



Objectives-Student Friendly

- Compare and contrast latitude and longitude. This means that:
 - I can describe the differences between latitude and longitude according to
 - Their point of references (name of their respective 0° line)
 - The direction they run around the earth
 - Relationship between lines: parallel, converging,...
 - Whether they are labeled N vs. S, or E vs. W
 - I can compare their similarities, including how each degree is broken down into smaller units
 - I know the latitude or longitude of key areas of the earth including the Equator, North Pole, South Pole, Prime Meridian, International Date Line, Tropic of Cancer (23.5N), Tropic of Capricorn (23.5S).
- If given the latitudes and longitudes I can:
 - Determine which of 2 cities is farthest IN DEGREES from the Equator, Prime Meridian, or International Date Line.
 - Calculate the distance further north or south (in KILOMETERS) one city is compared to another. Because 1° latitude = ____ km.
 - Use a map to pinpoint and identify the location.

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Objectives-Student Friendly cont'd

- Analyze & create topographic maps. This means that I can:
 - Describe the use of and identify the following on a topographical map: contour line, contour interval, index contour, hachure, depression contour.
 - Determine whether an area is flat vs. hilly using a contour map, based on the spacing between contour lines..
 - Create 3D versions of real topographic map, and vice versa create a 2D topographic map from 3D terrain.
 - Calculate the gradient between 2 given points.
 - Calculate the contour interval of a given map.
- Define watershed and describe how to tell where the boundaries are. Understand how runoff affects our water quality.

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The Importance of Map Reading Skills!!



Video: Oh, oh! What could happen if you can't read a map??
<http://www.youtube.com/watch?v=BlakZtDmMqo>

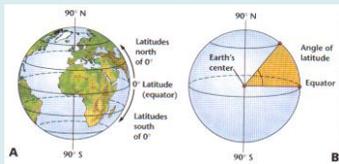
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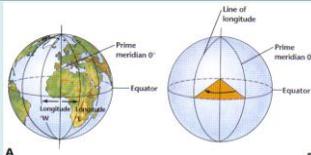
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Overview of Latitude & Longitude Lines

Latitude:



Longitude:



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Battleship with Latitude and Longitude

- Battleship** is a game for two players where you try to guess the location of five ships your opponent has hidden on a grid. Players take turns calling out a row and column, attempting to name a square containing enemy ships.
- Tie to Latitude & Longitude?** You will be placing your ships and sinking your "enemy" ships on coordinates similar to latitude and longitude coordinates.
- Goal of game :** To sink all of your opponent's ships by correctly guessing their location.
- Goal for unit:** Learn how latitude lines are LABELLED north & south of equator, while longitude lines are LABELLED east & west of the Prime Meridian.

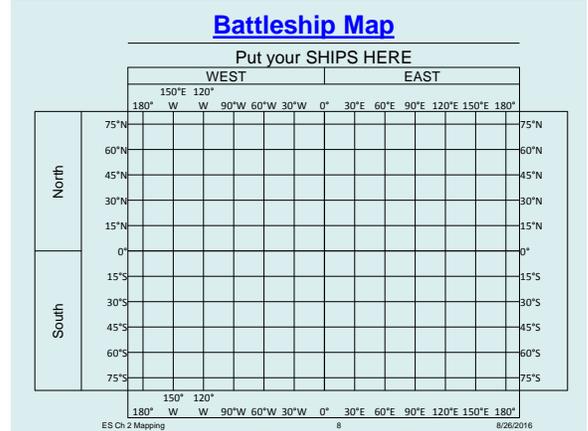
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- Put your ships **onto line CORNERS**. NOT inside the squares.
- On your turn, call out a number and a letter of a row and a column on the grid. **Rules**
- A. NOTE***Always read the North/South Number and then the East/West number (e.g. 15°N 30°E). If you read the incorrect format (e.g 15°E 30°N or 15° 30°N) your opponent can call "misfire". You get one chance to repeat the correct coordinates.
- Your opponent checks that space on their lower grid, and says "miss" if there are no ships there, or "hit" if you guessed a space that contained a ship.
- Mark your shots on your upper grid, with X's for misses and large red circles for hits, to track your guesses.
- When one of your ships is hit, place a red circle on your lower grid at the location of the hit.
- When one of your ships has all of its points marked in red, you must announce to your opponent that he has sunk your ship.

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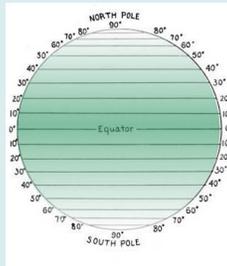


Latitude

Latitude: Distance in degrees **N or S** of the **equator** (0 – 90° N or S)

- Latitude lines are like

- "Fatitude"** - like a belt running **around** the earth. **RUNNING/DRAWN** East to West.
- "Ladder"** – on the Earth & are **LABELLED North & South** of the equator

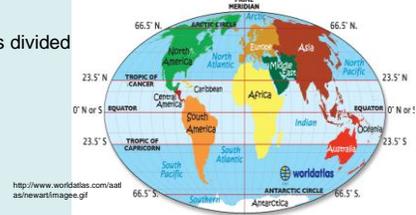
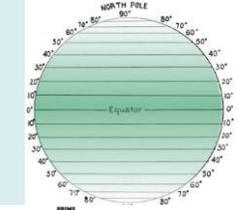


- Parallel**

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Latitude - Continued

- Equator = **0°**
- Poles = **90° N or S**
- 23.5°N = **Tropic of Cancer**
- 23.5°S = **Tropic of Capricorn**
- 1° latitude is about **111 km (68 miles)** on Earth's surface
- Each degree divided into **60 minutes (60')**
- Each minute is divided **seconds (")**

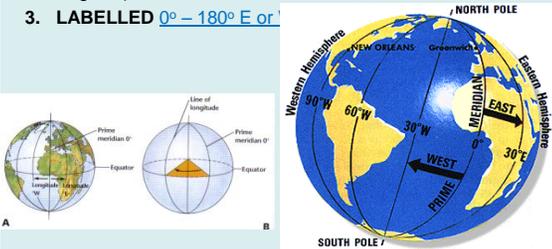


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Longitude

Longitude: Distance in degrees **E or W** of the **prime meridian**

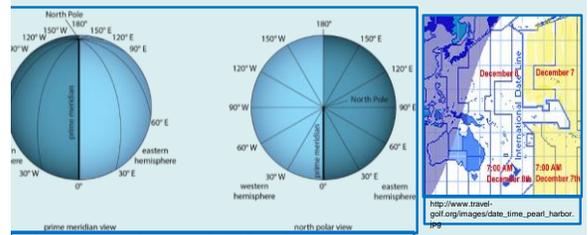
- Longitude lines are like **"long hair"** & **RUNNING/DRAWN** North to South
- Prime meridian = **0°** longitude (goes through Greenwich, England)
- LABELLED 0° – 180° E or W**



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Longitude - Continued

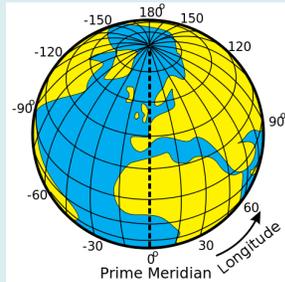
- International Date Line** is **180°**
 - On opposite side of world from the prime meridian
 - Where all **time zones** meet: **LOSE or GAIN** a day if cross



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Longitude - Continued

- Semi-circles from pole to pole
- NOT** parallel
 - Converge** at poles
 - Diverge** at equator
- Does 111km separate each degree longitude? Explain.



<https://geolounge.com/wp-content/uploads/2014/08/longitude.png>

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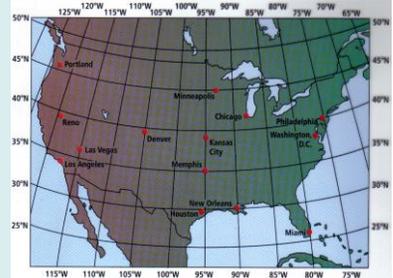
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TT #4 Mapping Latitude & Longitude

Mapping Coordinate Example

- New Orleans: 29° 57' N, 90° 04' W
- Always list **latitude** 1st



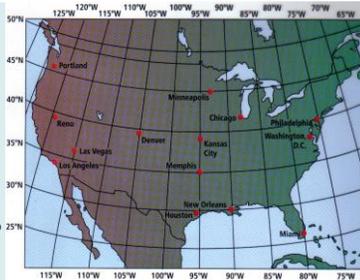
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Practice Problems

- What are coordinates of Washington D.C.?
- What city at 30N 90W?
- Which is further from Greenwich England, in degrees, Philadelphia or Denver? **EXPLAIN QUANTITATIVELY.**
- Which is closer in degrees to the International Dateline? Minneapolis or Portland? **EXPLAIN QUANTITATIVELY.**
- Memphis:
 - # km from Equator? **SHOW WORK.**
 - # km from North Pole? **SHOW WORK.**
 - #km from South Pole? **SHOW WORK.**
 - # km south of Minneapolis? **SHOW WORK.**



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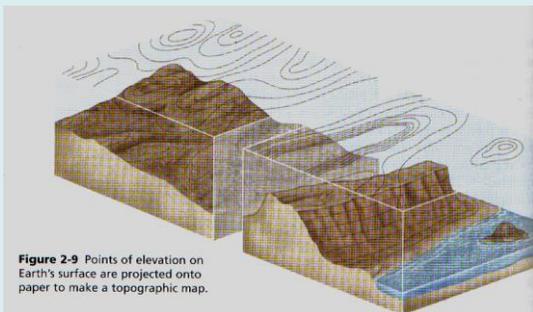
Section 2.2 Types of Maps

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Fig 2-9 Making of a Topographic Map



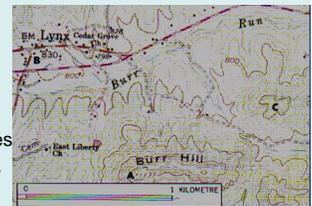
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Topographic Maps & PSL p35

- Detailed maps showing Earth's **surface** features: hills, valleys, rivers, forests, bridges
- Contour lines connect points of **equal** elevation
 - Contour lines never cross? Why?
 - Contour **interval**: **Difference** in elevation between 2 contour lines
 - Index** contours: Lines marked with **numbers** representing their elevation



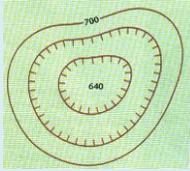
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Topo Maps, Cont'd

D. **Depression** Contour Lines:
Hachures, **short lines** at right angles to the contour lines, **point toward lower** elevations and indicate depressions



i. Used for volcanic craters, etc.

3. **Gradient**: Calculation showing the **steepness** of a slope

A. **Change in elevation** = Gradient
Change in distance

B. Example: If you climbed a mountain trail that was 2 miles long from the base camp at an elevation of 7500ft to its Peak at 11500ft, what is the trail's gradient?

$$\text{Answer: } \frac{11500\text{ft} - 7500\text{ft}}{2 \text{ miles}} = \frac{4000\text{ft}}{2 \text{ miles}} = \text{Gradient of } 2000\text{ft/mi}$$

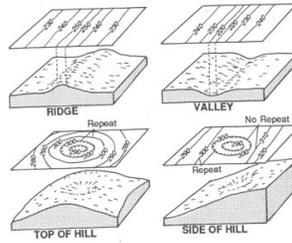
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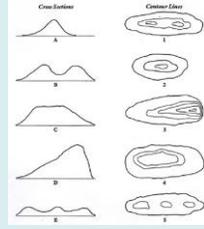
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Match – Topo Map to Side View

Various Land Form Examples



Match Side View to Map



Side View D has gradients of 70m/km and 20m/km.

- Which side has the gradient of 70m/km?
- How did you decide?
- What is gradient if FLAT?

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Example Map



1. If the contour interval is 20 feet, what is the elevation of lines A? B? C? D? E? F? G?
2. Which side of the hill with the depression at the top is steeper? **Left, lines are closer together**
3. What is the elevation of the index contour?

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Gradient Problem #1

The distance from Point G to Point H on a map is 9.6cm. The scale on the map says that 1 mile = 3 cm. Write an equation using a conversion factor to determine how many miles apart the two points are. Show your work. Include units on your conversion factor and your answer.

$$\frac{9.6\text{cm}}{1} \times \frac{1 \text{ mile}}{3 \text{ cm}} = \frac{9.6 \text{ miles}}{3} = 3.2 \text{ miles}$$

The elevation of Point G is 625 feet, while the elevation of Point H is 433 feet. Combining this information with the distance calculated above, determine the gradient between Point G & Point H. Show your work. Label your work and your answer with units.

$$\frac{625 \text{ feet} - 433 \text{ feet}}{3.2 \text{ miles}} = \frac{192 \text{ feet}}{3.2 \text{ miles}} = 60\text{ft/mile}$$

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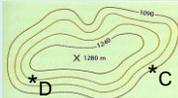
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Gradient Problem #2

Calculate the gradient from Point C to Point D through the following steps. Show your work. **Hand out rulers & calculators**

1. What is the contour interval?
 $1240 - 1090 = 150\text{m}$
3 lines between: $150/3 = 50 \text{ m}$
2. Determine the elevation of the line Point D is on.
 $1090 + 50 + 50 = 1190 \text{ m}$
3. Determine the distance in miles.
 $4.9\text{cm} \times \frac{3 \text{ mile}}{1 \text{ cm}} = 14.7 \text{ mile} = 13.4 \text{ miles}$
(11.5 - 15mi ok)
4. Write an equation to determine the gradient between Point C & Point D.)



#3: $\frac{1}{100} \text{ m}$
 4.7 - 5.0cm ok &
 1.0 - 1.2 cm ok

$$\frac{1190 \text{ feet} - 1090 \text{ feet}}{13.4 \text{ miles}} = \frac{100 \text{ feet}}{13.4 \text{ miles}} = 7.5 \text{ m/mi}$$

(6.6 - 9 m/mi ok)

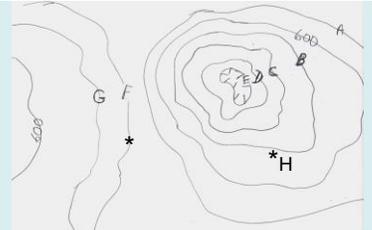
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Gradient Problem #3

0 5 miles



Contour interval = 20 ft

Calculate the gradient from Point F to Point H. Show your work. Label the units in both the work and the answer.

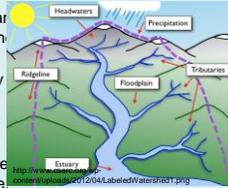
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Crumpled Paper Watershed Lab –Formative Assessment

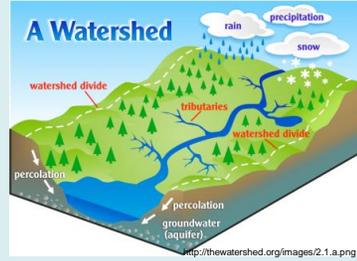
- Choose the best description for the **watershed** of a stream:
 - The water of a stream and all the tributaries that feed into it, including wetlands
 - All the land that slopes toward the stream and drains rain and melting snow into the stream
 - A large wet area of land that completely surrounds the stream.
- You are hiking along a trail in a hilly countryside. You know that you have reached the watershed of a different stream because
 - The ground changes from soggy soil to dry forest
 - You can see another stream
 - You are standing on a high spot and the land starts to slope downward again.



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What is a Watershed?

- Watershed** = All the land that drains into a stream, river, lake or ocean.
- Runoff** = Extra rainfall or snowmelt that cannot be absorbed by soil and vegetation and "runs off" the land into a body of water.



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Watershed Boundary

- The **boundary of a watershed** is the ridgeline of high land surrounding it, like the edge of a bowl.
 - "Drainage Basin" = Another term for watershed



<https://www.portlandoregon.gov/shared/cfm/image.cfm?id=527136>

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Human Effects on Watershed

Runoff carries whatever is on the land, causing pollution of bodies of water. Examples:

- Bacteria & manure – from farms & human sewage
- Chemicals: fertilizers, etc. from farms and city
- Soil (dirt) – from fields & city construction sites
- Oil – from cars & factories



THINK ABOUT THIS
the next time you swim or boat in **Duck Creek or the Mississippi!!**

<http://www.cityofdenton.com/Home/ShowImage?id=5014&t=635337568202570000>

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Worksheet Topography #2

Map Reading Activity: Topography #2

Topographic Map. Circle features, lines that show points, lines on, and the main lines.

The map shows two hills, 'Ash Hill' and 'Oak Hill', with contour lines. A path is drawn across the hills. A scale bar shows 50 m, 40 m, 30 m, 20 m, 10 m, and Sea level = 0'. Below the map is a table with questions and a grid for plotting a side view.

1. Color the elevations on the topographic map as follows: Red: 50m and higher, Orange: 40-50m, Yellow: 30-40m, Light green: 20-30m, Dark green: 10-20m, Purple: 0-10m	
2. Finish the mountain diagram below the topographic map, completing Oak Hill and drawing Ash Hill with proper elevations.	
3. Approximately how tall is Ash Hill?	
4. Approximately how tall is Oak Hill?	
5. Which mountain is taller, and by about how much?	
6. How many feet of elevation are there between contour lines on the topographic map?	
7. Are the contour lines closer together on Ash Hill or Oak Hill?	

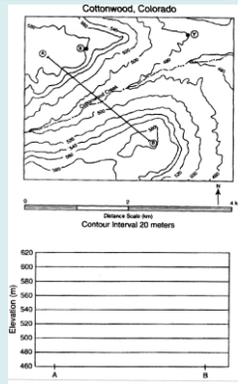
If you were walking along the "path" (line) on the map, what would the terrain be doing?

- We will convert the topographic map to a side view by plotting the elevation every time we "step" on a contour line as we walk along the path.
- Did the resulting side view match the terrain you thought you'd be "walking"?

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Practice Map –YOU Draw Side View/Silhouette

- Put an "S" on the location that is the "Steepest" in the diagram above. Mark an "F" on a large area that is relatively "Flat".
- On the grid above, construct a topographic profile representing the cross-section between Point A and Point B, following the directions below:
 - Plot the elevation of the land along line AB by marking with a dot, the elevation of EACH point where a contour line is crossed by line AB.
 - Connect the dots with a smooth, curved line to complete the topographic profile (AKA silhouette or cross-section).

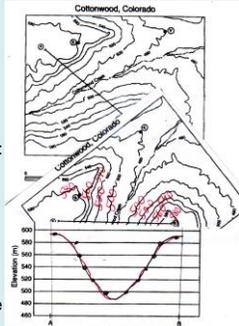


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Practice Map –YOU Draw Side View- KEY

- Put an "S" on the location that is the "Steepest" in the diagram above. Mark an "F" on a large area that is relatively "Flat".
- On the grid above, construct a topographic profile representing the cross-section between Point A and Point B, following the directions below:

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 ***Connect the dots with a smooth, curved line to complete the topographic profile (AKA silhouette or cross-section).



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Test Prep

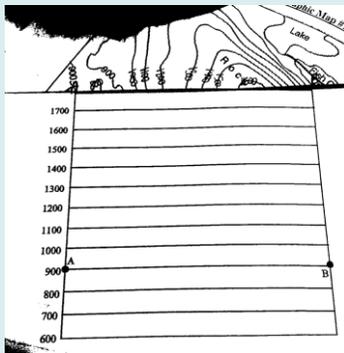
- NOTE: YOU WILL NEED A CALCULATOR FOR THE EXAM**
- To study:
 - Textbook reading
 - Objectives at the beginning of this note outline
 - Vocab words: italicized at the beginning of each section, and bold throughout text
 - Questions at the end of each section and at the end of the chapter
 - Summary page at end of chapter
 - Notes, objectives, labs, worksheets from class
 - My website: Quizlet (vocab flashcards/games/quizzes), videos, textbook website for practice quizzes

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Topographic Map Worksheet #1

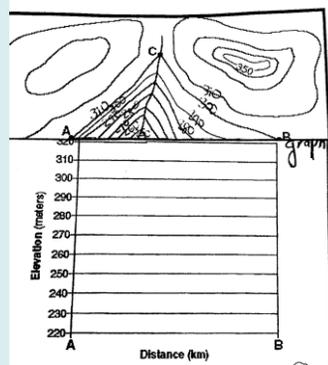


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Topographic Map Worksheet #2

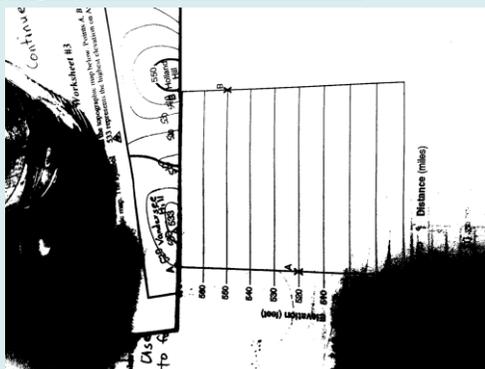


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Topographic Map Worksheet #3



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Time Zones

- Earth rotates in 24 hours, so there are 24 time zones
- Each time zone is approximately 15 degrees LONGITUDE wide
- Don't separate main cities/states
- The International Date Line is where you LOSE or GAIN a day when cross
- If it's 1pm in Florida, what time in Chicago? Denver? D.C.? Seattle?
- Notice time zones aren't straight, why not?



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Time Zones, Cont'd



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