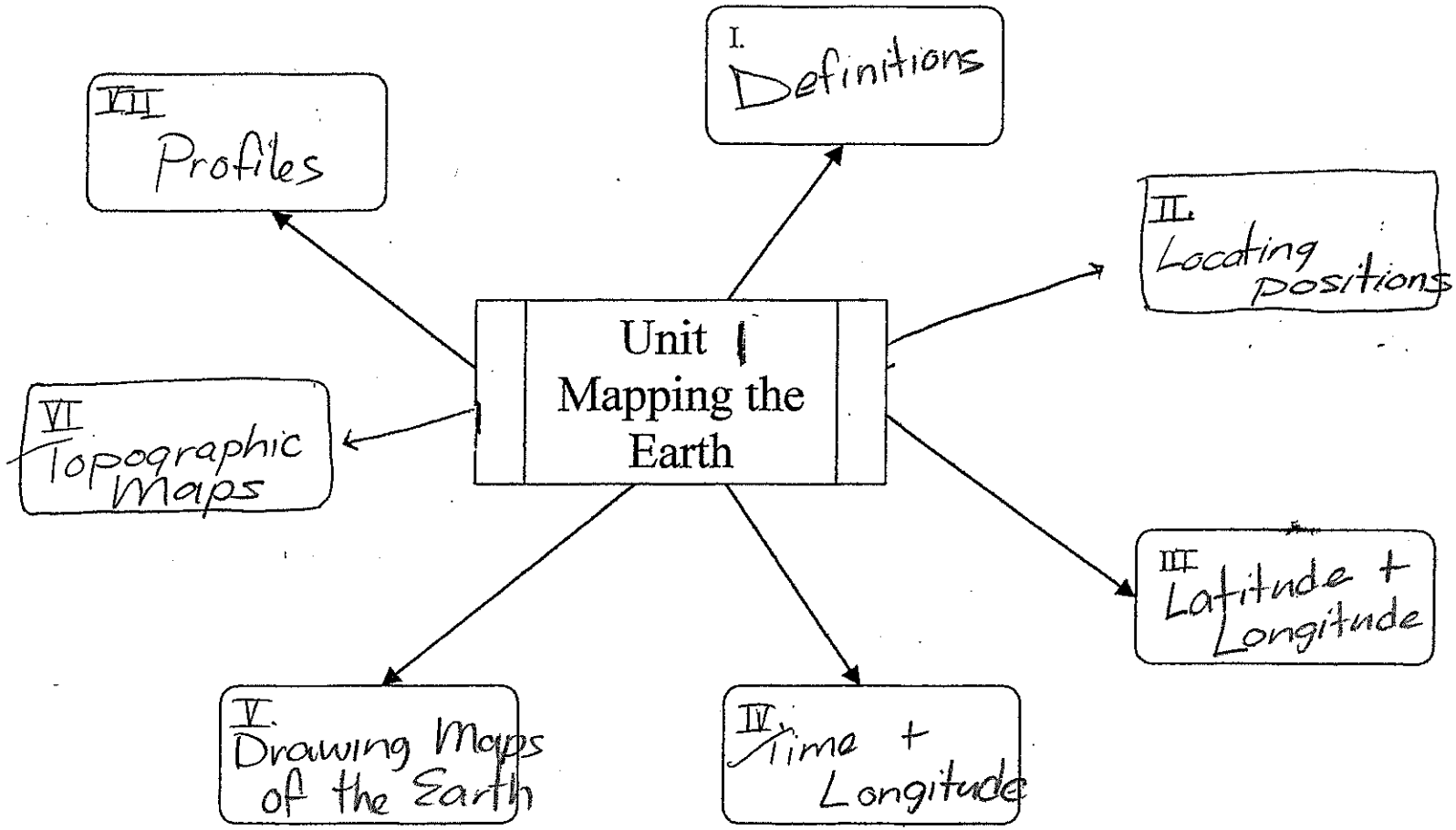
Name Key
Date _____
Period ___

Unit 1 Mapping the Earth
Earth Science



I. Some Definitions

A. Observation—using your senses

B. inferences are assumptions/explanations based on observations.

C. classification is grouping on the basis of common properties. Why do we do this?

-organize -make study easier

D. Mass is the amount of matter in an object. It is measured in grams.

E. Volume is the amount of space an object occupies. It is measured in ml or cm3.

#1 A prediction of next winter's weather is an example of

(1) a measurement
(2) a classification
(3) an observation
(4) an inference or prediction

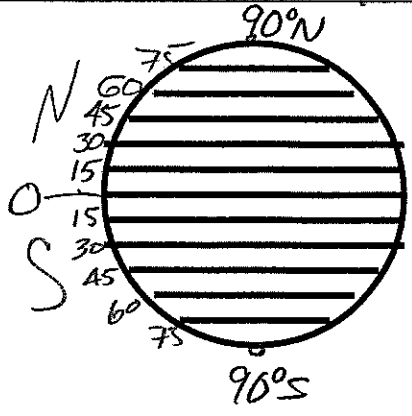
II. Locating positions on the Earth's surface

- Humans have established a system to locate positions on Earth.
- Latitude and Longitude are based on the Earth's rotation and our observations of the Sun and stars.
- Navigation is the science of locating your position on Earth.
- Coordinate systems assign a pair of numbers to every position on the Earth's surface.
- Latitude - how far N or S of the equator

Equator = 0° = reference line

Parallel = a line of latitude

Highest # is 90°N or 90°S.



- Longitude-how W or E of the Prime Meridian

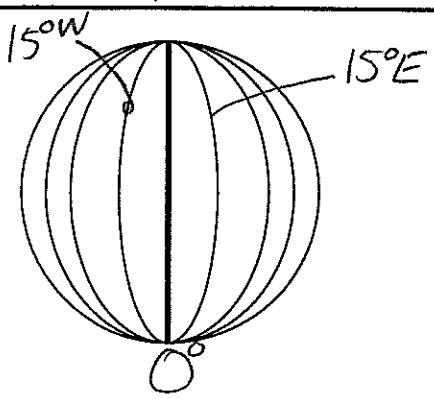
0° = Prime Meridian = reference line

Meridian = line of longitude

180° = highest number

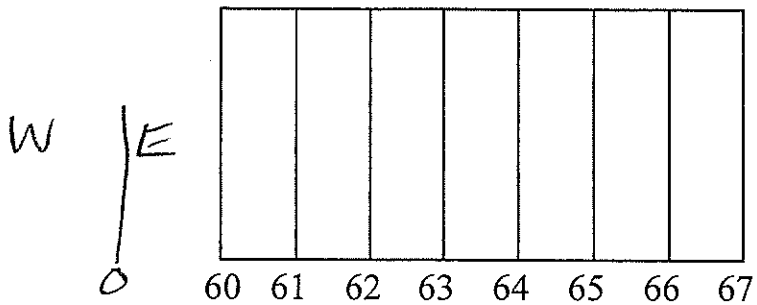
international date line

- where the date changes

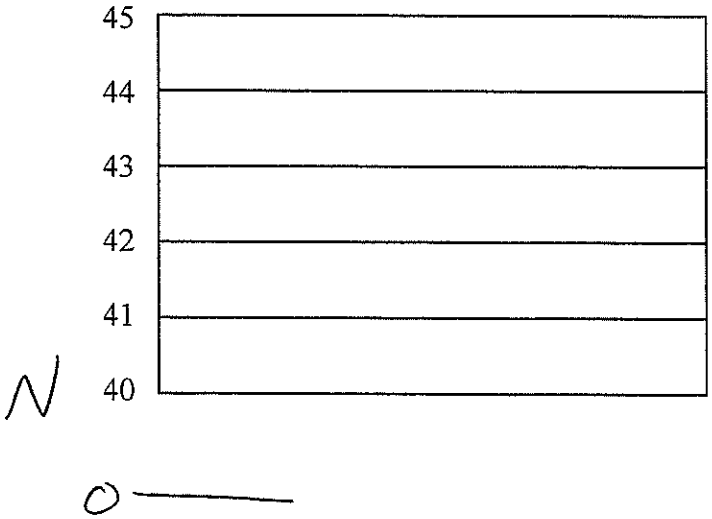


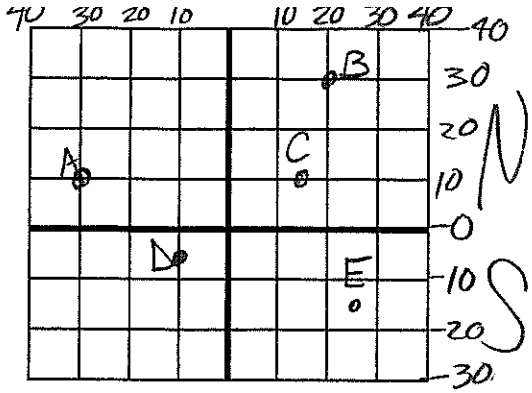
III. Using latitude and longitude

- These are lines of longitude.
- Is this map area in the Eastern or Western Hemisphere?

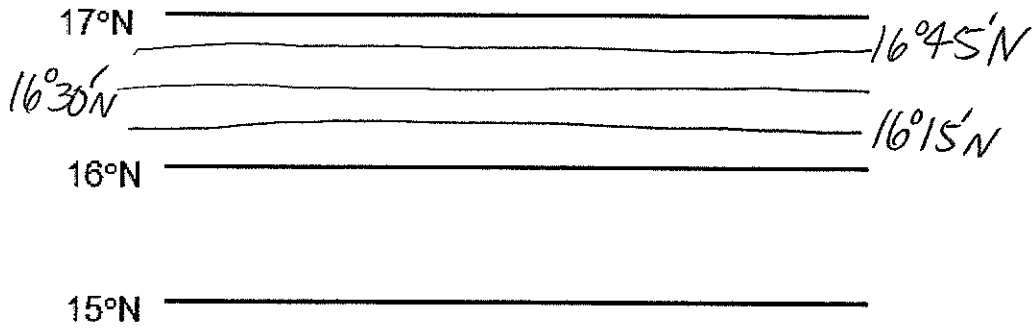


- These are lines of latitude.
- Is this map area in the Northern or Southern Hemisphere?





	Latitude	Longitude
A	10°N	30°W
B	30°N	20°E
C	10°N	15°E
D	5°S	11°W
E	15°S	25°E
F	10°N	20°W



Using a BLUE colored pencil, draw the 16°30'N line.
Using a RED colored pencil, draw the 16°15'N line.
Using a GREEN colored pencil, draw the 16°45'N line.

#2 Which latitude and longitude coordinates represent a location on the continent of Australia?

(1) 20° N, 135° E
(2) 20° N, 135° W
(3) 20°S, 135° E
(4) 20° S, 135° W

#3 An observer in New York State measures the altitude of Polaris to be 44°. According to the *Earth Science Reference Tables*, the location of the observer is nearest to

(1) Watertown
(2) Elmira
(3) Buffalo
(4) Kingston

#4 Base your answer to the following question on the *Earth Science Reference Tables*.

What is the location of Binghamton, New York?

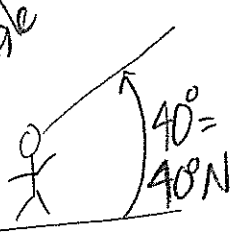
(1) 42° 06' N. lat., 75° 55' W. long.
(2) 42° 06' N. lat., 76° 05' W. long.
(3) 42° 54' N. lat., 76° 05' W. long.
(4) 42° 54' N. lat., 75° 55' W. long.

Polaris = north star

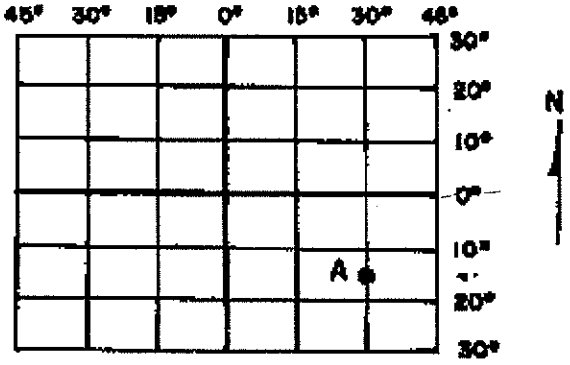
#5 The latitude of a point in the Northern Hemisphere may be determined by measuring the

(1) apparent diameter of Polaris
(2) altitude of Polaris
(3) distance to the Sun
(4) apparent diameter of the Sun

The latitude of the observer = angle to Polaris.



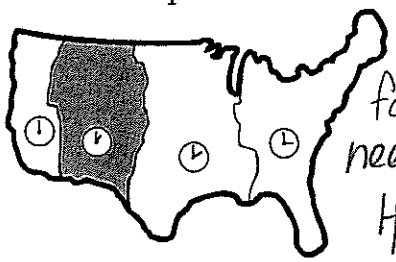
#6 The diagram below represents a portion of a map of the Earth's grid system. What is the approximate latitude and longitude of point *A*?



(1) 15°N. 30°W.
(2) 15°S. 30°W.
(3) 15°N. 30°E.
(4) 15°S. 30°E.

IV. Time and Longitude

- People have used the stars to note passage of time.
- The earth rotates spins:
  - 360 ° in 24 hours.
  - 15 ° in 1 hour
  - 1 ° every 4 minutes
- Humans divided the Earth into 24 time zones
- Meridians of longitude are the basis of longitude
- If you move one time zone to the West, the time is 1 hour earlier
- If you move one time zone to the East, the time is 1 hour later.
- Why did humans put time zones on earth?



Once humans were traveling far distances (railroad) we needed to way to keep time. Humans mark ~6am as dawn.

#7
The time required for one Earth rotation is about
(1) one hour
(2) one day
(3) one month
(4) one year

#9
Cities located on the same meridian (longitude) must have the same
(1) altitude
(2) latitude
(3) length of daylight
(4) solar time

#8
A person knows the solar time on the Prime Meridian and the local solar 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

#10
Upon which frame of reference is time based?
(1) the motions of the Earth in space
(2) the longitude of an observer
(3) the motions of the Moon
(4) the real motions of the Sun

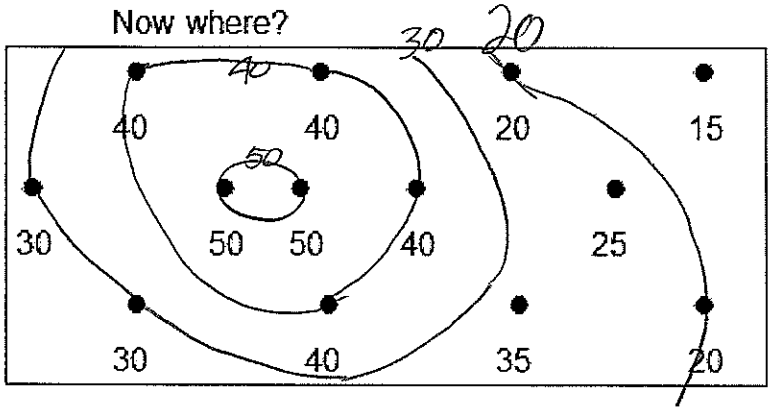
#11
What is the total number of degrees that the Earth rotates on its axis during a 12-hour period?
(1) 1°
(2) 15°
(3) 180°
(4) 360°

V. Drawing Maps of the Earth

- Humans can map just about anything.
- Field - a region of space in which a similar quantity can be measured at every point or locatio
- The values (numbers) can change with time.
- Types of fields: elevation, temp., pressure
- Once we measure an area we can make a map of what we were measuring:

Draw isotherms at a 10° interval.

Start at the left and work right.



- We then connect the points that have equal values so that the map is more meaningful to us.
- isolines connect points of equal value.
  - isotherms connect points of equal temperature.
  - isobars connect points of equal pressure.
  - Contour lines connect points of equal elevation.
    - elevation is the distance above or below sea level.

#12

Which statement is true about an isoline on an air temperature field map?

(1) It represents an interface between high and low barometric pressures.

(2) It indicates the direction of maximum insolation.

(3) It increases in magnitude as it bends southward.

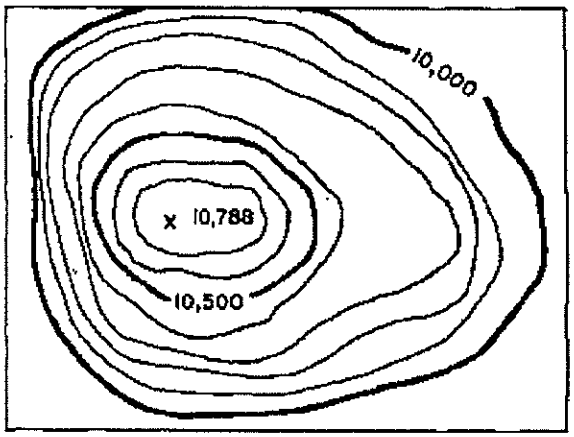
(4) It connects points of equal air temperature.

VI. Topographic Maps

- Topographic maps are also called contour maps.
- They are two-dimensional models that use contour lines to represent places of equal elevation.
- They represent landforms through the use of contour lines.
- Technology has both created changes and accelerated natural changes in the landscape that can be recorded with topo maps.
- You **HAVE** to know how to read, interpret, and topo maps.
- Contour lines are isolines that connect points of equal elevation.
- **Contour interval** is the distance between contour lines.

#13

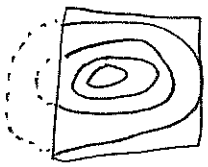
What is the elevation of the highest contour line shown on the map below?



(1) 10,000 feet
(2) 10,688 feet
(3) 10,700 feet
(4) 10,788 feet

VII. Topographic Map Rules

1. All points on a contour line have the same elevation
2. Every fifth line is called an index line. It is usually darker and helps you count.
3. All contour lines are closed (make a circle), but they might not look like they are closed because the map might be too small.

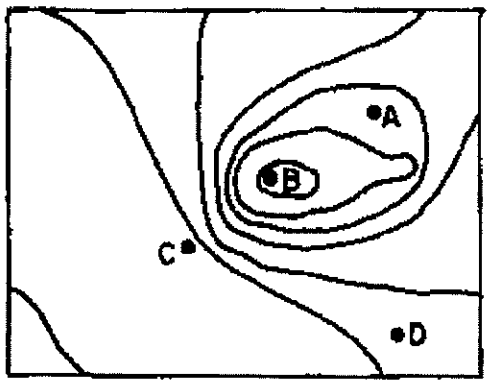


4. Two contour lines of different elevations may not cross each other. Exceptions: cliffs and waterfalls

5. The spacing of contour lines indicates the nature of the slope.
   - Closer together = steep
   - Farther apart = gentle
   - No lines = flat

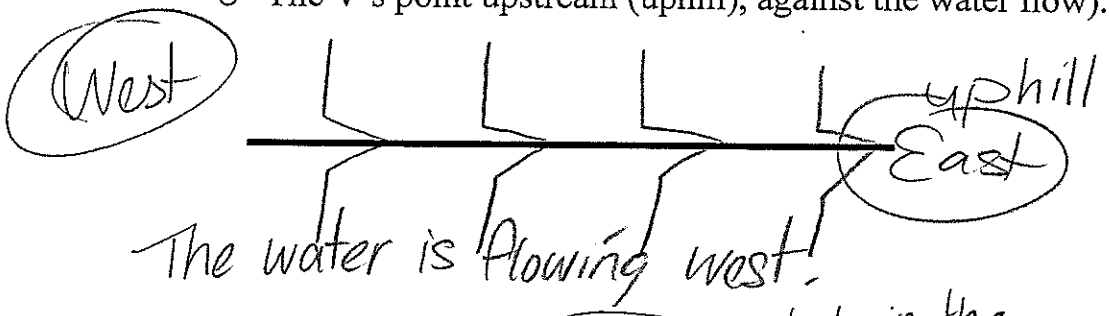
#14

The diagram below is a contour map. Between which two points is the slope of the hill steepest?



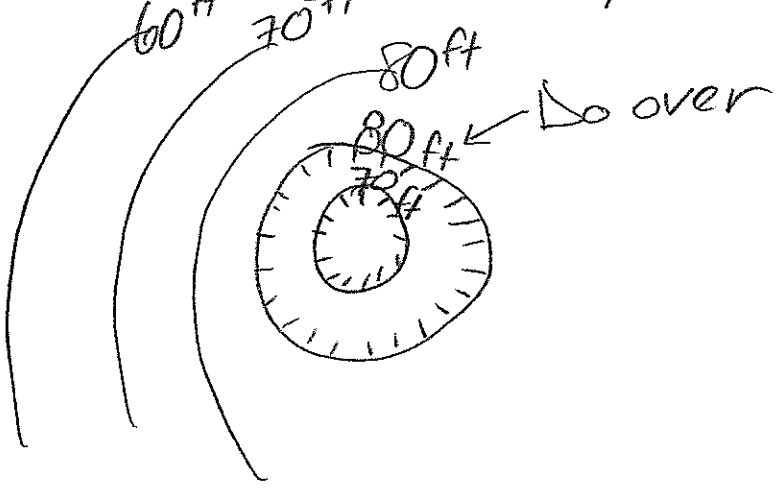
(1) A and B
(2) B and C
(3) C and D
(4) A and D

6. Where contour lines cross a stream, they always form a V.
   - The V's point upstream (uphill), against the water flow).

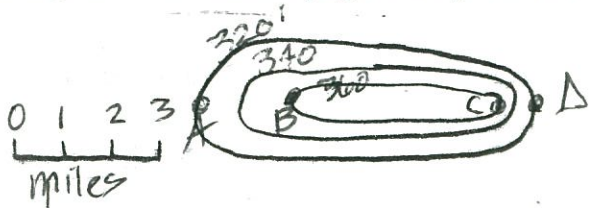


7. Hachure marks indicate a depression. hole in the ground.

Mrs. Weiler's special Rule: The first hachure line is a "do over."



8. Gradient is how steep the slope is. It is possible to calculate the gradient of a slope using the formula on page 1 of your reference tables.



of AB

$$\text{Gradient} = \frac{\text{change in field value}}{\text{distance}}$$

$$= \frac{360' - 320'}{2 \text{ miles}}$$

$$= \frac{40'}{2 \text{ miles}}$$

$$= 20 \frac{\text{ft}}{\text{mile}}$$

of CD.

$$\text{Gradient} = \frac{\text{change in field value}}{\text{distance}}$$

$$= \frac{360' - 320'}{1 \text{ mile}}$$

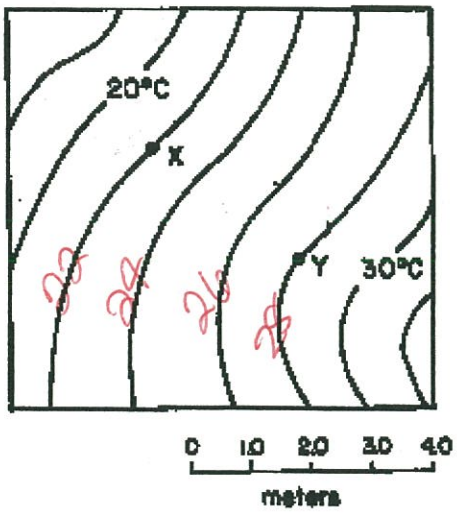
$$= \frac{40'}{1 \text{ mile}}$$

$$= 40 \frac{\text{ft}}{\text{mile}}$$

0.2

#16

The diagram below represents a temperature field in degrees Celsius. What is the approximate temperature field gradient between points *X* and *Y*? [Refer to the *Earth Science Reference Tables*.]



(1) 0,5 °C/m
(2) 2 °C/m
(3) 3 °C/m
(4) 6 °C/m

$\frac{28-22}{3} = \frac{6}{3} = 2$ °C/m

#15

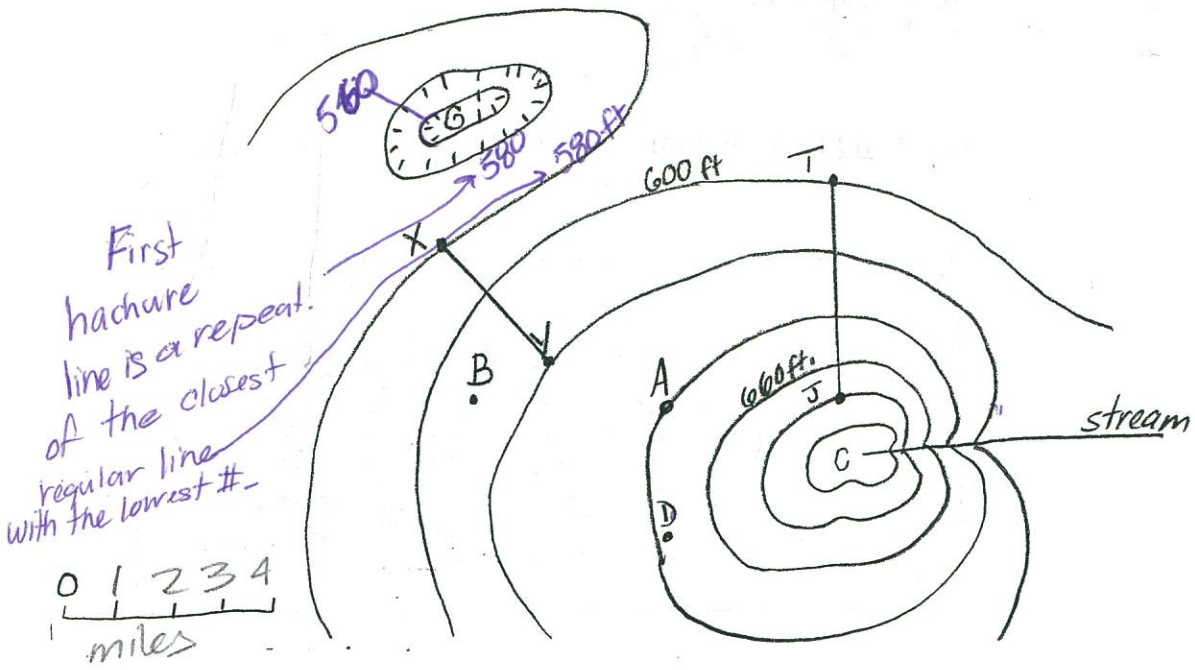
Base your answer to the following question on the *Earth Science Reference Tables*.

A stream begins at an elevation of 2,000 meters and ends in a lake at an elevation of 400 meters. The lake is 320 kilometers from the stream's source. What is the average gradient of the stream?

(1) 1,6 m/km
(2) 2,0 m/km
(3) 5,0 m/km
(4) 8,0 m/km

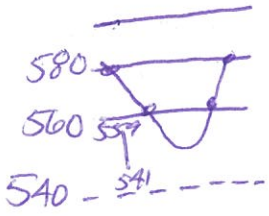
$\frac{2000-400}{320} = \frac{1600 \text{ m}}{320 \text{ km}} = 5$ (3)

Practice Map:



Practice Questions:

1. The contour interval of the map is 20 ft.
2. The top of the hill is represented by letter C.
3. The depression is represented by letter G.
4. Line XY is 3 miles - long
5. The water in the stream flows from W to E.
6. Point A is at an elevation of 640 ft..
7. Point B is at an elevation of 610 ft..
8. Point C is at an elevation of 701 - 719 ft
9. Point D is at an elevation of 641 - 648 ft.
10. Point G is at an elevation of 541 - 559 ft
11. Line TJ is 4 miles long.
12. Point T is at an elevation of 600 ft
13. Point J is at an elevation of 680 ft.
14. Calculate the gradient of line TJ: ____ round to the nearest tenth.



$$\text{Gradient} = \frac{\text{change in field value}}{\text{distance}}$$

$$= \frac{680 - 600 \text{ ft}}{4 \text{ miles}}$$

$$= \frac{80}{4} \text{ ft/mile}$$

$$= 20 \text{ ft/mile}$$

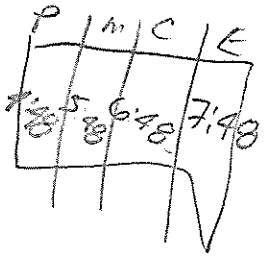
$$= 20.0 \text{ ft/mile}$$

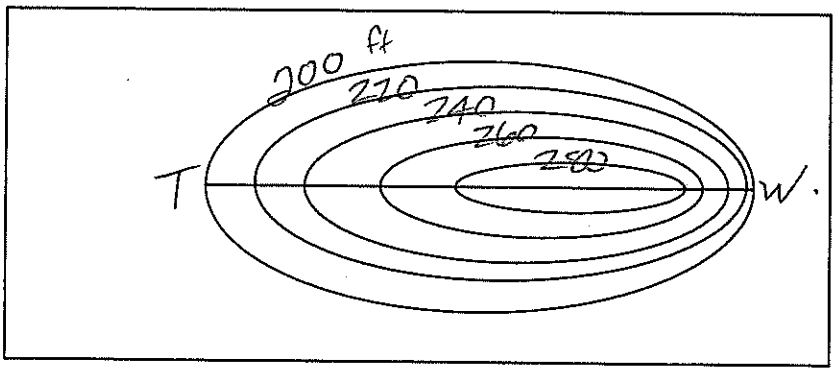
mi = mile

m = meter

VII Profiles

A profile is what something looks like from the side.





- 1. Find the contour interval. (What you are counting by.) 20 ft
- 2. Label the elevation on each contour line. (On the top where you can see it.)
- 3. Bring the edge of a piece of paper to line TW.
- 4. Put a mark on the paper where the contour lines cross the edge.
- 5. Label the elevations on the edge of the paper.
- 6. Label the elevations on the graph.
- 7. Bring the edge of the paper to the bottom of the graph.
- 8. Make a dot on the graph directly above each mark on the edge of the paper. The dot must be at the correct elevation.
- 9. Connect the dots with curved lines. Curve the tops of hills and the bottoms of valleys. Only connect the dots that you drew.