



**Grids, Maps
& Positions**

A S – 12.3.4; 12.3.2

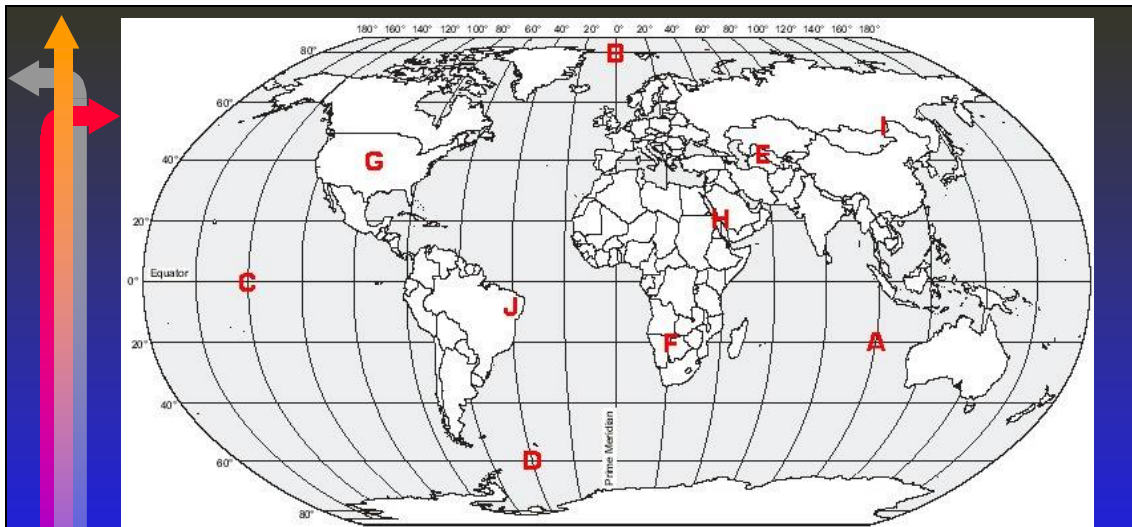


Where am I now?
Where am I going?



Global Positioning System (GPS) devices are wonderful instruments. They allow you to pinpoint your location to within a few meters, no matter where you are on planet Earth!

The GPS gives the information in terms of **latitude and longitude** which is measured in degrees, minutes and seconds.



Match the letters corresponding to the following:

1. 20° South, 20° East	4. 0° , 140° W
2. 60° South, 40° West	5. 20° S, 100° E A
3. 50° North, 120° East	6. 5° S, 40° W J

Each degree of latitude or longitude is divided into 60 minutes and each minute into 60 seconds e.g. 20° 13' 25" E.


Convert the following co-ordinates into degrees.

☀ 19° 14,5' N ; 156° 15,7' W

$14,5/60 \approx 0,24$ and $15,7/60 \approx 0,26$
19,24° N ; 156,26° W

☀ 21° 10' 5" S ; 33° 25' 29" E 20,17°S ; 33,42°E

Calc:	21	D°M'S"	10	D°M'S"	5	2 nd F	D°M'S"
	33	D°M'S"	25	D°M'S"	29	2 nd F	D°M'S"



Convert the following degrees into deg, min, sec

1. e.g. $25,22^{\circ}$ N ; $12,51^{\circ}$ E $25^{\circ} 13' 12''$ N ; $12^{\circ} 30' 36''$ E

$0,22 \times 60 = 13,2' \rightarrow 0,2' \times 60 = 12''$
 $0,51 \times 60 = 30,6' \rightarrow 0,6' \times 60 = 36''$

2. $59,82^{\circ}$ S ; $15,28^{\circ}$ E

Calc: 59.82
 15.28

Task Convert $62,66^{\circ}$ N ; $112,32^{\circ}$ W to deg min sec.

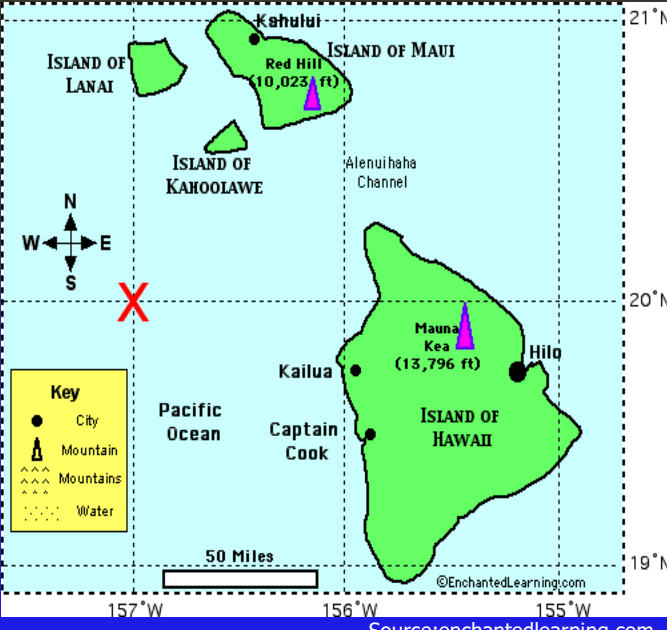
Checkpoint

1. The latitude values decrease from top to bottom. Why?

2. Name the largest island?

3. Which island is farthest west?

4. In approximate what direction would you travel to go from Kahului to Red Hill?



The map displays the Hawaiian Islands with a coordinate grid. The islands shown are the Island of Lanai, the Island of Maui (with Kahului city and Red Hill mountain at 10,023 ft), the Island of Kahoolawe, and the Island of Hawaii (with Mauna Kea mountain at 13,796 ft, and cities Kailua, Captain Cook, and Hilo). The Alenuihaha Channel is between Maui and Hawaii. A red 'X' is marked at the intersection of 20°N latitude and 156°W longitude. A key identifies symbols for City (black dot), Mountain (black triangle), Mountains (hatched area), and Water (dotted area). A scale bar shows 50 Miles. The map is credited to EnchantedLearning.com.

1. At approximately what bearing would you fly from Hilo to Captain Cook?

2. State the coordinates of X.

3. What is situated at or near $20^{\circ} 32,3' N$, $156^{\circ} 30,4' W$

4. What is the approximate distance, in km, from Hilo to Kailua?

50 Miles

1 mile = 1,6 km

The screens from a GPS show latitude and longitude of a ship nearing a harbour. Use the GPS readings to mark the path and direction of the ship.

1. Which coastal town is it nearing?

Lat N 20° 0'	Lat N 19° 14,5'
Lon W 157° 0'	Lon W 156° 15,7'
Lat N 19° 28,5'	Lat N 19° 17,8'
Lon W 156° 29,7'	Lon W 156° 8,1'

Longitude and Time

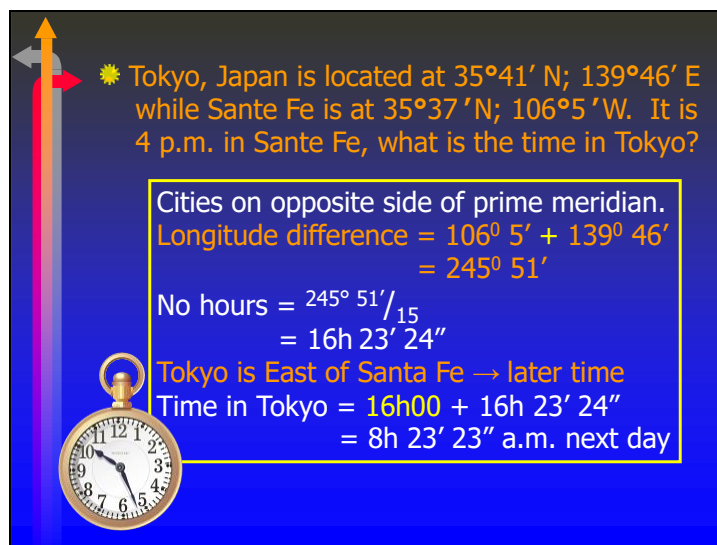
The earth rotates 360 degrees from **East to West** every 24 hours i.e. 15° longitude every hour. When it is noon at Greenwich, it is 10:00 a.m. at 30° W. and 2:00 p.m. at 60° E.

$-$ ← GMT → $+$
 W ← ————— → E

☀️ City A is on the 70° W line of longitude at midnight. What is the time in city B if it is on the 40° W line of longitude?

e.g. ↗

Both West: difference = $70 - 30 = 30^\circ$
 Hours = $30 / 15 = 2\text{h}$
 B is east of A → later
 Time in B = midnight + 2 = 2 a.m.




☀ Tokyo, Japan is located at $35^{\circ}41' N$; $139^{\circ}46' E$ while Santa Fe is at $35^{\circ}37' N$; $106^{\circ}5' W$. It is 4 p.m. in Santa Fe, what is the time in Tokyo?

Cities on opposite side of prime meridian.
Longitude difference = $106^{\circ} 5' + 139^{\circ} 46'$
= $245^{\circ} 51'$


No hours = $\frac{245^{\circ} 51'}{15}$
= 16h 23' 24"

Tokyo is East of Santa Fe → later time
Time in Tokyo = 16h00 + 16h 23' 24"
= 8h 23' 23" a.m. next day



Check

1. Which coastal city sees the sun rise first?
2. Which coastal city has the latest sunset?
3. The longitude and latitude lines are not completely parallel. Why?



The map displays South Africa with major cities like Cape Town, Johannesburg, and Durban. It includes latitude and longitude lines, a scale bar (0-150 km), and labels for neighboring countries and oceans. The Tropic of Capricorn is also marked.

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