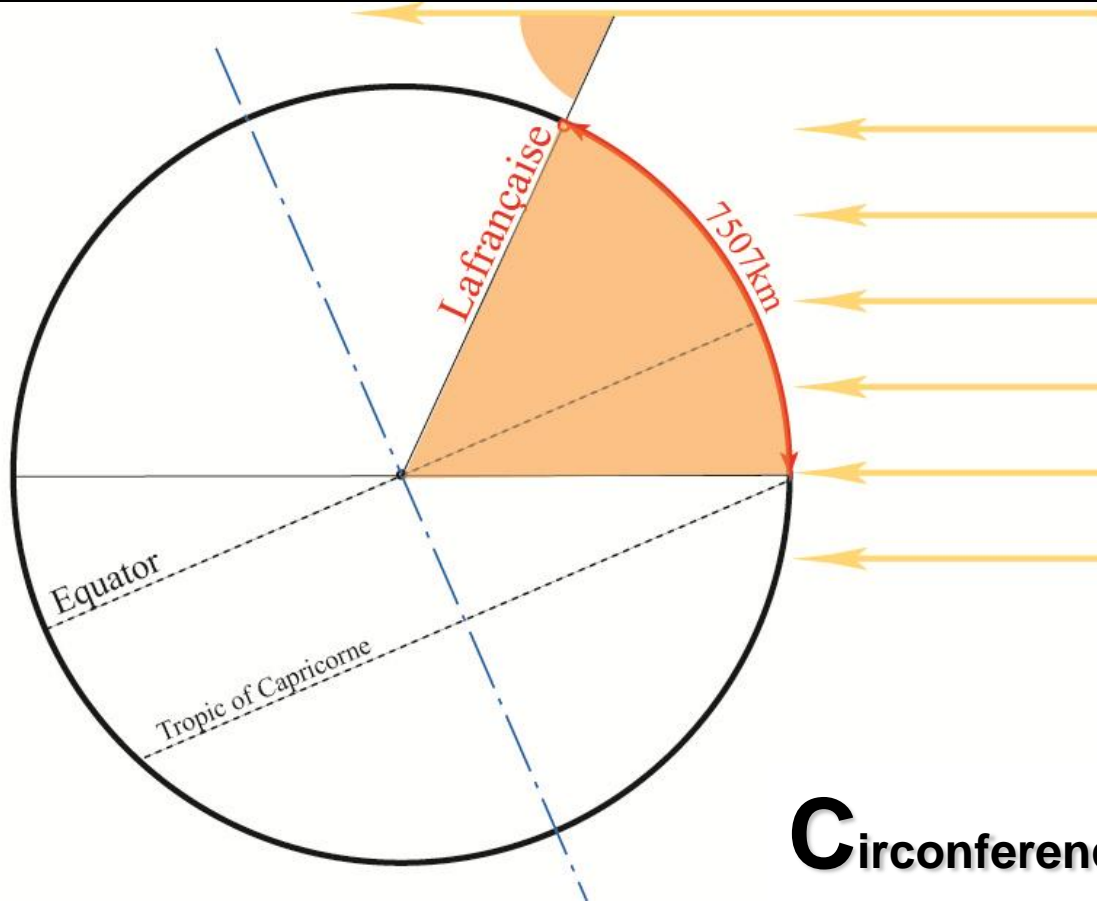
France

Collège Antonin Perbosc, Lafrançaise



Latitude: 44°07' North

Longitude: 01°14' East

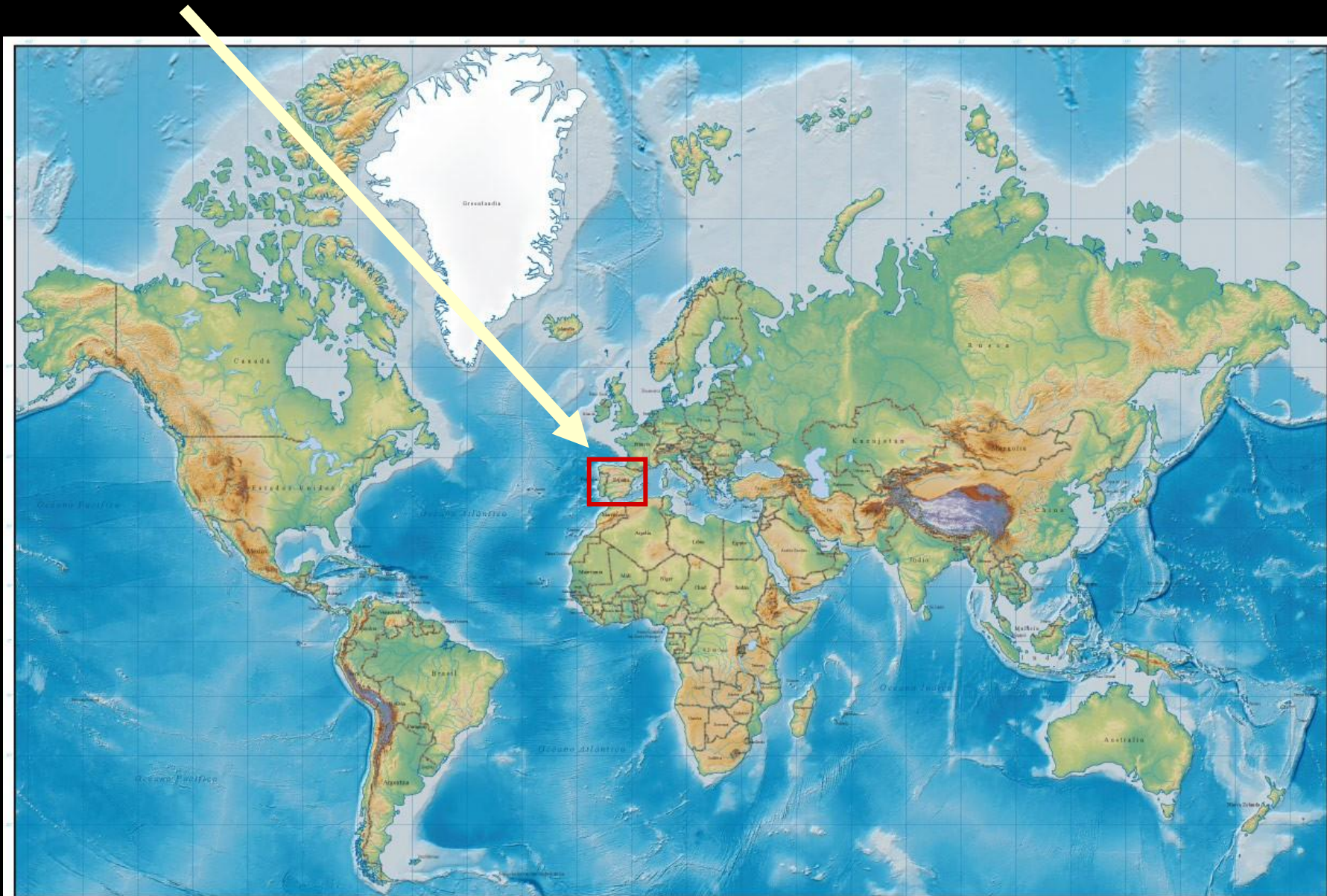


$$Z = 67,5^\circ \quad (100\text{cm})$$

$$C = \quad \text{km}$$

$$C_{\text{irconference}} = (360/Z) * D_{\text{istance}}$$

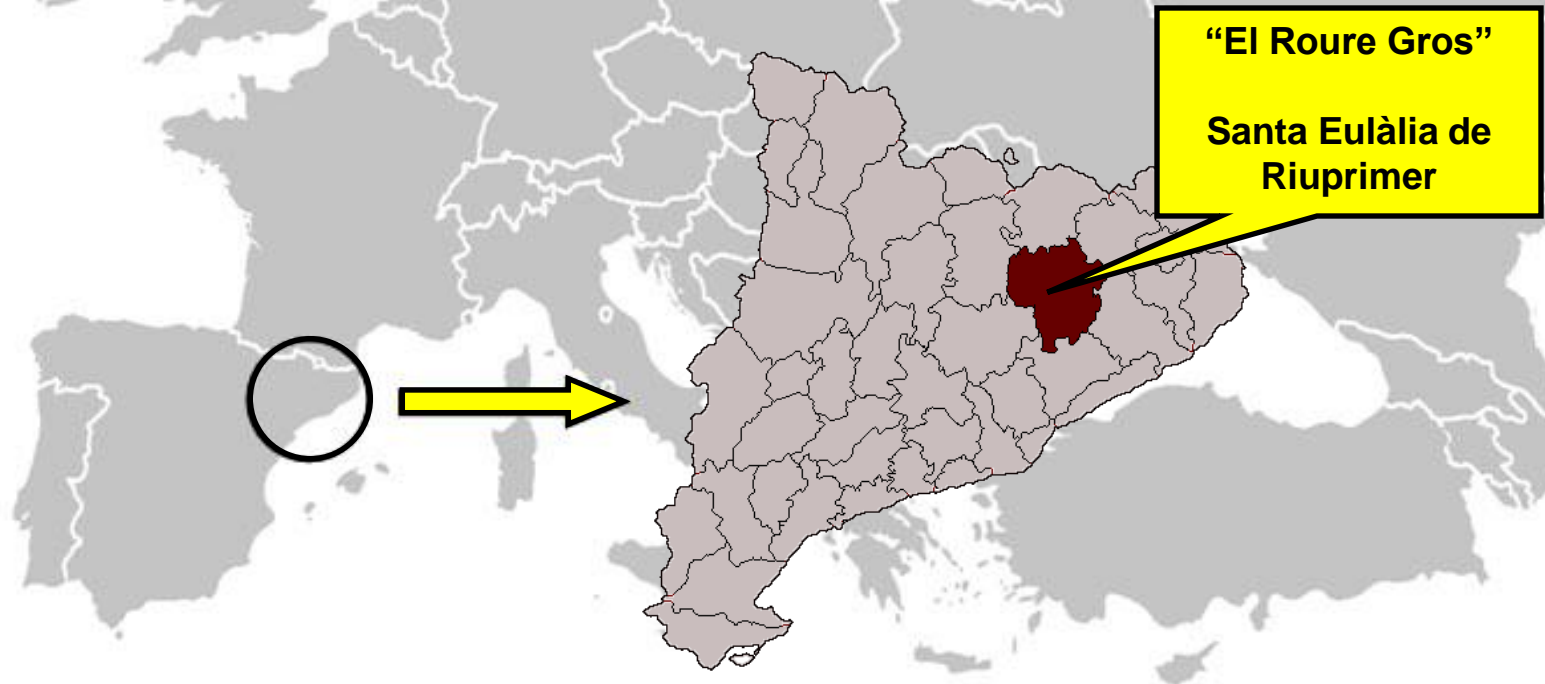
ESPAÑA



Catalonia



Catalonia is one of the seventeen autonomous communities of the Kingdom of Spain. The capital is Barcelona. Catalonia covers an area of 32.114 km² and has an official population of 7.504.881 inhabitants. It borders with France and Andorra to the north, Aragon to the west, the Valencian Country to the south and the Mediterranean Sea to the east (580 km coastline). The official languages are Catalan, Spanish and Aranese.



Landscapes of Catalonia Paisajes de Catalonia



Our school



Our school is called “El Roure Gros” and it’s in “Santa Eulàlia de Riuprimer”, a little town near Barcelona (80 kilometres).

This town have 1.000 inhabitants, and it’s in a rural environment. In this academic year we are 138 pupils in the school, between 3 and 12 years old.





Activities with Eratosthenes

To make this work, we realise different activities : first of all we searched information about who was Eratosthenes and his discoveries.

In Spain, Alejandro Amenabar, made one film titulated Agora. The principal character is Hipatia, the philosopher and mathematician. This film help us to understand where was Alexandria and to know the importance of the library.

Eratostrhenes' measurement



Tuesday 13th dec.

11:45 UTC

$G_{\text{nomon}} = 101,86\text{cm}$

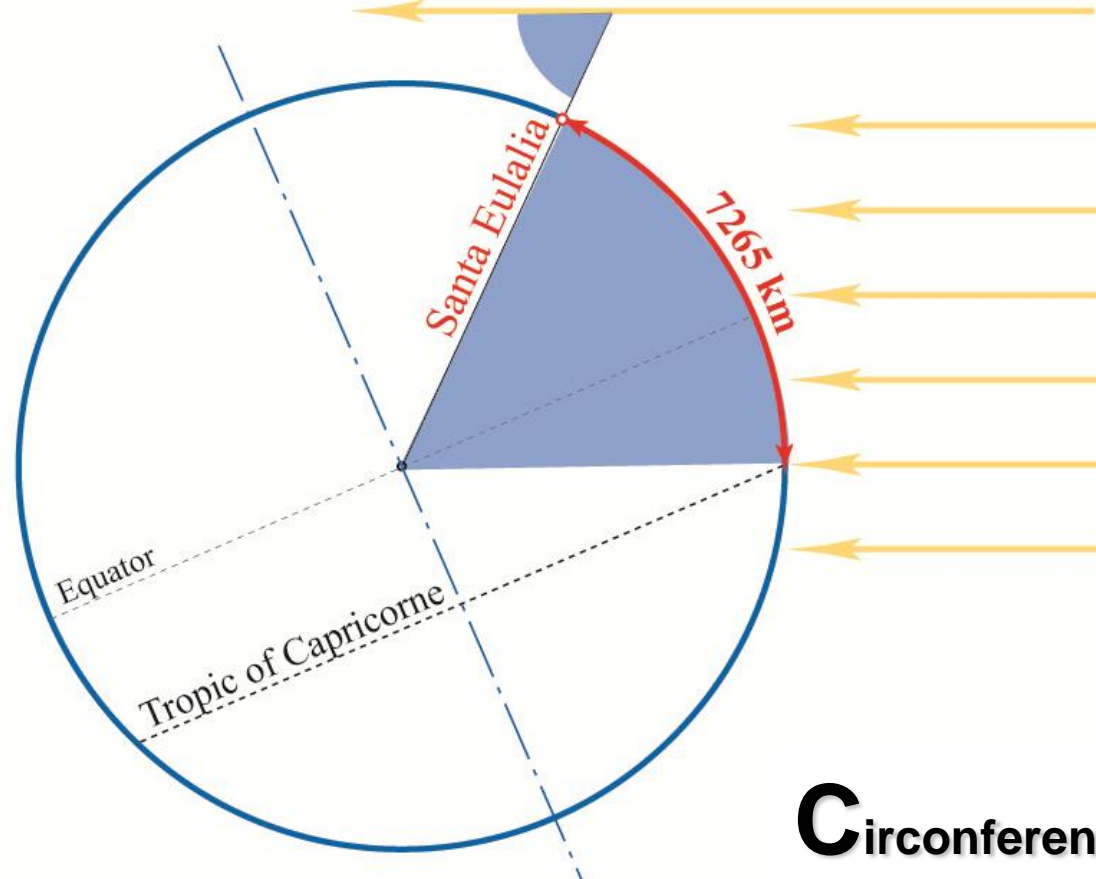
$S_{\text{shadows}} = 195\text{cm}$



Eratostrhenes' measurement



- Latitud: 41°55' Norte
- Longitud: 02°11' Este



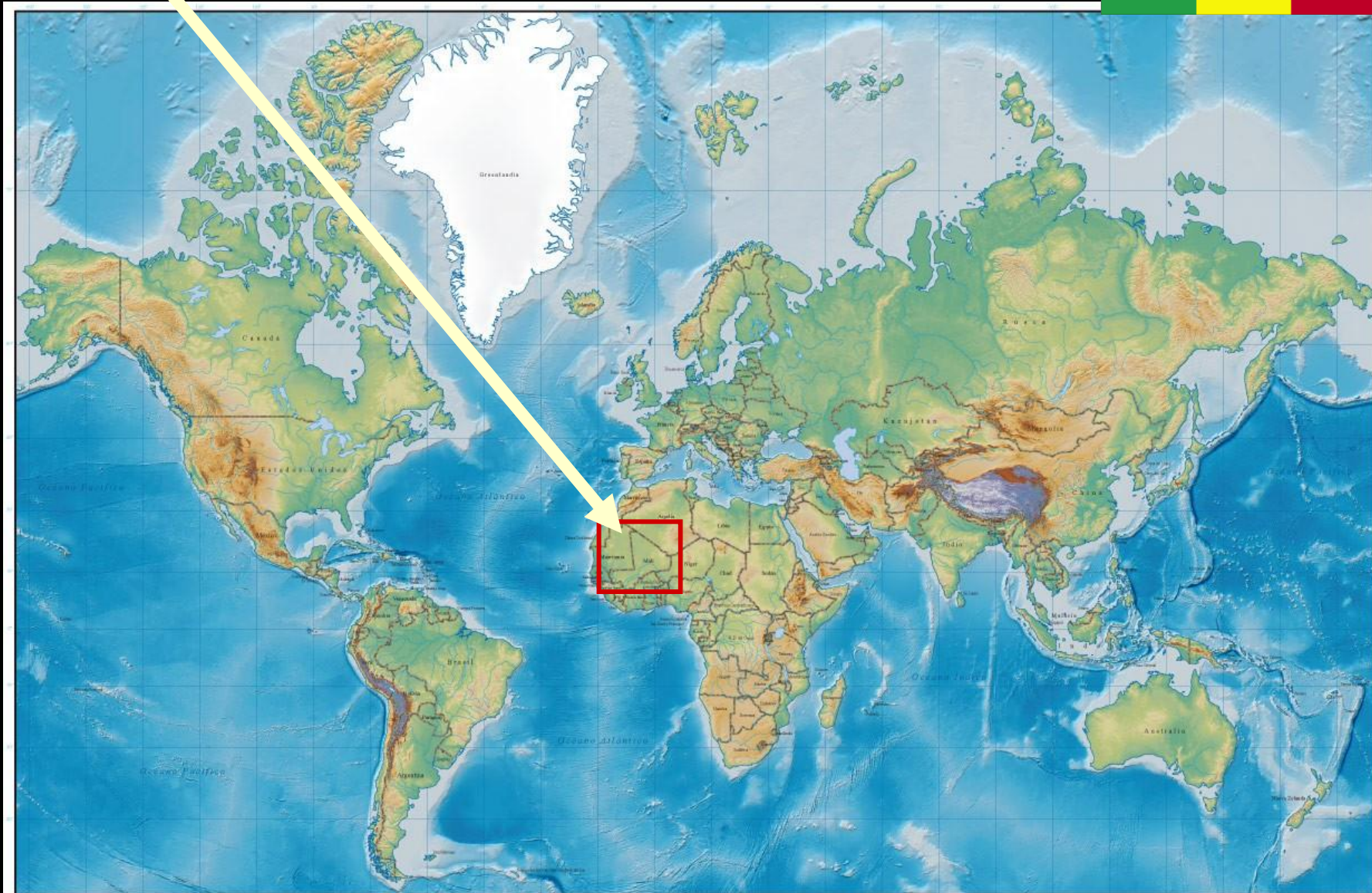
Tuesday 13th dec.
11:45 UTC

$$Z = 67,5^\circ$$

$$C =$$

$$C_{\text{irconference}} = (360/Z) * D_{\text{istance}}$$

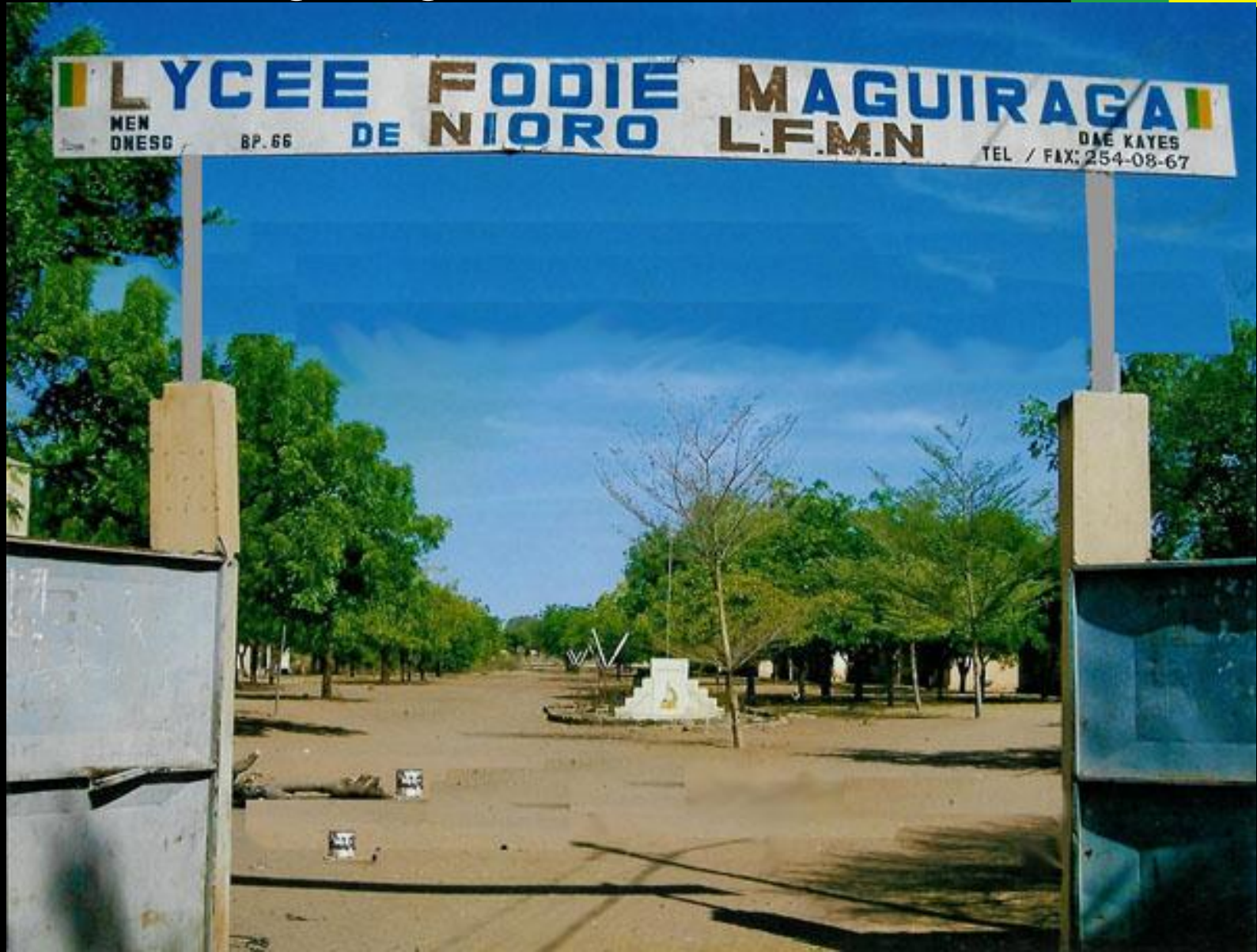
MALI



0 750 1 500 Miles
0 750 1 500 Kilometers

Mali

Lycée Fodie Maguiraga



Eratothene' measurement

- Latitude: $15^{\circ}14'$ North
- Longitude : $09^{\circ}35'$ West

Hour Hora	Shadows Sombra
10 ^h 33	2,00 m
11 ^h 00	1,80 m
11 ^h 30	1,66 m
12 ^h 00	1,54 m
12 ^h 30	1,53 m
12 ^h 45	1,55 m
13 ^h 00	1,57 m



Eratostrhenes' measurement

- Latitude: 15°14' North
- Longitude : 09°35' West

Monday 12th dec
Time : 12:32 UTC



Gnomon=181 cm

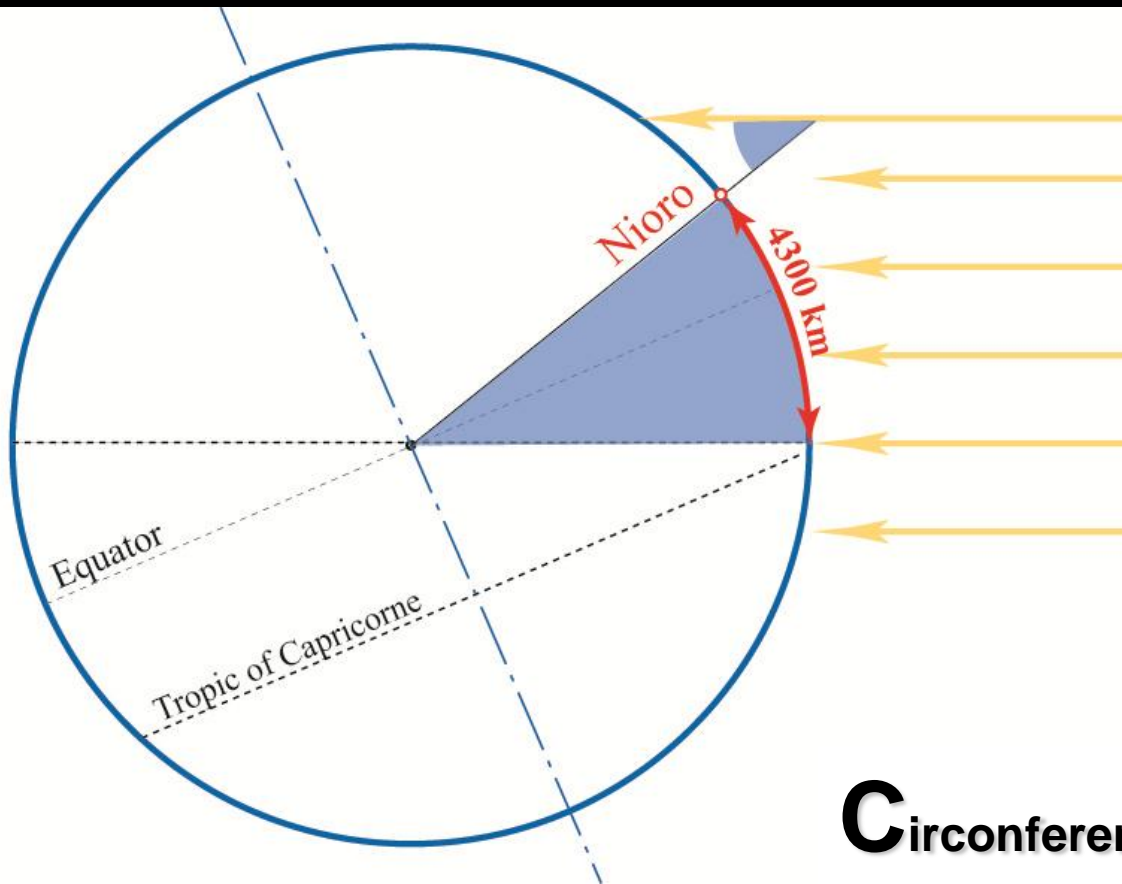
Shadows= 154 cm

$$\text{Distance} = \left(\frac{360}{Z} \right) * \text{Distance}$$

Erastosthenes' measurement

- Latitude: 15°14' North
- Longitude : 09°35' West

Monday 12th dec
12:32 UTC

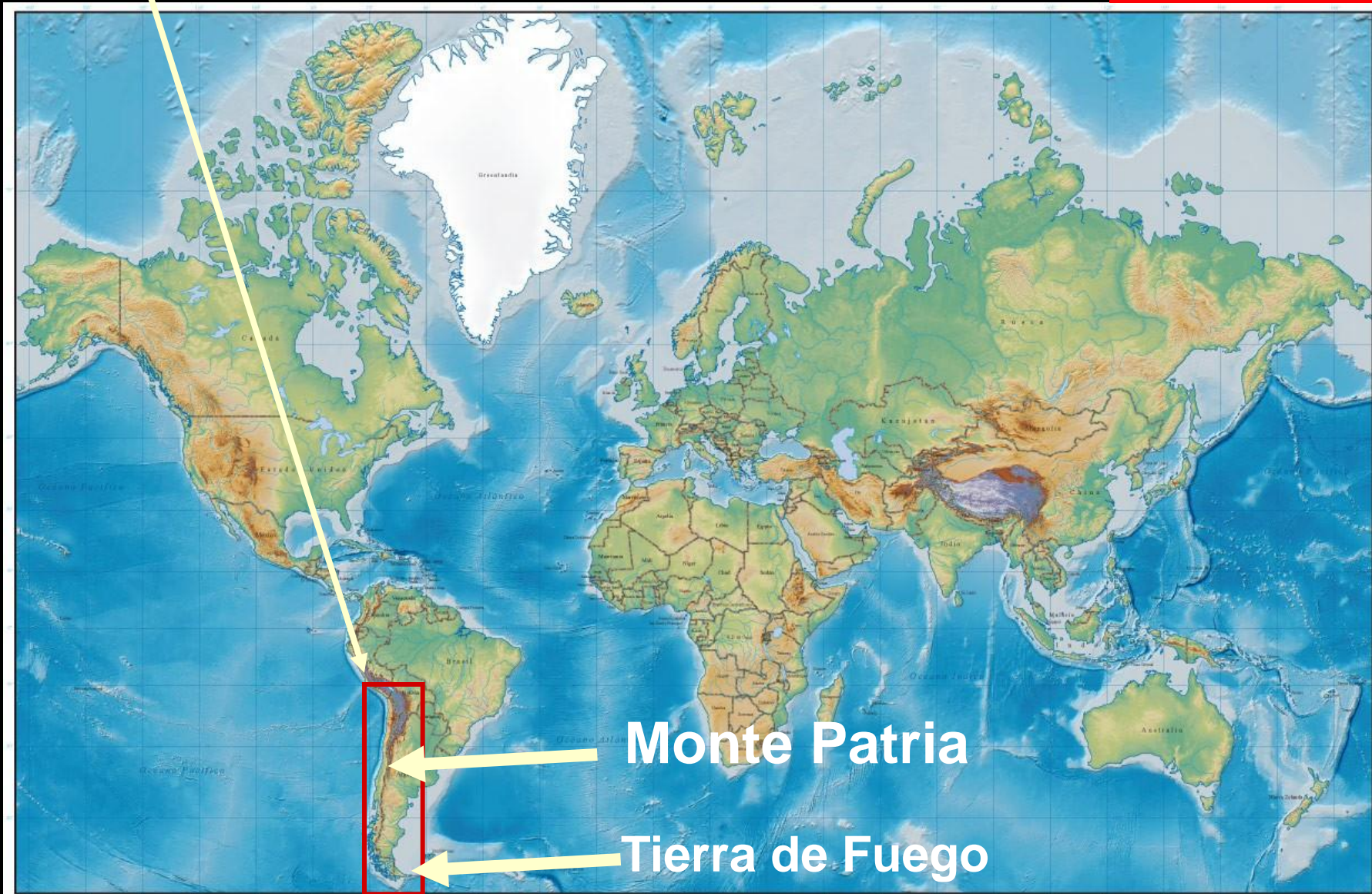
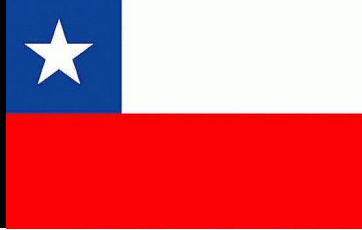


$$Z = 40^{\circ}23'$$

$$C = \quad \text{km}$$

$$C_{\text{irconference}} = (360/Z) * D_{\text{istance}}$$

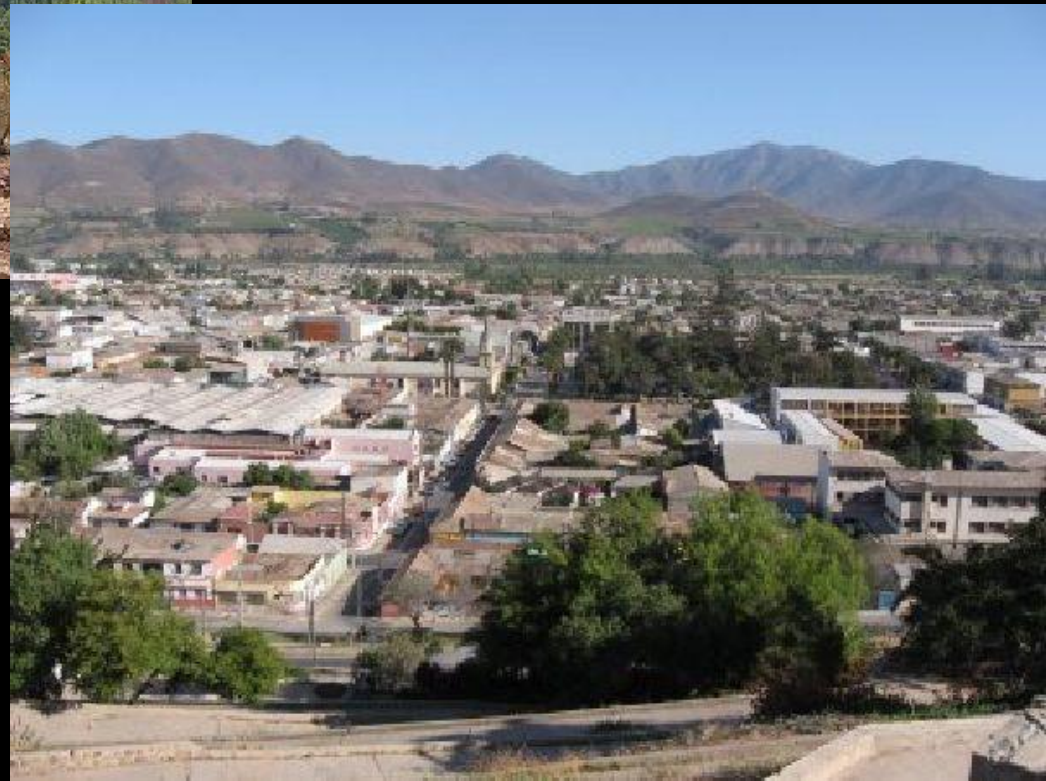
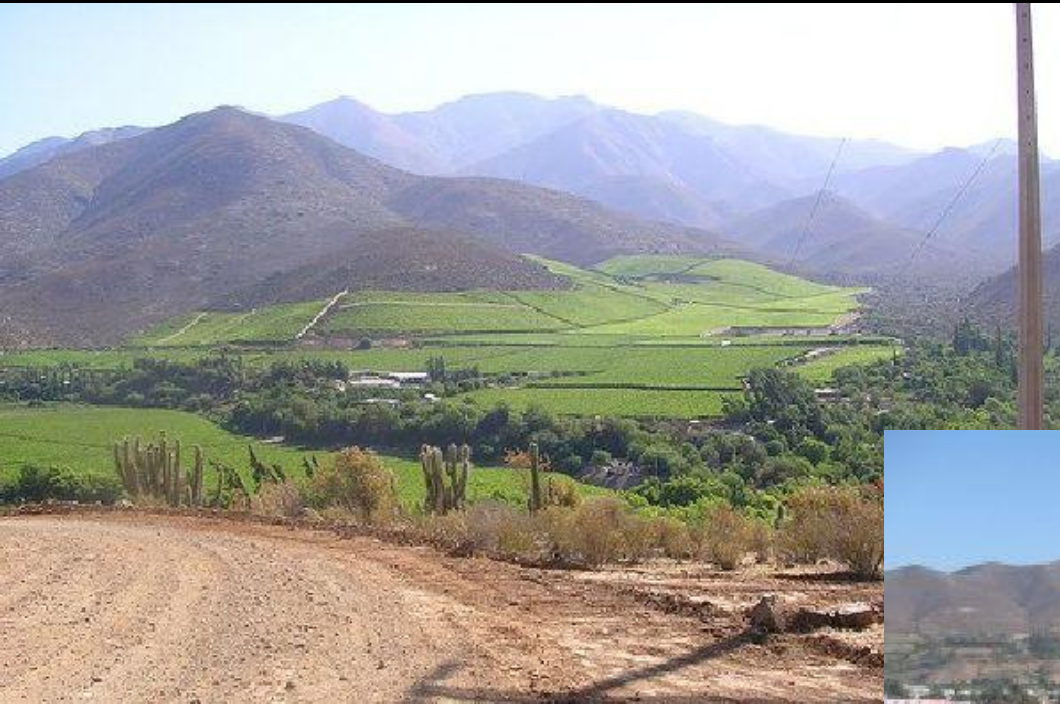
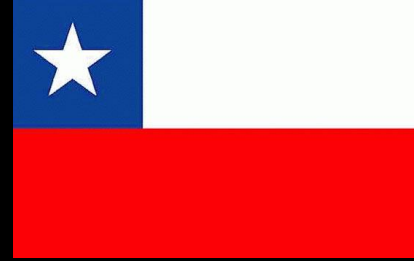
CHILE



Monte Patria

Tierra de Fuego

Chile, Monte-Patria



Monte-Patria

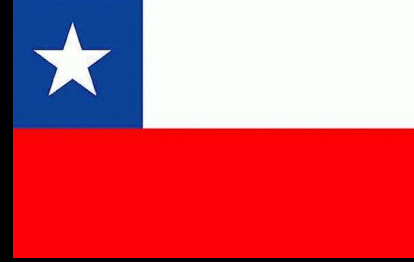


Colegio República de Chile



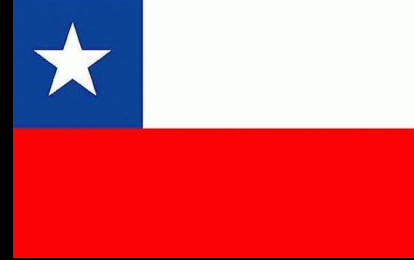
Chile, Monte-Patria

Colegio Republica de Chile



- Latitud: $30^{\circ}41'$ Sur
- Longitud : $70^{\circ}57'$ Oeste





La medida de Eratostenes

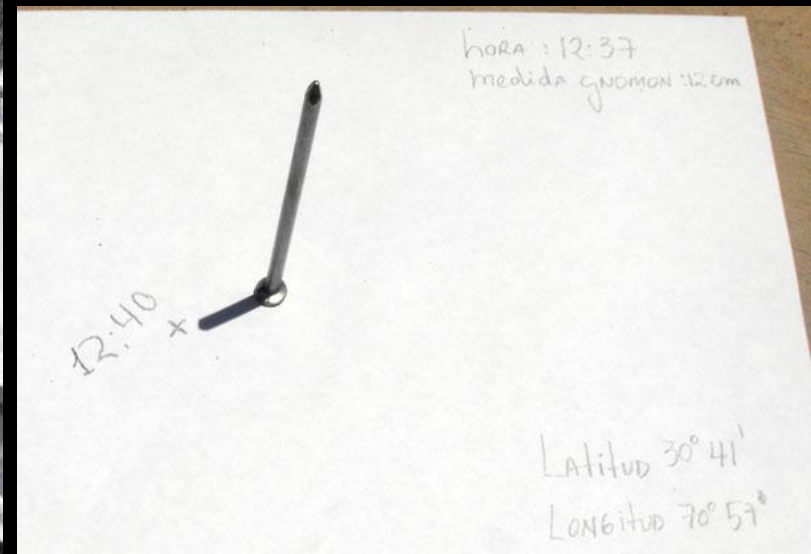
- Latitud: $30^{\circ}41'$ Sur
- Longitud : $70^{\circ}57'$ Oeste

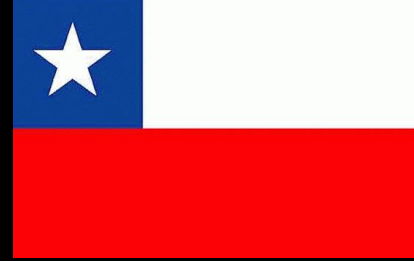
Miercoles 14 de diciembre

16:37 UTC

Gnomon : 12 cm

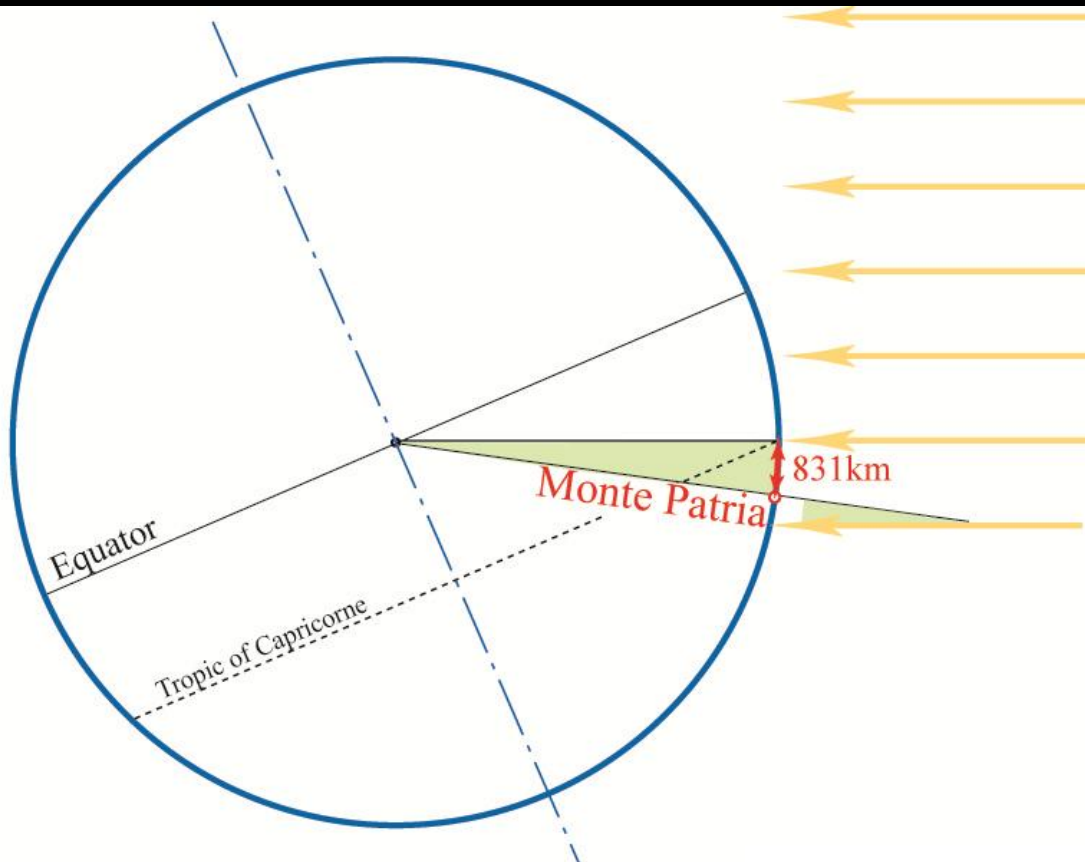
Sombra : 2 cm





Colegio Republica de Chile

- Latitud: $30^{\circ}41'$ Sur
- Longitud : $70^{\circ}57'$ Oeste

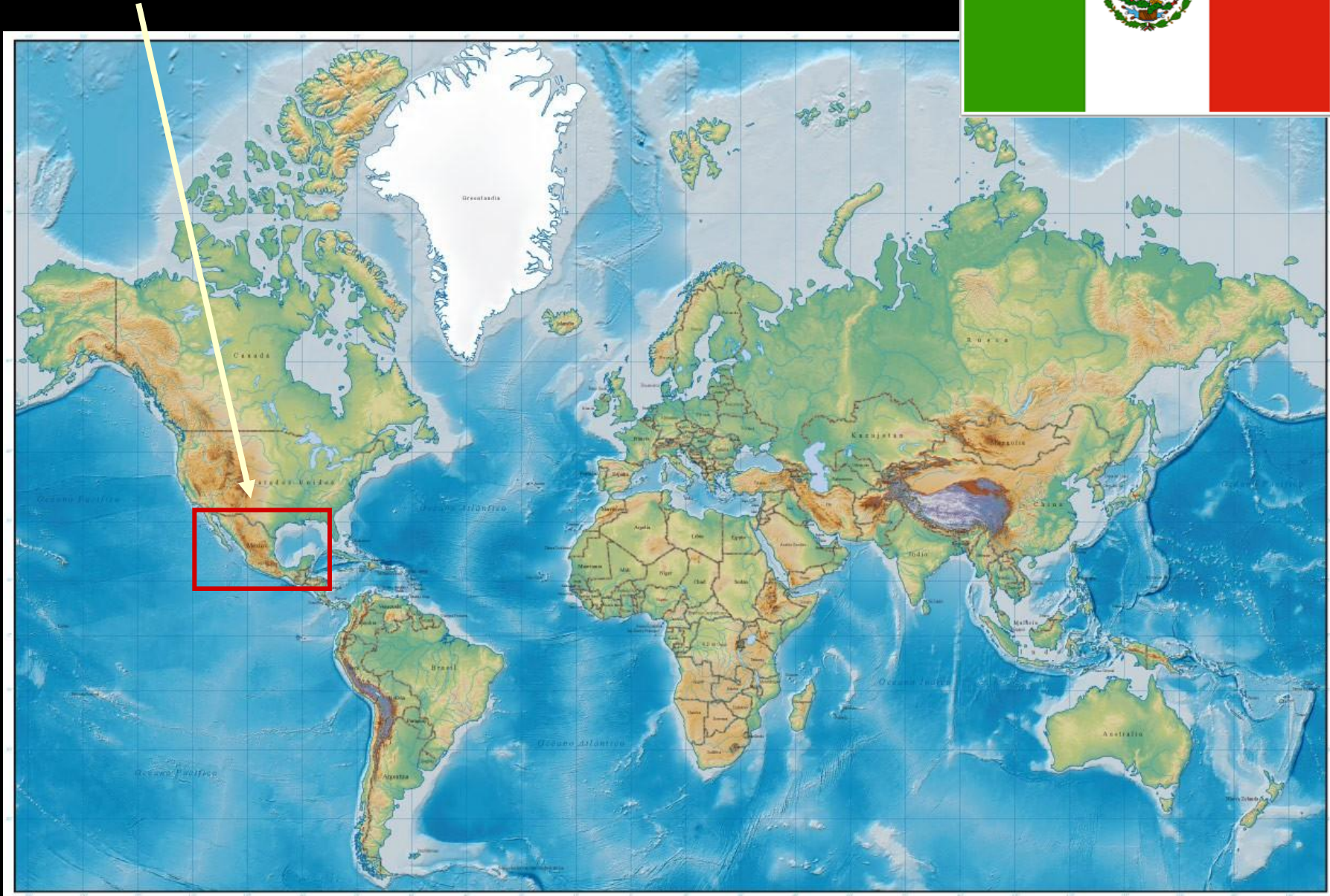


$$Z=9^{\circ}27'$$

$$C=$$

$$C_{\text{Circunferencia}} = \left(\frac{360}{Z}\right) * D_{\text{Distancia}}$$

MEXICO



0 750 1 500 Miles
0 750 1 500 Kilometers

ESCUELA SECUNDARIA N° 229 T. M.
LUDMILA YIVKOVA
XX ANIVERSARIO
1979-1999
GENERACION 1997-2000

Escuela Secundaria Diurna 229 "Ludmila Yivkova"



Escuela Secundaria Diurna 229 "Ludmila Yivkova"



Erastosthenes' measurement



Tiempo	Sombra	Gnomon	Altura
11:30	1,415	1,51	46,9
11:40	1,415	1,51	46,9
11:50	1,375	1,51	47,7
12:00	1,355	1,51	48,1
12:10	1,345	1,51	48,3
12:20	1,32	1,51	48,8
12:30	1,31	1,51	49,1
12:40	1,31	1,51	49,1
12:50	1,3	1,51	49,3
13:00	1,385	1,51	47,5
13:10	1,44	1,51	46,4
13:20	1,46	1,51	46,0
13:30	1,505	1,51	45,1
13:40	1,55	1,51	44,3



Eratothhenes' measurement



- Latitud: $19^{\circ}18'$ Norte
- Longitud : $99^{\circ}10'$ Oeste



$G_{\text{nomon}}=151\text{cm}$

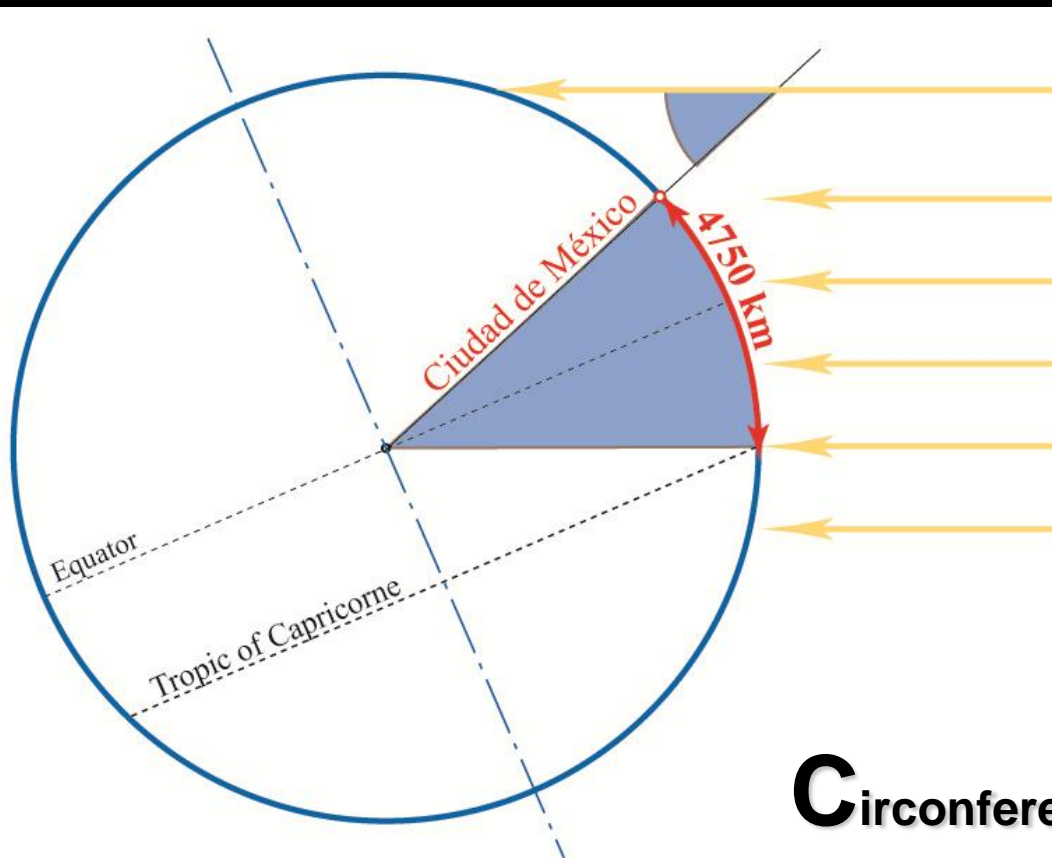
$S_{\text{ombra}}= 130\text{cm}$

Eratosthenes' measurement



Escuela Secundaria Diurna 22 "Ludmila Yivkova"

- Latitud: 19°18' Norte
- Longitud : 99°10' Oeste



$$Z = 40,7^\circ$$

$$C =$$

$$C_{\text{irconference}} = (360/Z) * D_{\text{istance}}$$

Equinoccio 20 de Marzo 2012, 23:20 Universal Time

Videoconferencia : al fin de Marzo

Videoconference : end of March

Școala Regina Maria, Sibiu, Roumania

Primary School "Bubanjski heroji", Niš , Serbia

Gozo College, Xewkija Primary, Malte

Ecole Les Anémones, Lyon, France

Collège Antonin Perbosc, Lafrançaise

Lycée Jules Verne, Limours

Escuela de Santa Eulàlia de Riuprimer, España, Catalonia

Lycée Fodie Maguiraga, Nioro, Mali

Colegio Republica de Chile, Monte Patria, Chile

Escuela Ludmila Yivkova, Ciudad de Mexico

