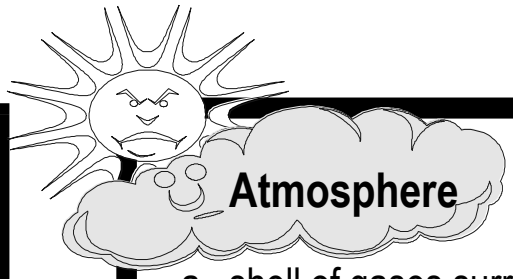
Topic II

The Model of the Earth

Date _____

Topic: The Model of the Earth

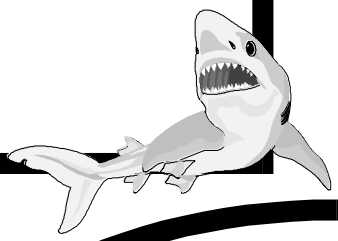


1. Hydrosphere

a. liquid water part of the Earth
b. covers 70% of the Earth
c. average depth 3.5 km
d.

2. Atmosphere

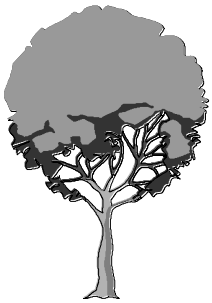
a. shell of gases surrounding Earth (layered)
b. average depth = 600 km
c.

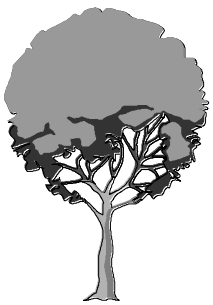


Aim:

3. Lithosphere

a. solid outer part of the Earth
b. thickness = 75-150 km
c.





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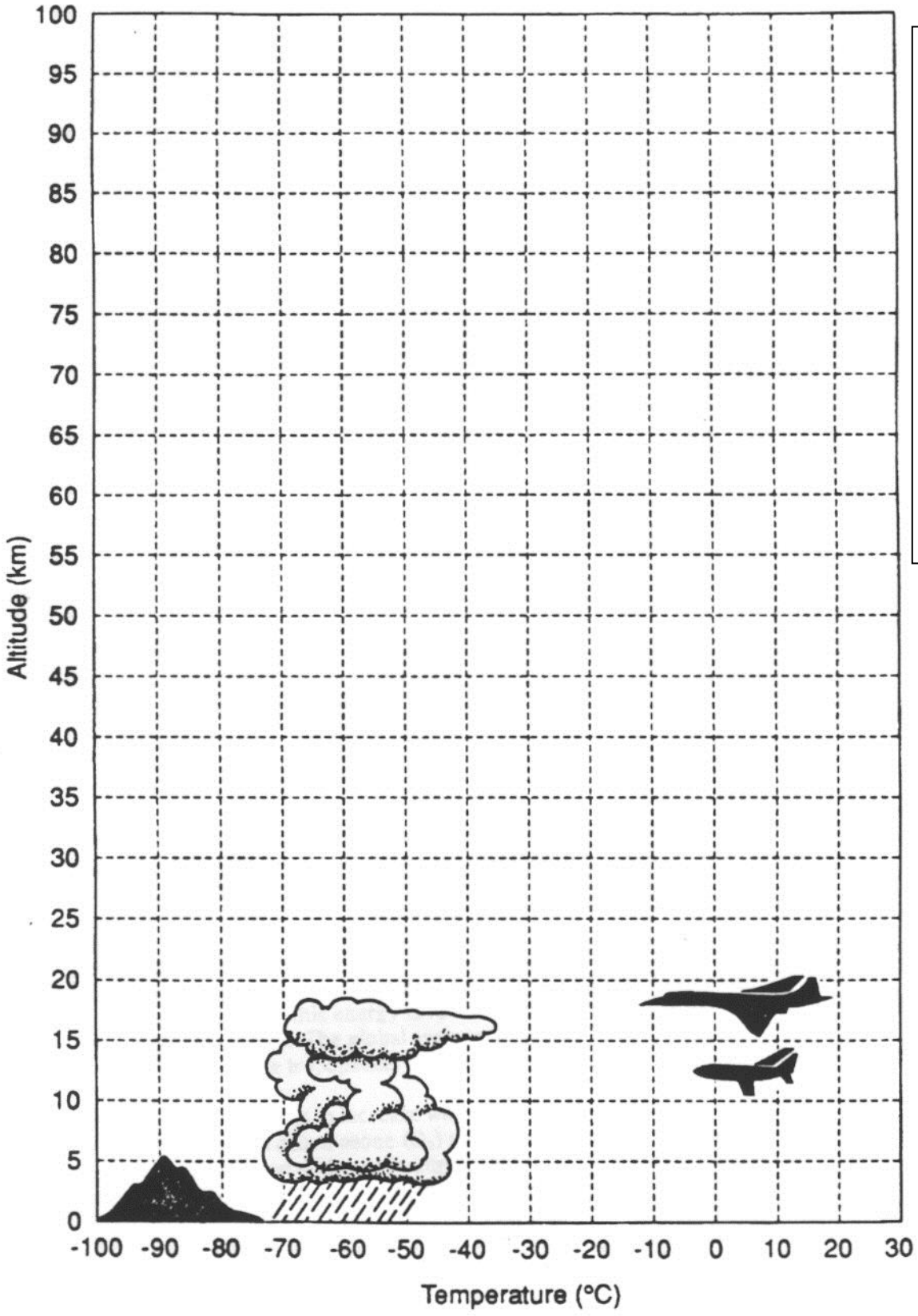

100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
Altitude (km)
-100 -90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30
Temperature (°C)

KEY

Date _____

The Parts of the Earth

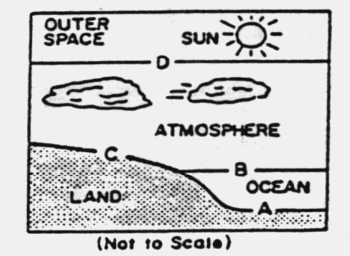
1. The lithosphere is the
   1 solid outer part of the Earth
   2 liquid part of the Earth
   3 gaseous part of the Earth
   4 solid and liquid parts of the Earth

2. Which statement most accurately describes the Earth's atmosphere?
   1 The atmosphere is layered, with each layer possessing distinct characteristics.
   2 The atmosphere is the gas that surrounds some of the Earth.
   3 The atmosphere's altitude is less than the depth of the ocean.
   4 The atmosphere is more dense than the hydrosphere but less dense than the lithosphere.

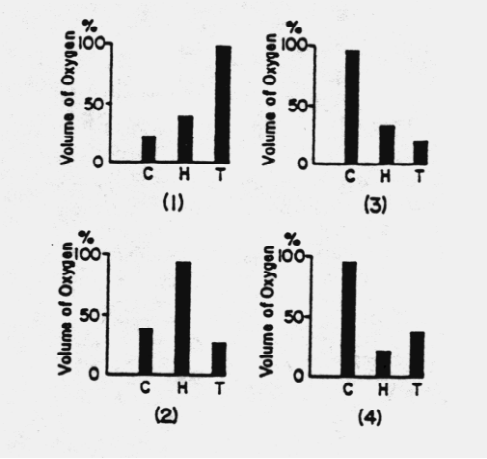
3. Which two elements listed below are most abundant by mass in the Earth's crust?
   1 silicon and oxygen
   2 hydrogen and iron
   3 oxygen and magnesium
   4 hydrogen and calcium

4. Which line best identifies the boundary between the lithosphere and the troposphere?

   1 line A
   2 line B
   3 line C
   4 line D



5. According to the *Earth Science Reference Tables*, which graph best represents the percent of oxygen, by volume, found in the Earth's crust (C), hydrosphere (H), and troposphere (T)?



6. In which group are the spheres of the Earth listed in order of increasing density? (Remember … you know what each of these are made up of …)
   1 atmosphere, hydrosphere, lithosphere
   2 hydrosphere, lithosphere, atmosphere
   3 lithosphere, hydrosphere, atmosphere
   4 lithosphere, atmosphere, hydrosphere

7. Ozone gas in the Earth's atmosphere helps to protect life on the Earth. This protection is due to the ability of ozone to absorb
   1 radio waves
   2 ultraviolet radiation
   3 gamma radiation
   4 visible radiation

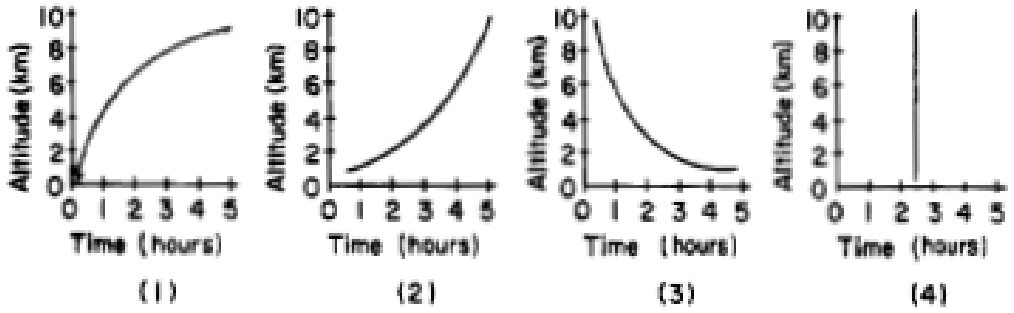
Base your answers to **questions 8-12** on the *Earth Science Reference Tables*, the information and the chart below, and your knowledge of Earth Science. The data were recorded by weather instruments carried into the atmosphere by a gas-filled balloon.

8. As the altitude of the balloon increased, the air pressure
   1 increased, only
   2 decreased, only
   3 remained the same
   4 increased and then decreased

9. What kind of relationship exists between altitude and air pressure?
   1 direct
   2 inverse
   3 cyclical
   4 unaffected

Elapsed Time (min) (Time After Balloon is Released)	Altitude of Balloon Above Ground Level (km)	Atmospheric Pressure Recorded (mb)
30	2.00	800
60	3.75	630
90	5.25	530
120	6.50	450
150	7.50	380
180	8.25	350
210	8.75	330
240	9.00	300
270	9.12	290
300	9.20	282

10. Which graph best represents the relationship between elapsed time and the altitude of the balloon?



11. What is the most abundant element in the atmosphere surrounding this balloon?
   1 hydrogen
   2 nitrogen
   3 carbon dioxide
   4 oxygen

12. How did the water vapor content and the air temperature change as the balloon's altitude increased? (Use the *Earth Science Reference Tables*)
   1 water vapor content and air temperature both decreased
   2 water vapor content and air temperature both increased
   3 water vapor content increased and air temperature decreased
   4 water vapor content decreased and air temperature increased

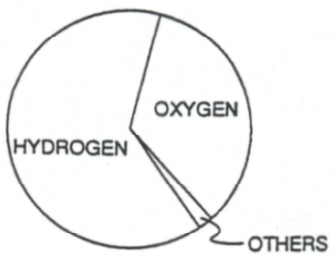
13. The element oxygen is found in the Earth's
    1 troposphere, only
    2 hydrosphere, only
    3 troposphere and hydrosphere, only
    4 troposphere, hydrosphere, and crust

14. Which substance released by humans into the atmosphere has contributed to ozone depletion?
    1 carbon dioxide
    2 chlorofluorocarbons
    3 sulfur
    4 carbon monoxide

15. In which group are the layers of the Earth's atmosphere listed in order of increasing thickness?
    1 troposphere, mesosphere, stratosphere, thermosphere
    2 troposphere, stratosphere, mesosphere, thermosphere
    3 thermosphere, mesosphere, stratosphere, troposphere
    4 troposphere, thermosphere, stratosphere, mesosphere

16. The graph to the right represents the percentage of elements by volume.

    This graph best represents the elements of the Earth's
    1 lithosphere
    2 hydrosphere
    3 troposphere
    4 stratosphere



17. What is the approximate temperature at the tropopause?
    1 0°C
    2 55°C
    3 15°C
    4 -55°C

18. As the altitude in the stratosphere increases, the air temperature in the stratosphere
    1 increases
    2 decreases
    3 remains the same

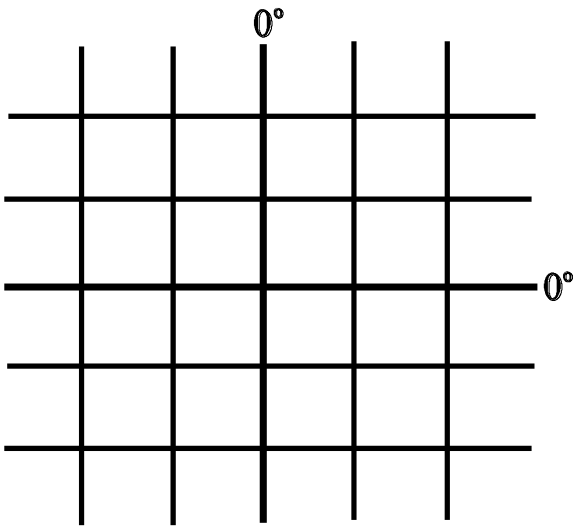
19. The ozone layer is located in the
    1 troposphere
    2 stratosphere
    3 hydrosphere
    4 thermosphere

20. The solid rock material that directly underlies sediments on the ocean floor is part of the Earth's
    1 lithosphere
    2 hydrosphere
    3 troposphere
    4 outer core

Date _____

Topic: The Model of the Earth
Aim:

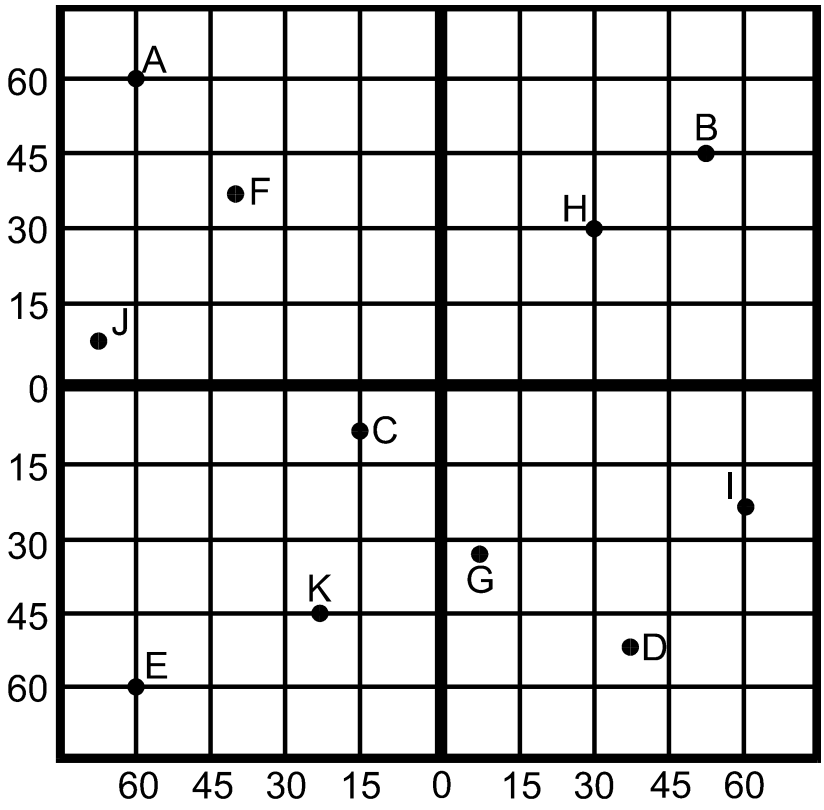
recall	notes
1. What is latitude and what do latitude lines measure?	a. latitude lines are horizontal lines (remember:" lat – flat") (parallel lines) b. measure how far a location is *north* or *south* of the Equator. c. ranges from 0^o to 90^o
2. What is longitude and what do longitude lines measure?	a. longitude lines are vertical lines (intersect at the poles) b. measure how far a location is *west* or *east* of the Prime Meridian (Greenwich Meridian). c. ranges from 0^o to 180^o



Location	Latitude	Longitude
W		
X		
Y		
Z		

Date _____

Latitude and Longitude Review Worksheet



1. Complete the chart below by finding the coordinates of each point.

Location	Latitude	Longitude
A		
B		
C		
D		

2. Which point is located at 45°S and 23°W? _____

3. Which point is located at 32°S and 7°E? _____

4. Which two points have the same longitude? _____

5. What is the difference in longitude between points H and I? _____

6. What is the difference in longitude between points H and C? _____

Date _____

Topic: The Model of the Earth
Aim:

Degrees / Minutes System of Latitude and Longitude: **Mainly used on *ESRT* page 3**

a degree of latitude or longitude can be divided into subunits called <u>minutes</u>

1° = 60' **"tick mark" is the symbol for minutes**

½° = 30'

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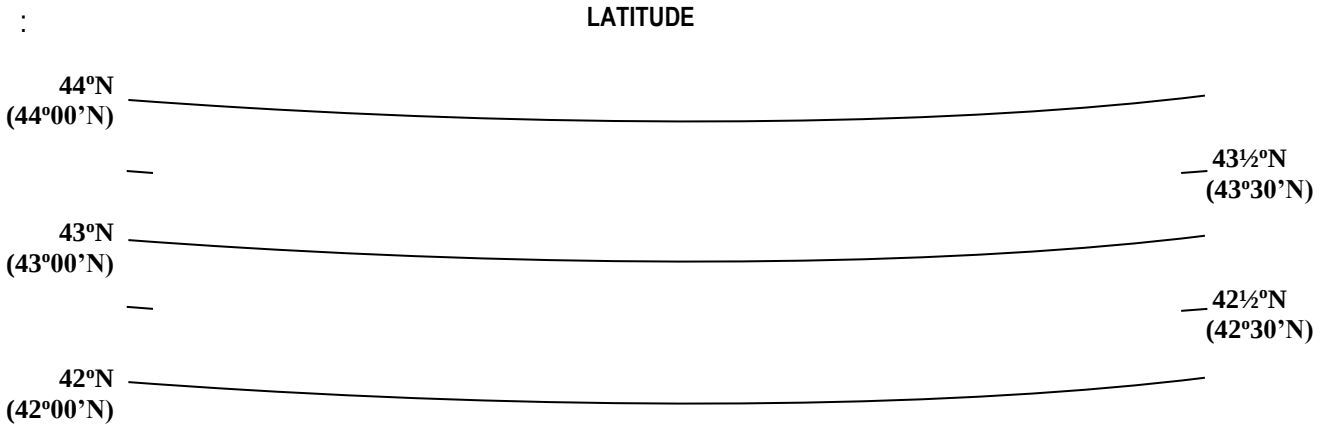
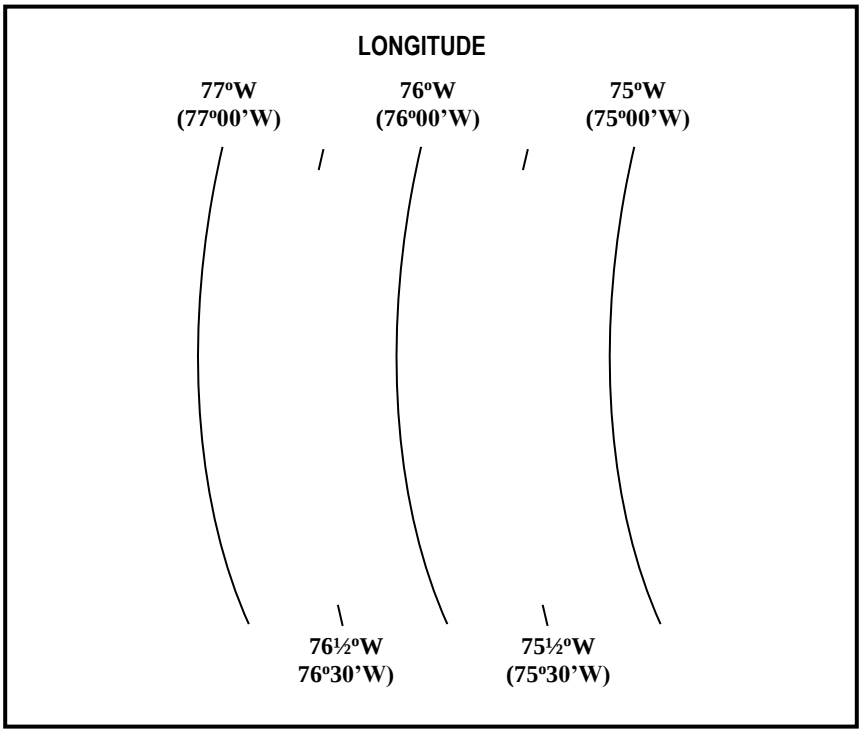




Date _____

Latitude and Longitude Review Worksheet

Use the *Earth Science Reference Tables* to determine the coordinates of the listed locations.

1. What is the latitude and longitude of New York City?
   (to the nearest whole degree) _____

For **questions 2-6**:
Use page 3 of the *ESRT* to approximate the latitudes and longitudes of locations in NYS on to the nearest minute.

2. What is the latitude and longitude of Slide Mountain, NY? _____

3. What is the latitude and longitude of Albany, NY? _____

4. What is the latitude and longitude of Ithaca, NY? _____

5. What is the latitude and longitude of Jamestown, NY? _____

6. What is the latitude and longitude of Mt. Marcy, NY? _____

7. At approximately which latitude would one experience the *Equatorial Countercurrent* in the Pacific Ocean? _____
   (Check out *ESRT* page 4 ...)

Use the Tectonic Plates map on page 5 of the *Earth Science Reference Tables*, what is the approximate latitude and longitude (to the nearest whole degree) of the following mantle hot spots (estimate the values from the center of the hot spot symbol on the map):

8. Hawaii Hot Spot _____

9. Iceland Hot Spot _____

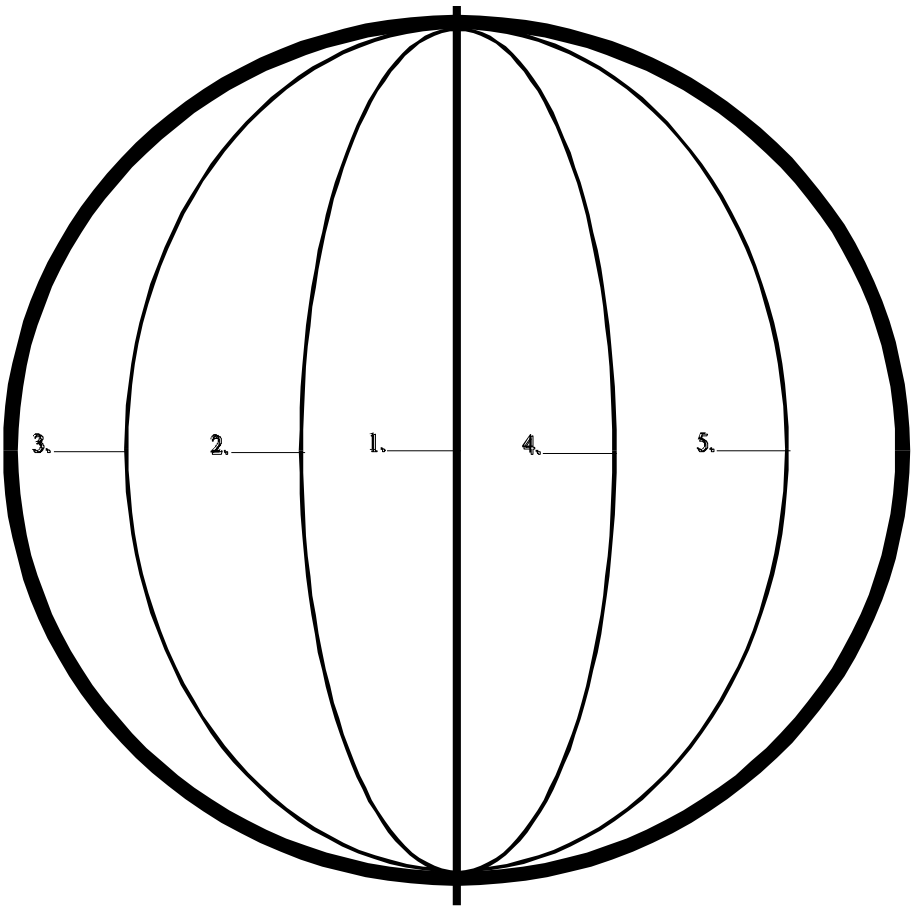
10. Yellowstone Hot Spot _____

11. Canary Islands Hot Spot _____

Date _____

Topic: The Model of the Earth
Aim:

SIDE VIEW



Notes

- longitude lines intersect at poles

- from side view you can't see every longitude line / time zone

Prime Meridian (0^o) = Greenwich Meridian

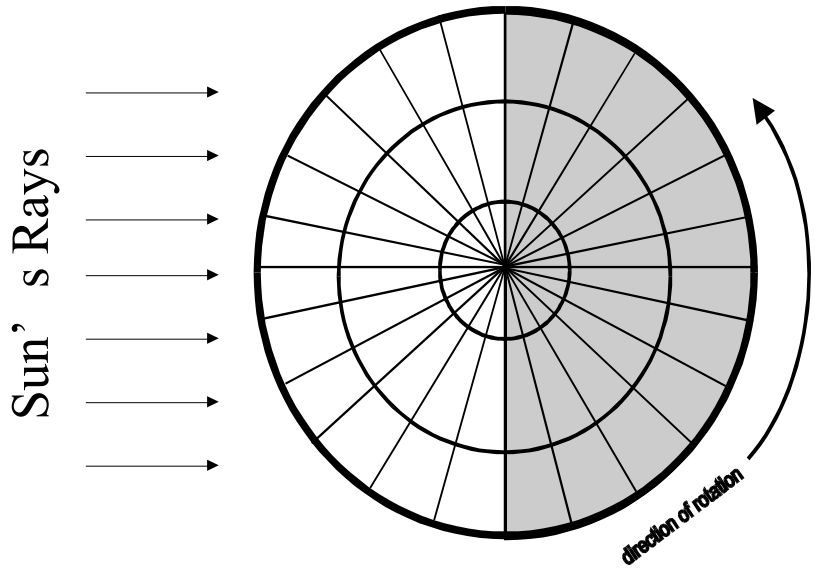
180^o = International Date Line (opposite side of 0^o)

On a globe:

Each line of longitude is 15^o apart or 1 hour apart

When working with time zones remember:
Left is less!

NORTH POLAR VIEW

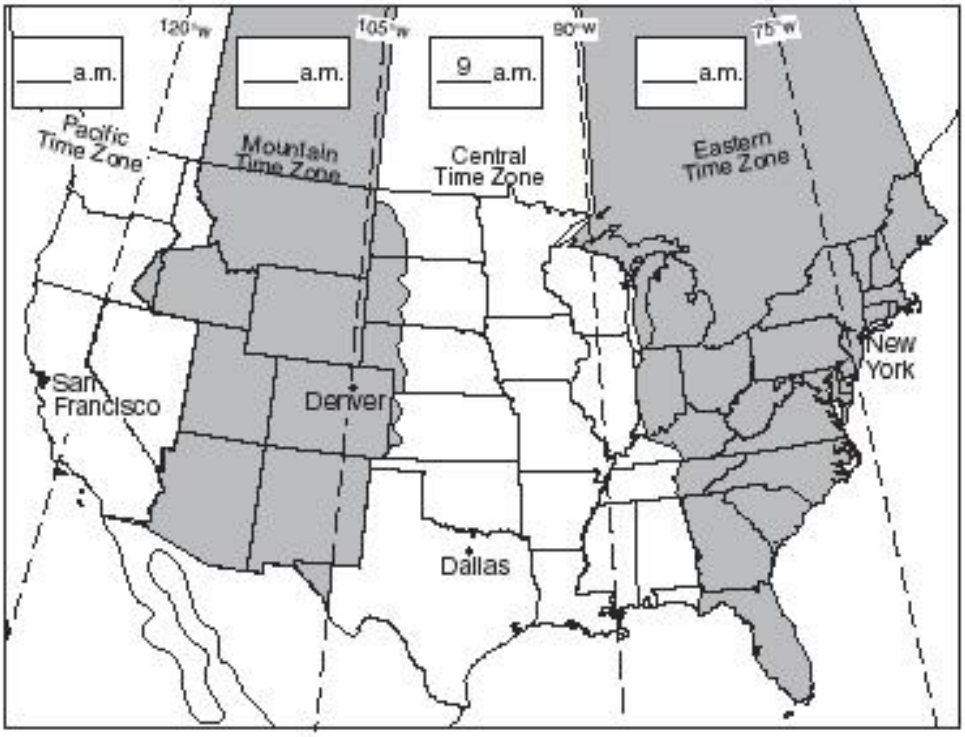


- from top view you CAN see every longitude line / time zone

The rotation of the Earth (spinning) is responsible for day and night by causing locations to turn toward and away from the Sun.

Date _____

Continental U.S. Time Zones



Solving Time Zone Problems: "The Grid Method"

Example 1: **The time at 90°E longitude is 7am. What is the time at 30°E longitude?**

Example 2: **The time at 45°W longitude is 2pm. At which longitude would the time be 7pm?**

Date _____

Time Zone Questions

1. Which lines, latitude or longitude, separate time zones? _____

2. How many degrees are there in a standard time zone? _____

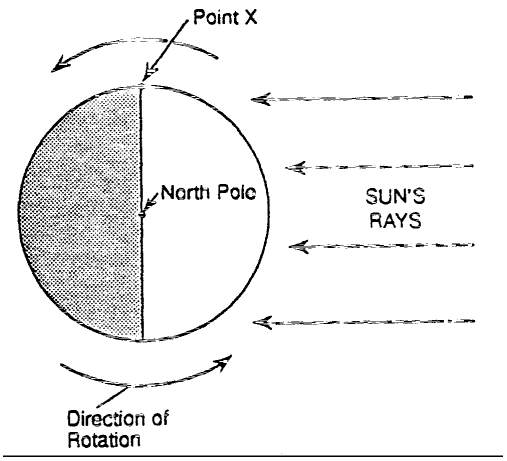
3. If two ships in the Pacific Ocean are three hours apart, how many degrees longitude separate them? _____

4. If two cities on the Earth have a 60˚ difference in longitude, what is the time difference between the two cities? _____

5. A person knows the solar time on the Prime Meridian and the local time. What determination can be made?
   (1) the date
   (2) the altitude of Polaris
   (3) the longitude at which the person is located
   (4) the latitude at which the person is located

6. Two cities on the globe have a 2 hour time difference. What is the difference in longitude between the two cities?
   (1) 15^o (2) 30^o (3) 45^o (4) 60^o

The diagram below shows the rotating Earth as it would appear from a satellite over the North Pole.



7. The time at point X is closest to
   (1) 6 am.
   (2) 12 noon
   (3) 6 p.m
   (4) 12 midnight

Use the Grid Method to answer **questions 8-15**. Show the grid below each question to support your answers.

8. How many hours of time exist between 45°N, 15°E and 60°N, 60°E? _____

9. If the time at 75°W longitude is 12:00pm, what time is it at 90°W longitude? _____

10. If the time at 120°W longitude is 9:00pm, what time is it at 75°W longitude? _____

11. The time at the Prime Meridian is 5:00pm.
    What would the time be at a location 45° east of the Prime Meridian? _____

12. The time at 45°W is 3:00am.
    At which longitude would the time be 6:00am? _____

13. The time in New York City (75°W) is 11:00pm.
    What would the time be at the Prime Meridian? _____

14. If the time at 30°E longitude is 1:00pm, what time is it at 45°W longitude? _____

15. The time at the Prime Meridian is 5:00pm.
    At which longitude would the time be 9:00pm? _____

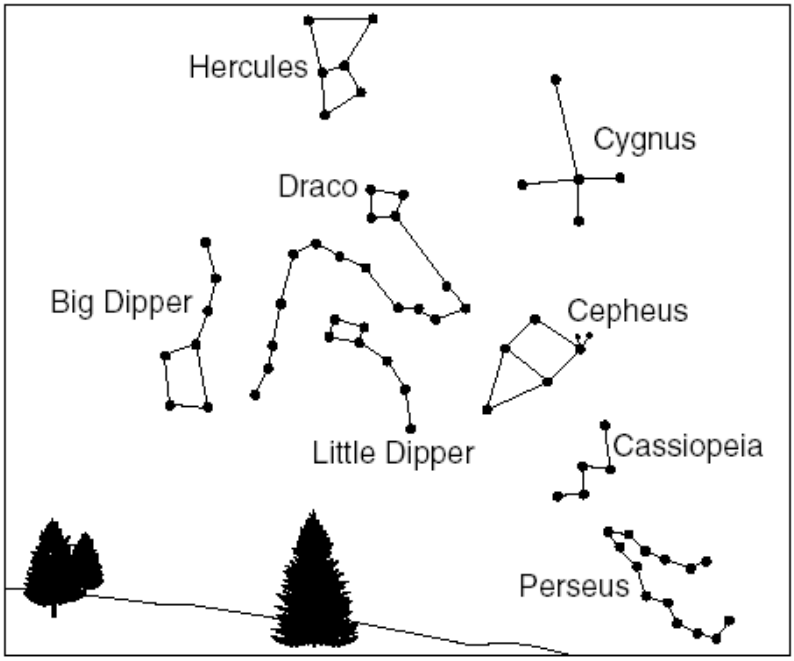
Date _____

Topic: The Model of the Earth

Aim:

Diagram 1

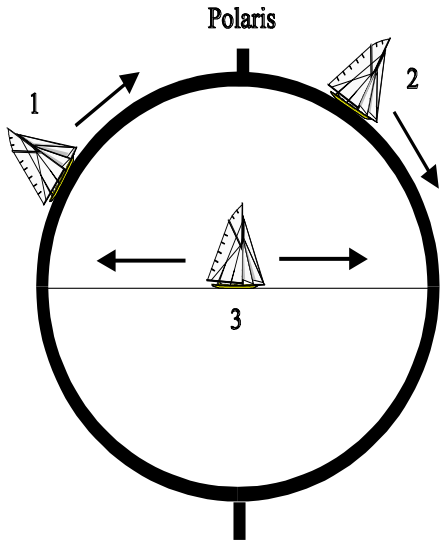
Diagram 2



Date _____

Topic: The Model of the Earth
Aim:

1. What is the definition of altitude?	**Altitude** - the height of an object above the horizon measured in degrees.
2. What is the numerical range of altitudes?	a. lowest = 0^o – object on horizon b. highest = 90^o – object is at observer's **zenith** (point directly above the observer)
3. How does the altitude of Polaris help determine an observer's latitude?	The altitude of Polaris is equal to the latitude of the observer in the Northern Hemisphere. *Example:* *If altitude of Polaris is 41^o, the observer is standing on 41^oN latitude.*



1 As a moving ship travels _____,

the observed altitude of Polaris will _____,

2 As a moving ship travels _____,

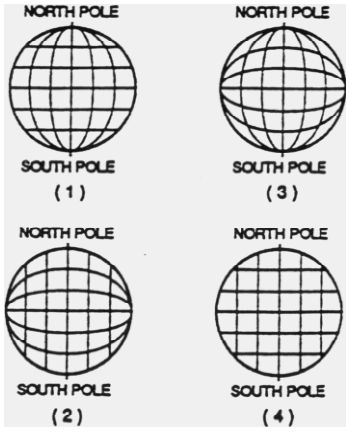
the observed altitude of Polaris will _____,

3 As a moving ship travels _____.

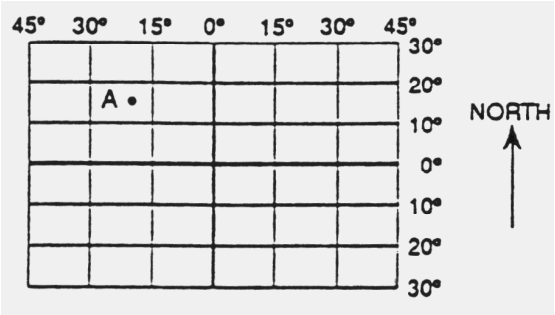
the observed altitude of Polaris will _____,

Latitude, Longitude, and the Altitude of Polaris,

1. The diagrams to the right represent four systems of imaginary lines that could be used to locate positions on a planet. Which system is most similar to the latitude-longitude system used on the Earth?



2. The diagram below represents a portion of the Earth's latitude and longitude system.



What are the approximate latitude and longitude of point A?

(1) 15°S, 20°W
(2) 15°N, 20°E
(3) 15°N, 20°W
(4) 15°S, 20°E

3. According to the *Earth Science Reference Tables*, which city is located closest to 44° N latitude, 76° W longitude?

(1) Massena
(2) Binghamton
(3) Buffalo
(4) Watertown

4. What is the location of Binghamton, New York?

(1) 42° 06' N, 75° 55' W
(2) 42° 06' N, 76° 05' W
(3) 42° 54' N, 76° 05' W
(4) 42° 54' N, 75° 55' W

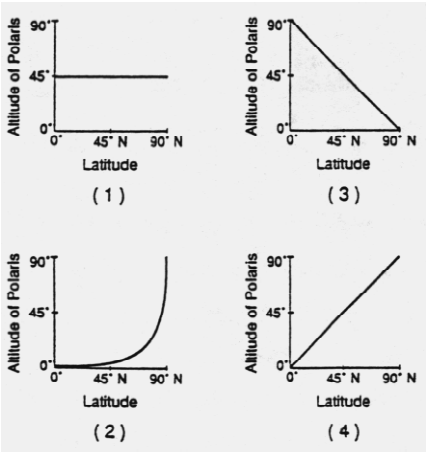
5. An observer on Earth measures the altitude of Polaris and finds it to be 90 degrees. The observer must be at the

(1) North Pole
(2) Arctic Circle
(3) Tropic of Cancer
(4) Equator

6. On June 21, the altitude of Polaris is observed from New York City and is found to be 41°. If the altitude is observed again on December 21, it will be

(1) 23 ½°
(2) 41°
(3) 49°
(4) 64 ½°

7. Which graph best represents the relationship between the latitude of an observer and the observed altitude of Polaris above the northern horizon?

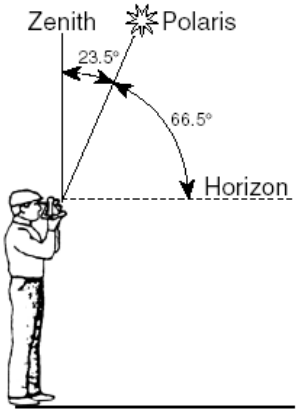


8. An observer on a moving ship notices that the altitude of Polaris decreases each night. In what direction is the ship moving?
   (1) due east
   (2) due south
   (3) due west
   (4) due north

9. An observer on Earth measures the altitude of Polaris and finds it to be 0^o. This observer must be at the
   (1) North Pole
   (2) Arctic Circle
   (3) Tropic of Cancer
   (4) Equator

10. As a ship crosses the Prime Meridian, the altitude of Polaris is 65^o. What is the ship's location?
   (1) 0^o latitude, 65^o East longitude
   (2) 0^o latitude, 65^o West longitude
   (3) 65^o North latitude, 0^o longitude
   (4) 65^o South latitude, 0^o longitude

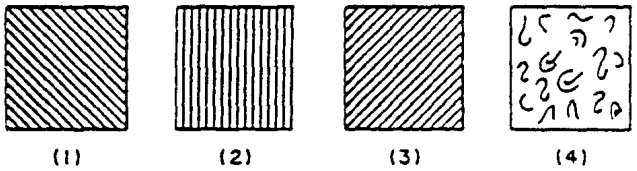
11. The diagram below shows an observer on Earth measuring the altitude of *Polaris*.



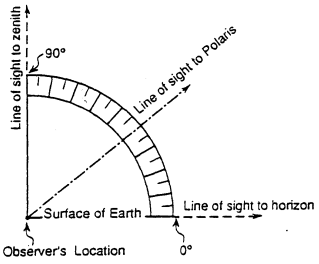
What is the latitude of this observer?
(1) 90° N
(2) 66.5° N
(3) 43° N
(4) 23.5° N

12. What is the approximate altitude of *Polaris* at Syracuse, New York?
   (1) 43°
   (2) 47°
   (3) 76°
   (4) 90°

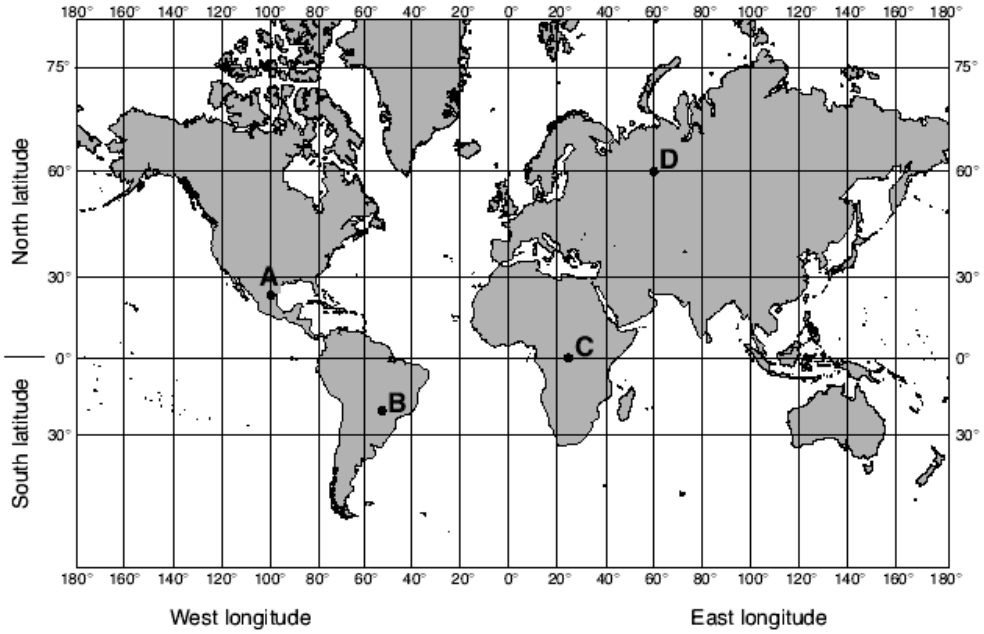
13. On the Generalized Bedrock Geology map of New York State what similar pattern is found at 44° 30' north latitude by 74°30' west longitude?



14. The diagram shows the altitude of Polaris above the horizon at a certain location. What is the latitude of the observer?
    (1) 10° N
    (2) 40° N
    (3) 50° N
    (4) 90° N



Use the world map to answer **questions 15-17**.

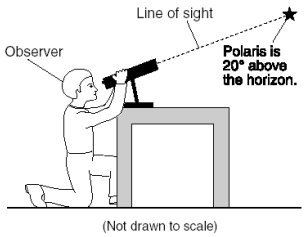


15. What is the latitude and longitude of point A? (don't forget directions) _____

16. What is the latitude and longitude of point B? (don't forget directions) _____

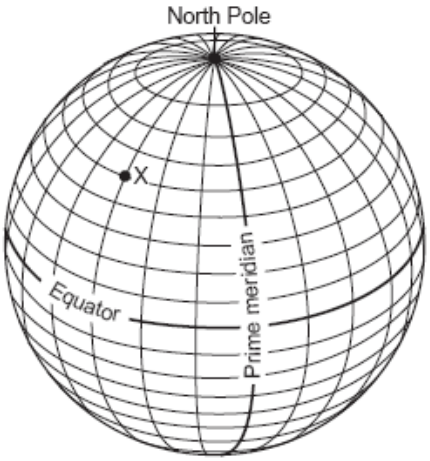
17. At which location could an observer *not* see *Polaris* in the night sky at any time during the year?
    (1) *A*
    (2) *B*
    (3) *C*
    (4) *D*

18. The diagram below shows an observer measuring the altitude of *Polaris.* What is the latitude of the observer?
(1) 20° N (3) 70° N
(2) 20° S (4) 70° S



19. From which New York State location would *Polaris* be observed to have an altitude closest to 45° above the northern horizon?
(1) Massena (3) Watertown
(2) Utica (4) New York City

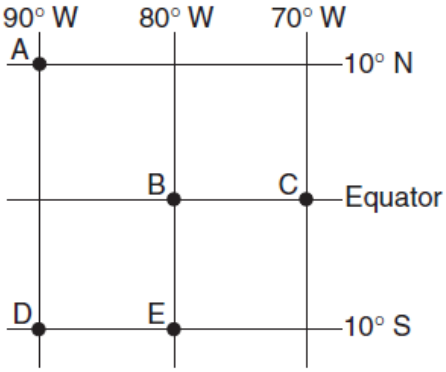
The diagram below shows latitude measurements every 10 degrees and longitude measurements every 15 degrees.



20. What is the latitude and longitude of point *X*?
(1) 40° S 45° E (3) 60° S 30° W
(2) 50° N 45° W (4) 75° N 30° E

Base your answers to **questions 21 and 22** on the map below, which shows the latitude and longitude of five observers, *A, B, C, D,* and *E,* on Earth.

21. What are the coordinates of letter A?
(1) 0°, 90°W (3) 90°N, 10°W
(2) 10°N, 90°W (4) 10°W, 90°S



22. Which two observers would be able to observe Polaris at the same altitude?
(1) *A* and *C* (3) *B* and *E*
(2) *B* and *C* (4) *D* and *E*