

Measuring the Earth

Unit 2



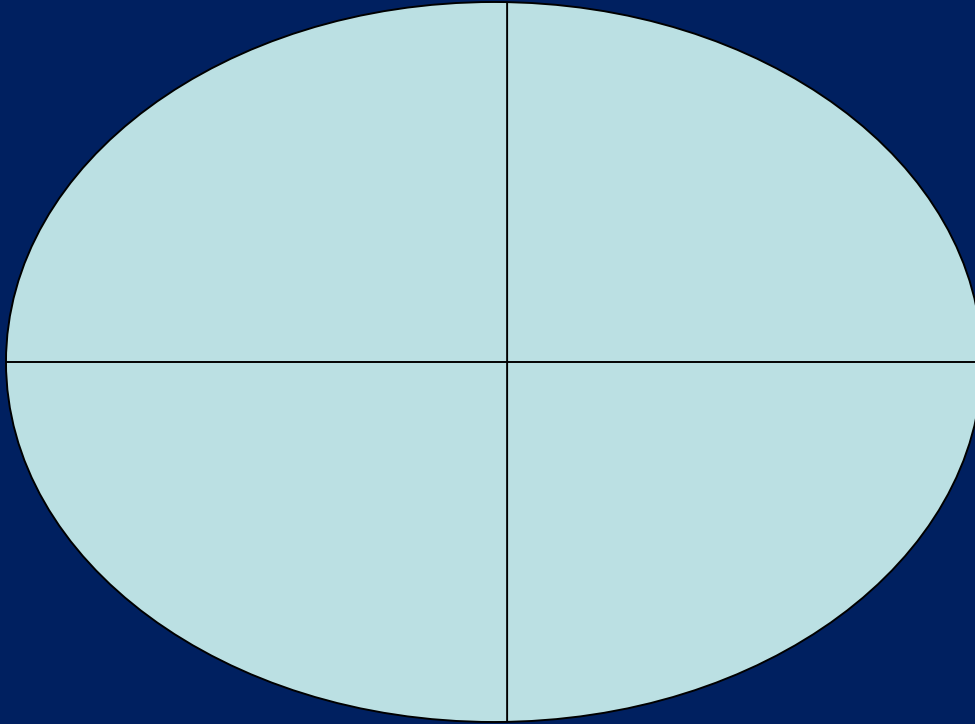
What is the shape of Earth

Earth's shape **Oblate Spheroid**

(Squished at the poles, bulging at the equator)

****The force of gravity is not equal at all places on Earth.**

What is the shape of Earth



Equatorial Diameter 12,756 Km

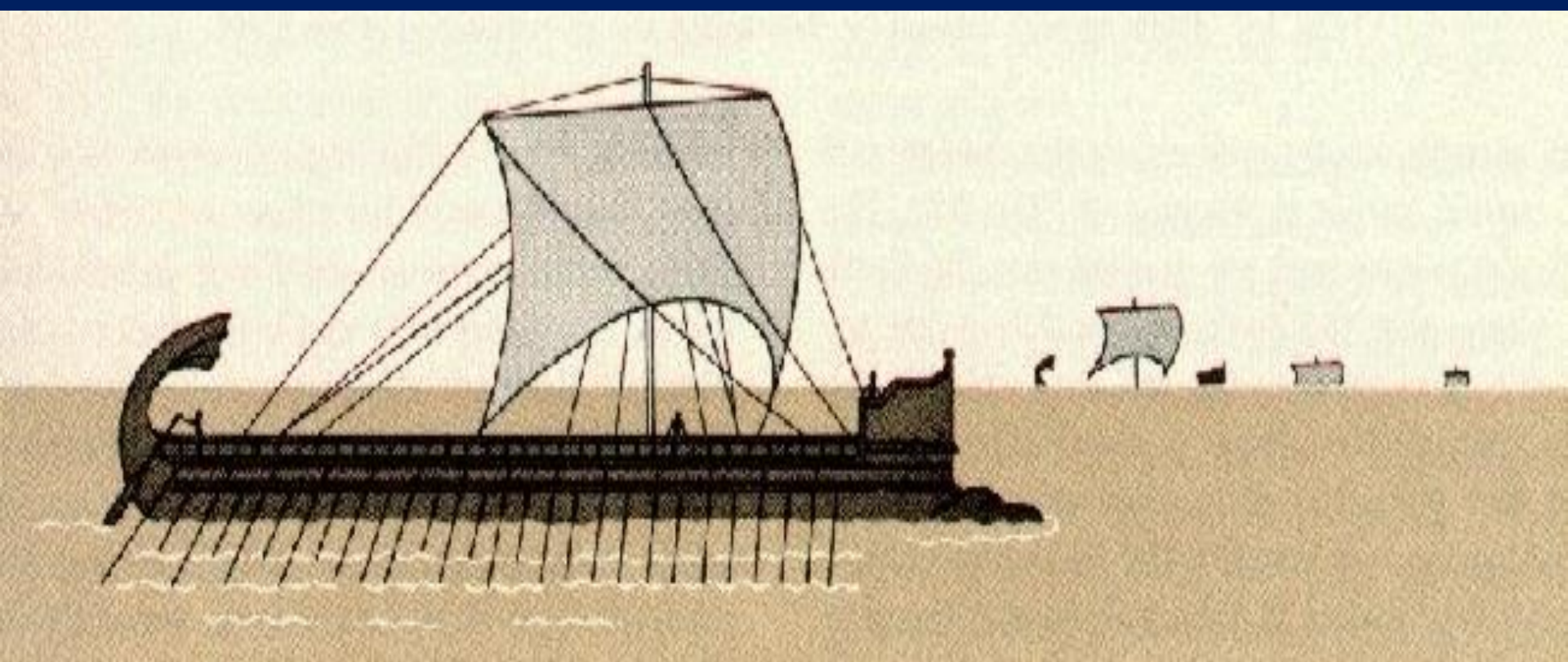
Polar Diameter 12,714 Km



How do we know the Earth is a sphere?

Evidence

**1) Ships sailing toward the horizon
seem to sink below it**



How do we know the Earth is a sphere?

Evidence

**1) Ships sailing toward the horizon
seem to sink below it**

**2) Altitude of stars change, Polaris can only
be seen in the Northern Hemisphere**

**3) Earth's shadow on the moon during a
lunar eclipse is curved.**

How a Lunar Eclipse Works



Earth's Shadow on Moon



Spheres of Earth

- The earth's spheres are held together by GRAVITY.
- They are arranged from lowest to highest density moving toward earth's center.



What are the 4 main Spheres of Earth

From Space to the Core

<u>Sphere Name</u>	<u>Phases of Matter</u>
1) Atmosphere	Gas
2) Hydrosphere	Liquid
3) Lithosphere	Solid
4) Earth's Interior	Mostly solid, some liquid

Spheres of Earth

1) Lithosphere

Solid part of Earth

includes:

**Crust, upper mantle,
bedrock and ocean floor**

Spheres of Earth

2) Hydrosphere – **Water on Earth**

includes:

**oceans, lakes, river,
groundwater (75 % of Earths
Surface)**

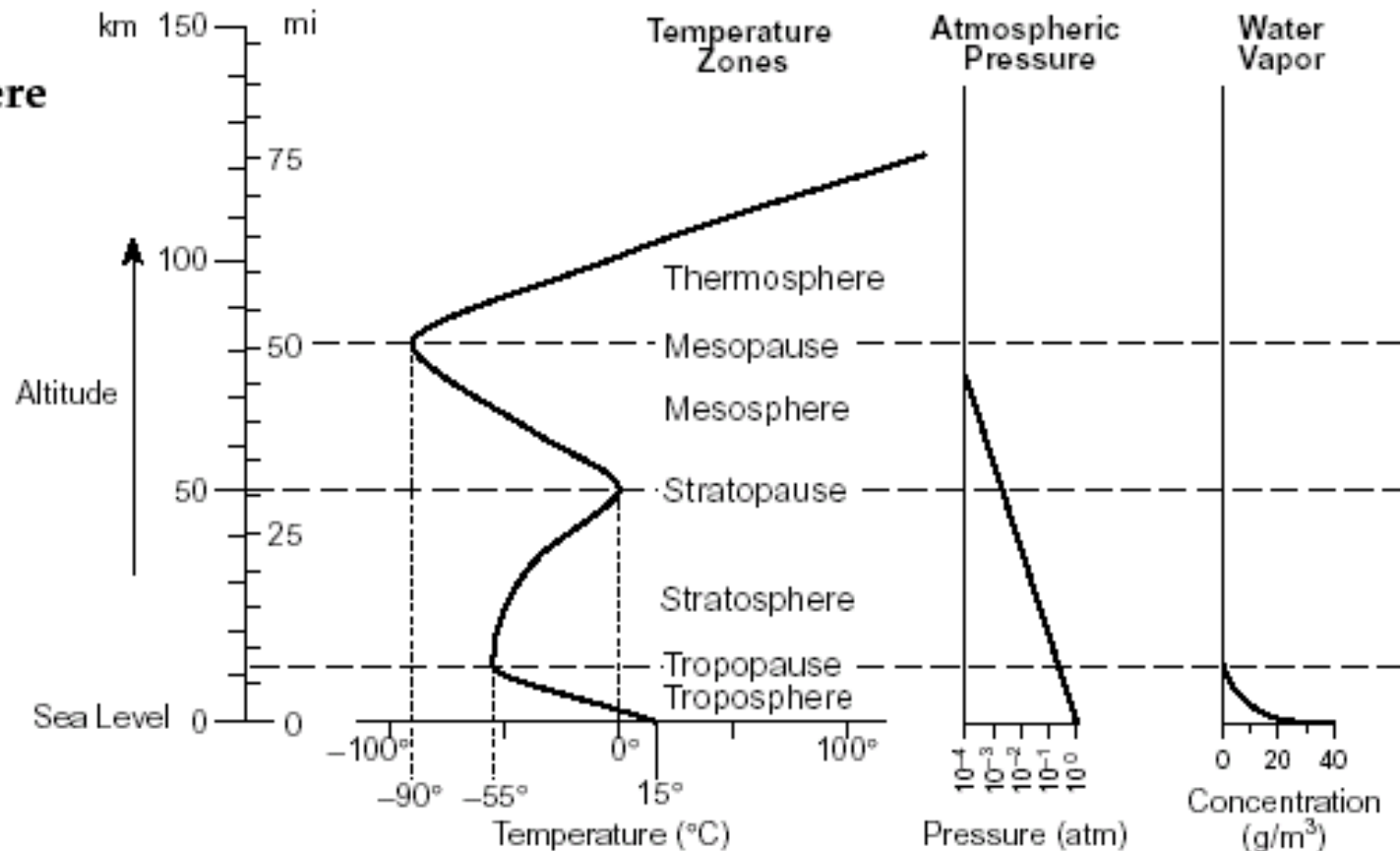
Spheres of Earth

3) Atmosphere · **Layer of Gas that surrounds Earth**

**Divided into layers based on
composition and temperature**

The layers of the Atmosphere (pg 14 in ESRT)

Selected Properties of Earth's Atmosphere

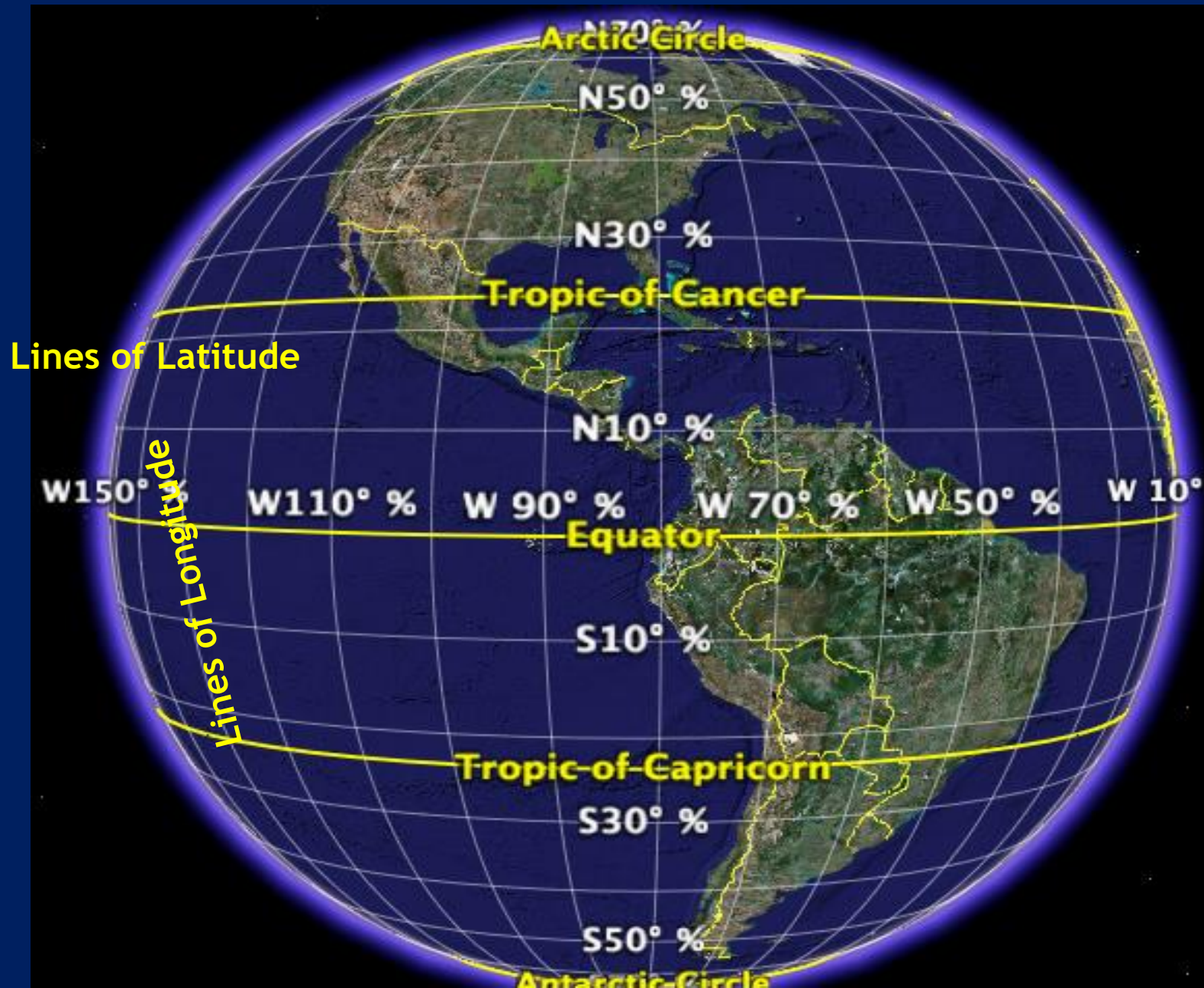


The boundaries of the layers of the atmosphere are called Pauses.

Complete notes packet pg 4-6

Watch YouTube Videos: 2.1, ESRT 1a,
ESRT 14a

Latitude & Longitude



Latitude

Longitude

Equator

Where is 0°

Prime Meridian

Parallels

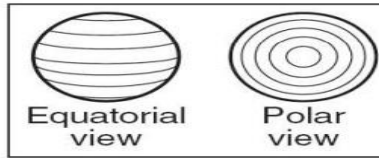
Lines are called

Meridians

East and West 

Lines run

North and South 



Appearance



N and S of Equator

Lines measure degrees

E and W of Prime Meridian

90° N (North Pole)

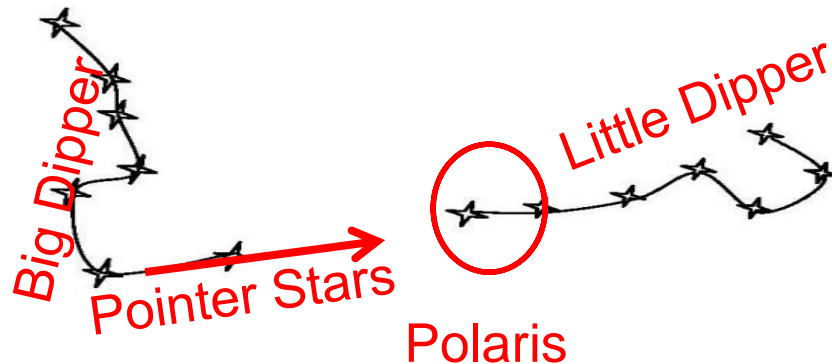
Highest degree

180°

90° S (South Pole)

Miscellaneous

**Altitude of Polaris =
Persons North Latitude**



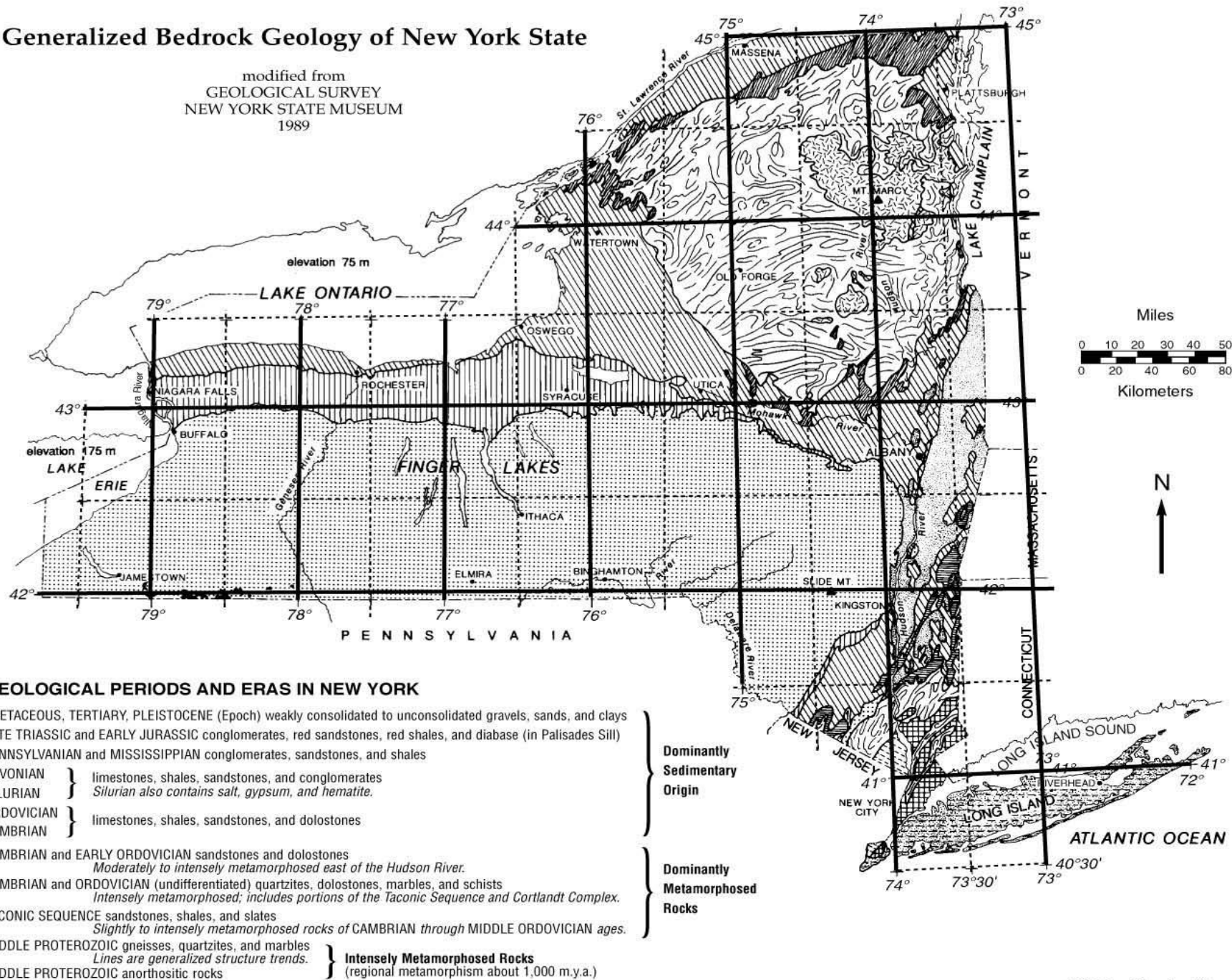
- Locations on the same longitude have the same time.

- Earth Rotates 15° per hour

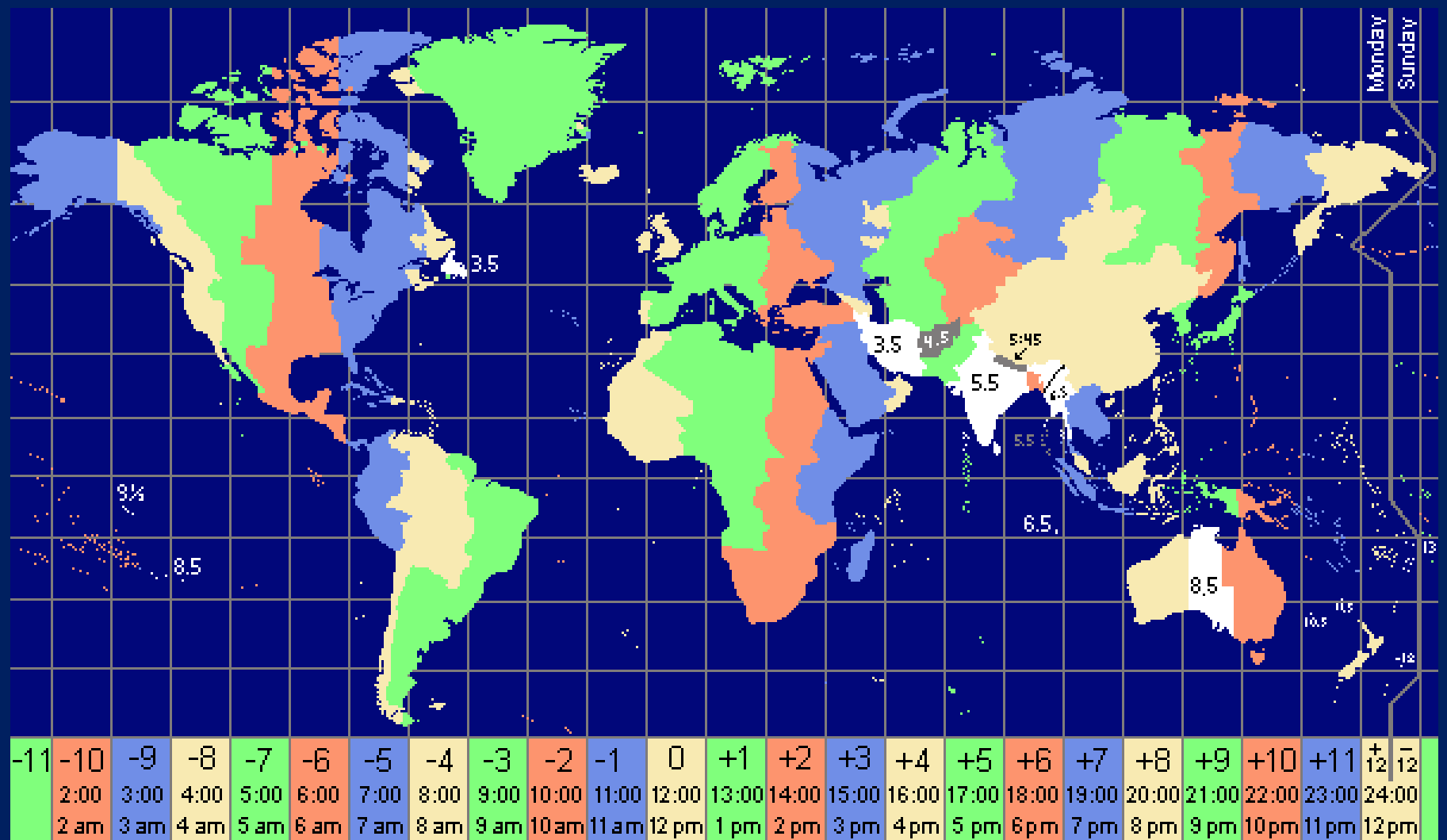
- Time Zones are 15° apart

Generalized Bedrock Geology of New York State

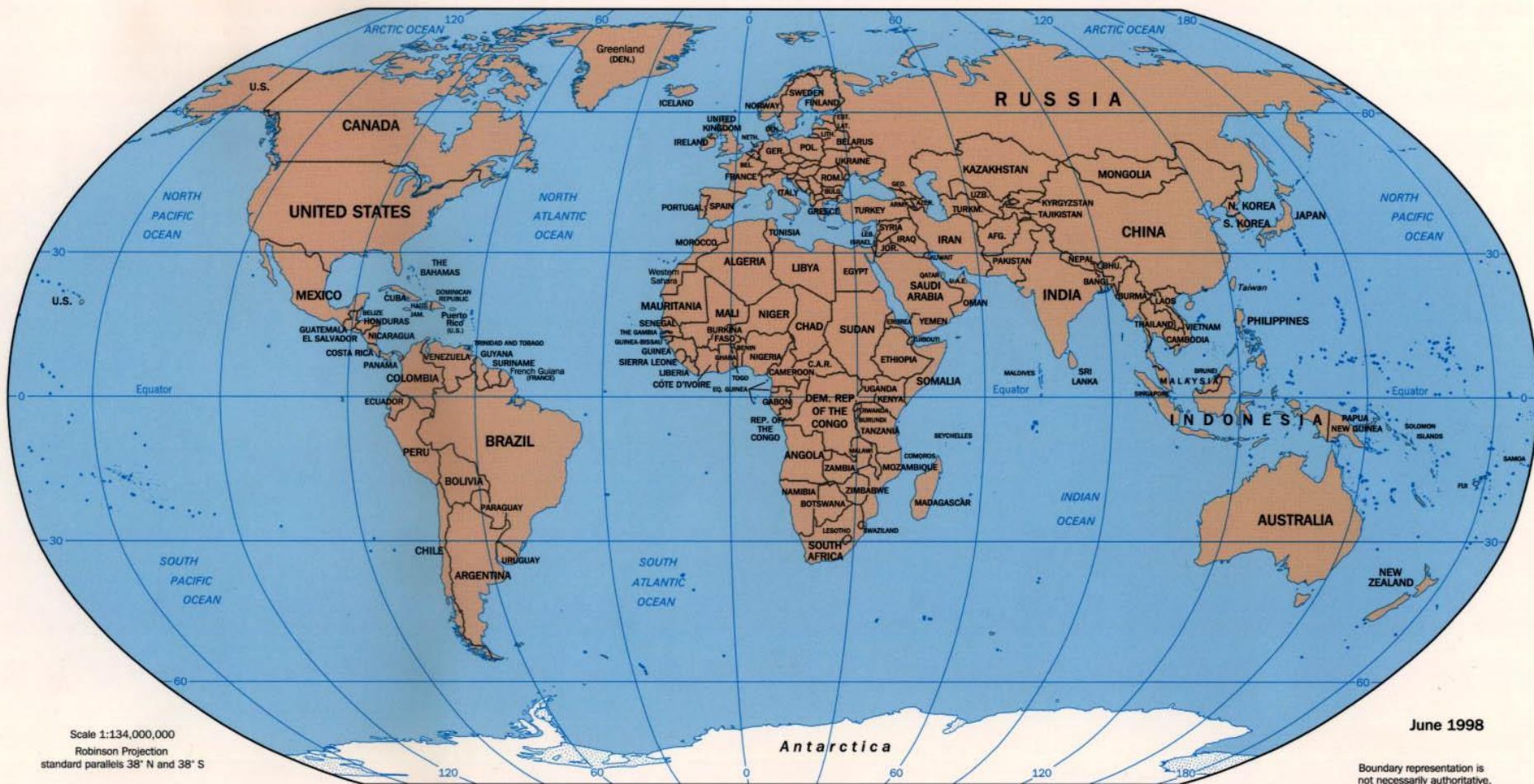
modified from
GEOLOGICAL SURVEY
NEW YORK STATE MUSEUM
1989



- Complete pages 8 – 9 in packet
- Watch YouTube Videos: 2.2, ESRT 3a

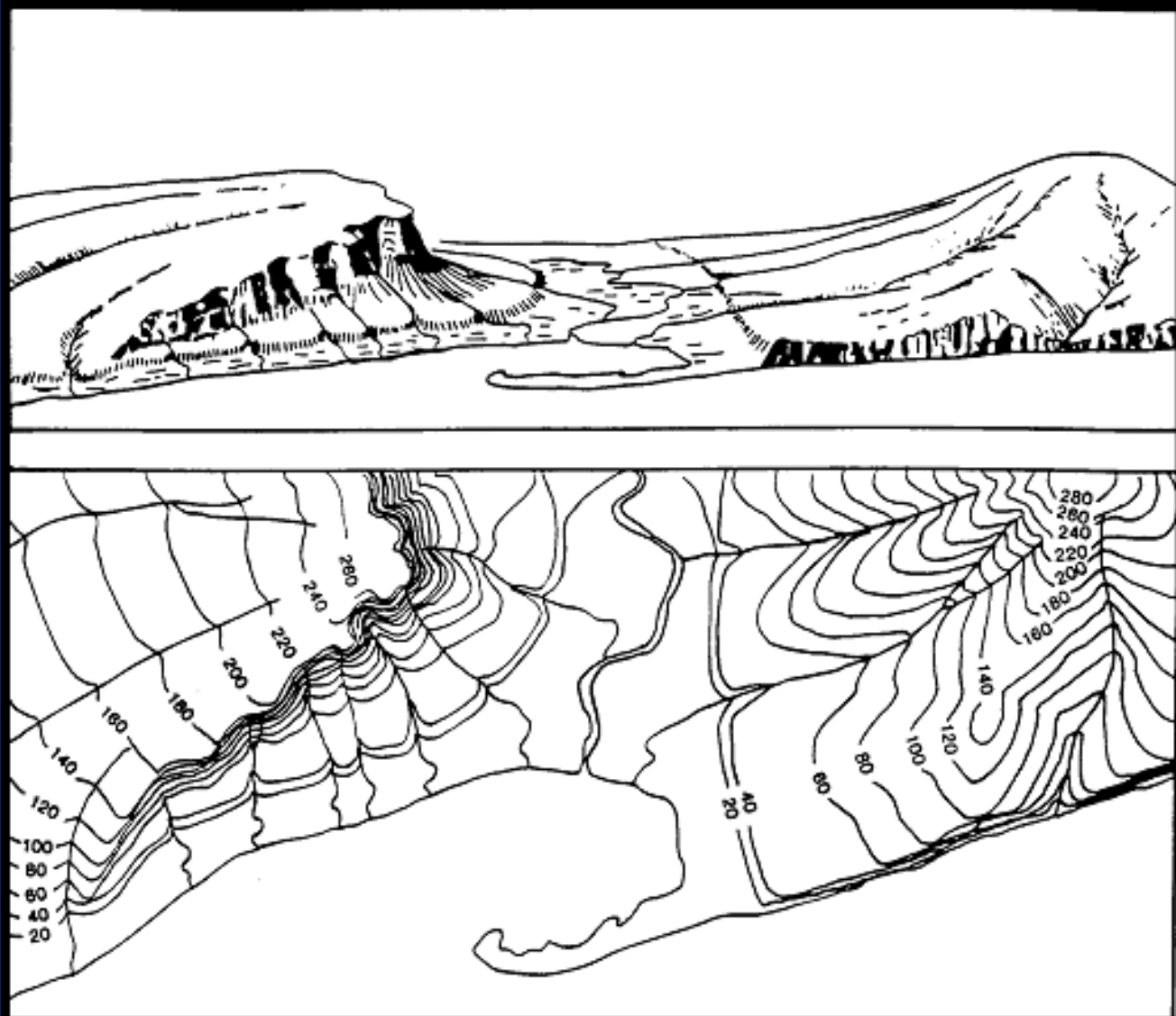


HOW MANY TIME ZONES?

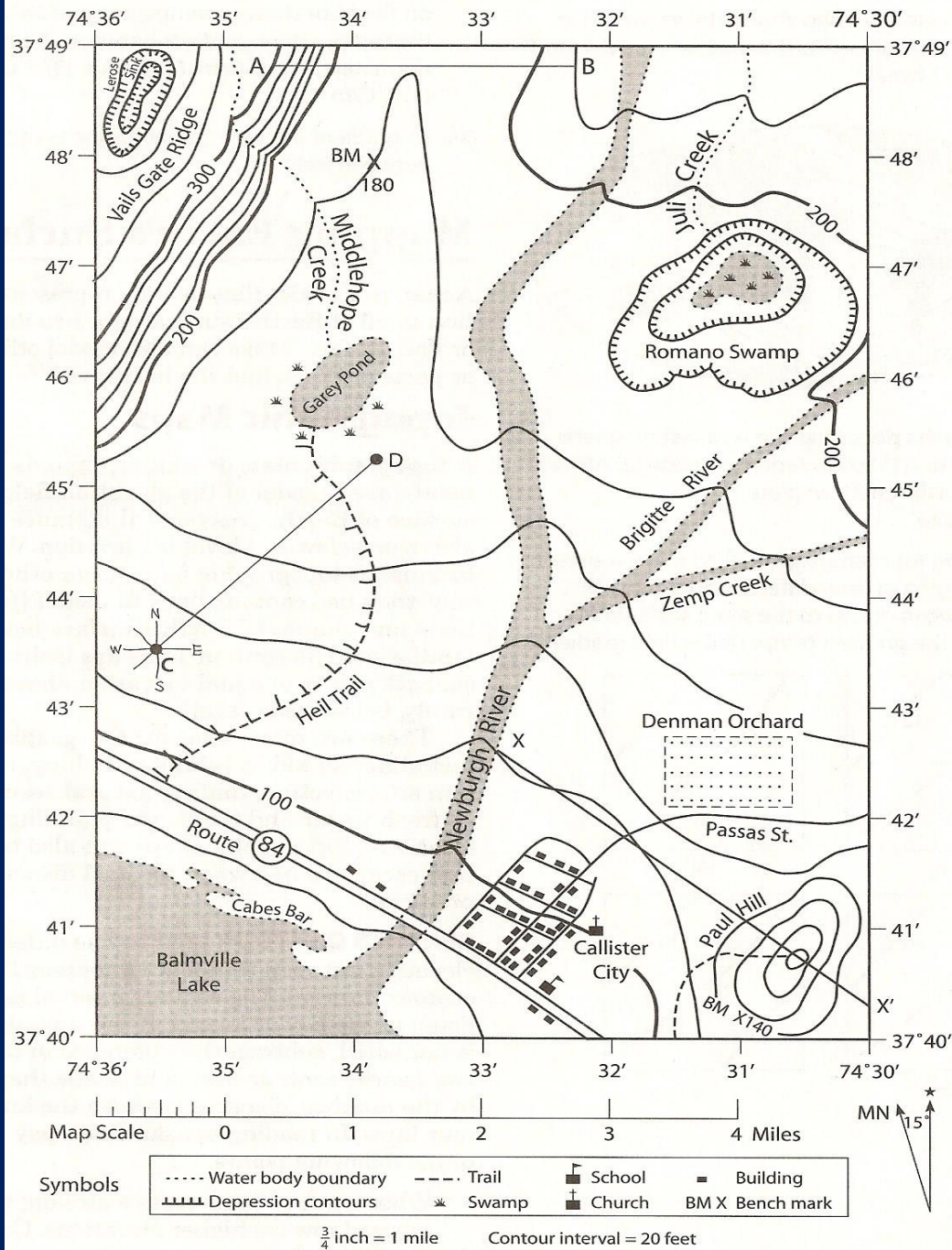


- Complete page 10 -12 in notes packet
- Watch YouTube Videos: 2.2, ESRT 3a

TOPOGRAPHIC MAPS



Callister Quadrangle



Isolines - **Lines that connect equal values**

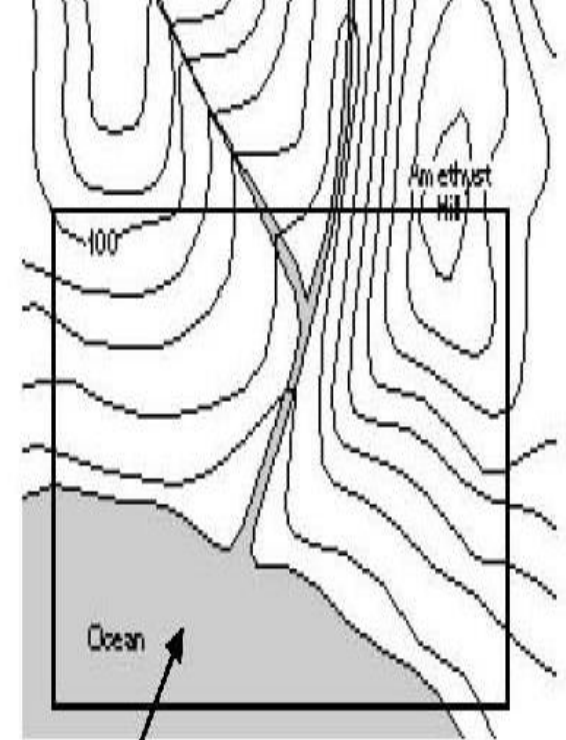
Isotherms - **Lines that connect equal temperatures**

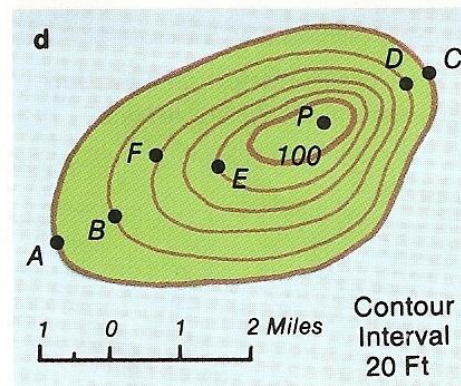
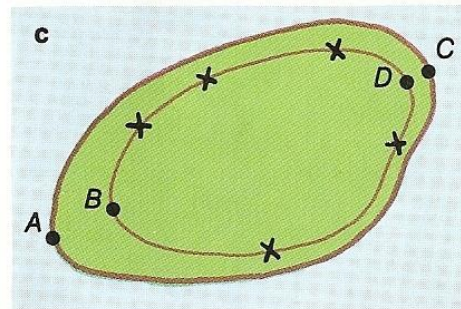
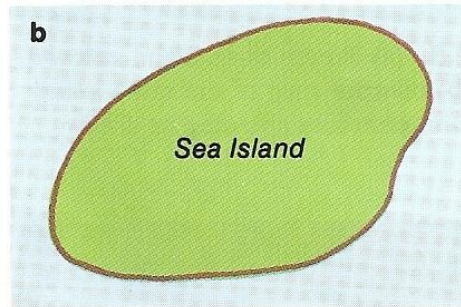
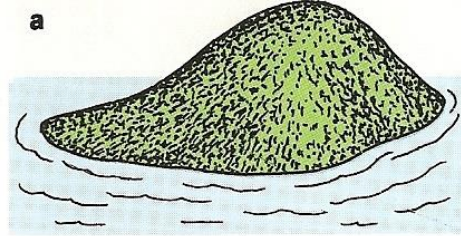
Isobars - **Lines that connect equal pressures**

Contour lines - **Lines that connect points of equal elevation**

*** The closer the contour lines = the steeper the slope of the land***

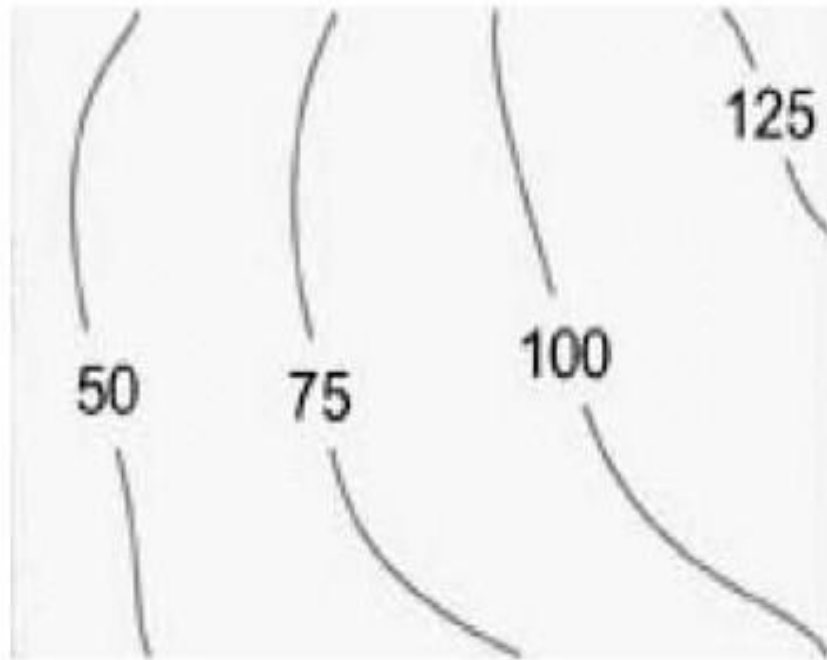
Contour interval **The number that the isolines go up by**





7.7 Mapping a sea island

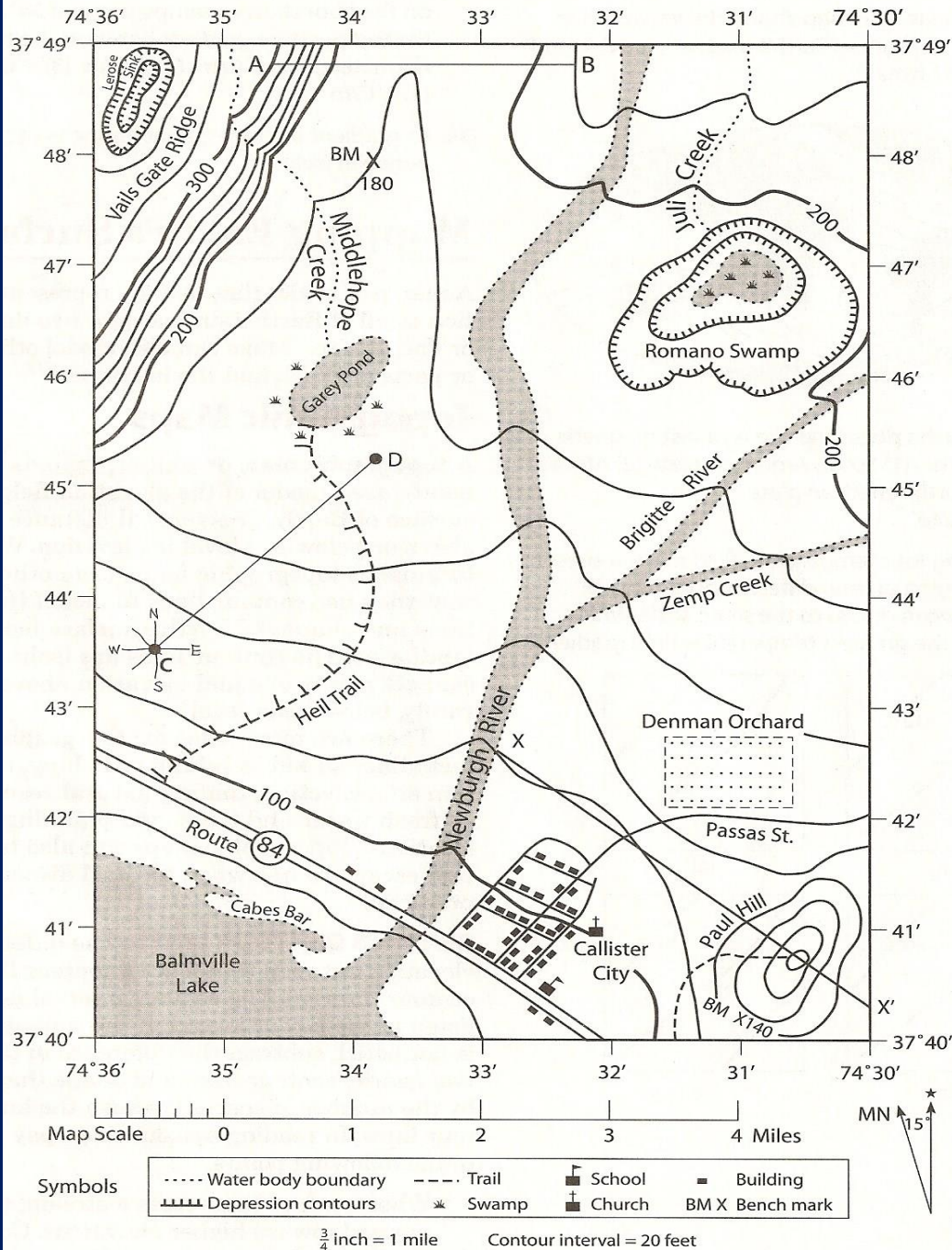
Topographic Maps---Contour Intervals



What is the contour interval of this map?

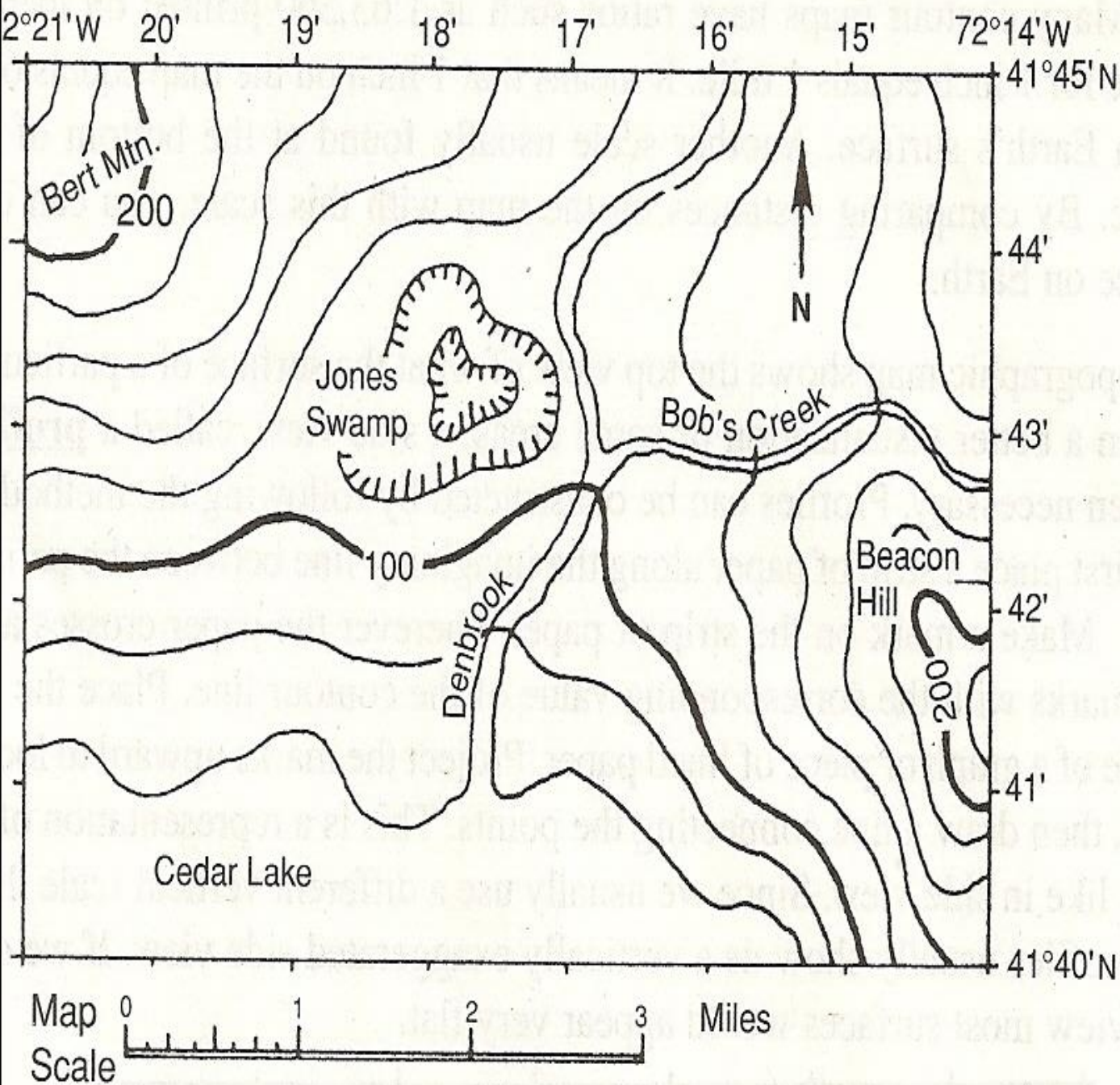
25 ft

Callister Quadrangle



What is the contour interval of this map?

Where is the land the steepest?

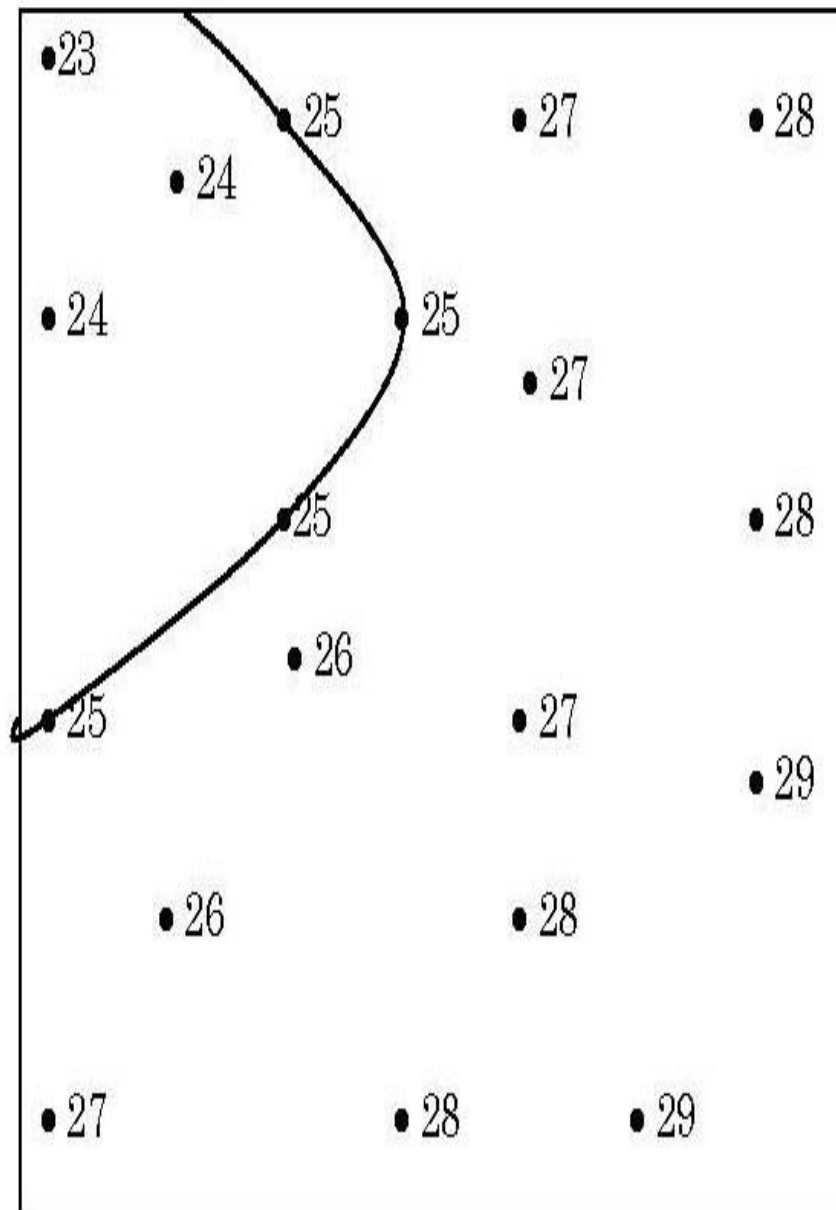


What is the contour interval of this map?

Where is the land the steepest?

Drawing isolines:

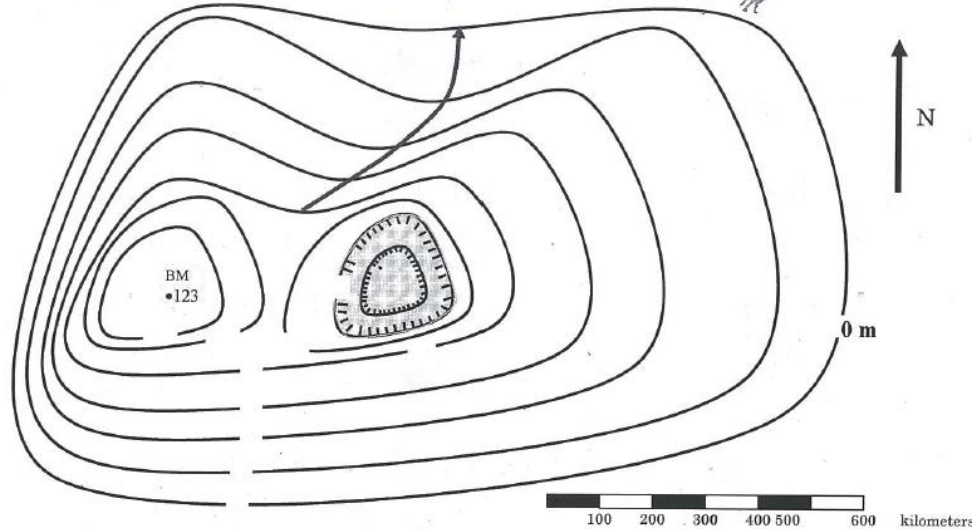
- Try to locate a pattern where numbers may be bunched together
- The 25 isoline has been drawn on the map to the right
- Follow a similar pattern for the line drawn
- When drawing the 26 isoline, make sure it falls between the 25 and 27 values
- Using a pencil, softly draw a line connecting equal values




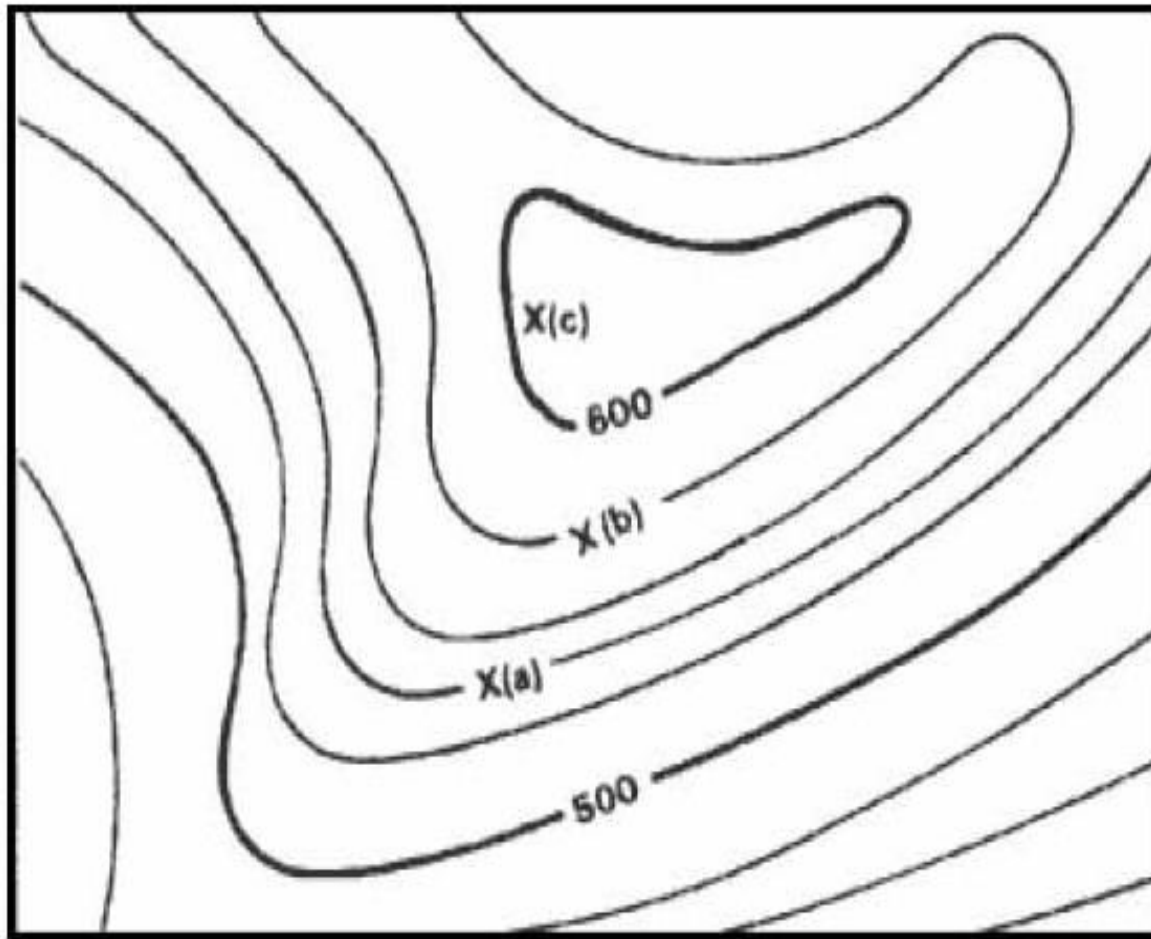
Complete pg 14 in notes packet



Topographic Maps:



Map Scale	Shows distance on a map
Contour interval	What each contour line goes up by.
Direction of stream flow	Rule of V: When a contour line crosses a stream it bends (V's). The bend or V points up hill. Stream flows opposite of the V
Steepest section	Contour lines are closest together.
Bench mark	Shows exact elevation
Depressions	Shown by hachure lines 
	Rule: First hachured line is the same elevation as the previous contour line. Then go down by the contour interval.
Islands	Elevation = 0
Highest elevation	- What would the next contour line be if that there was one? Subtract one from that.



For Max Possible Elevation, if you could draw the next contour line what would it be, then subtract 1 from it.

What is the contour interval on this map?

20 ft

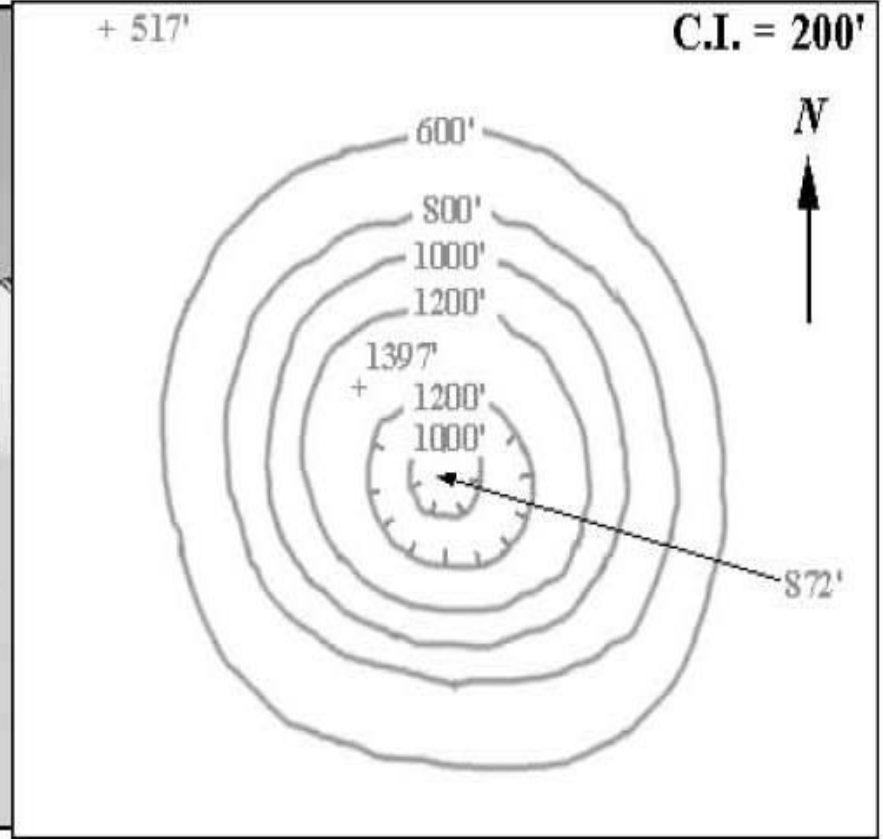
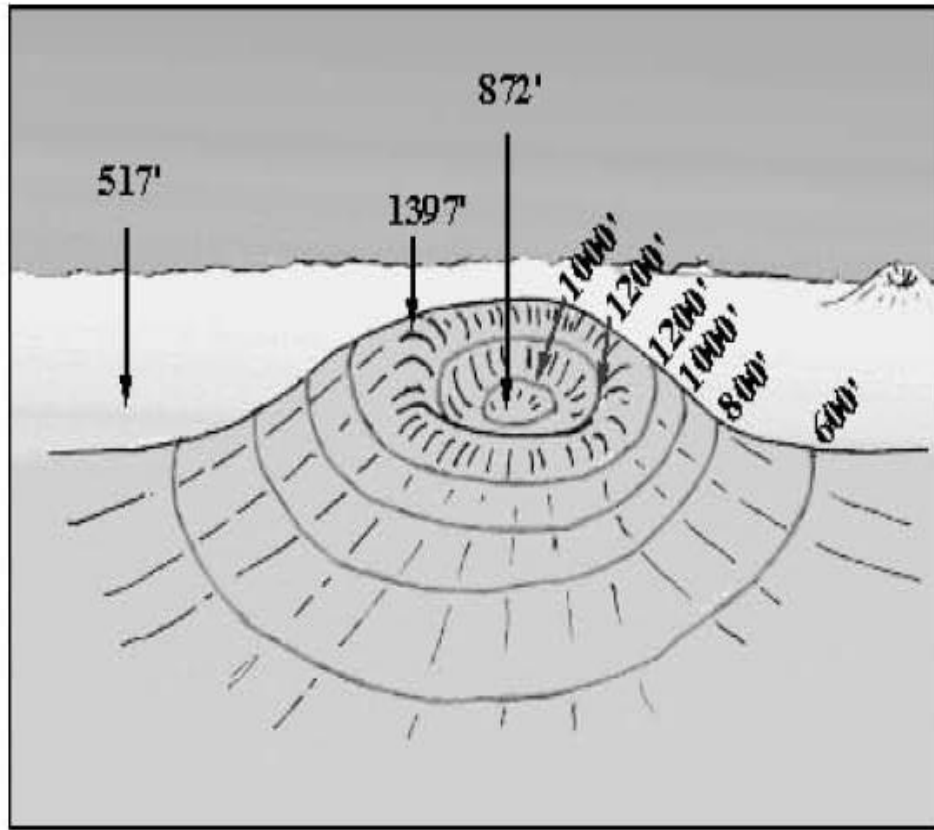
What is the elevation of points (a) and (b)?

a. **540 ft**

b. **580 ft**

What is the maximum possible elevation of (c)?

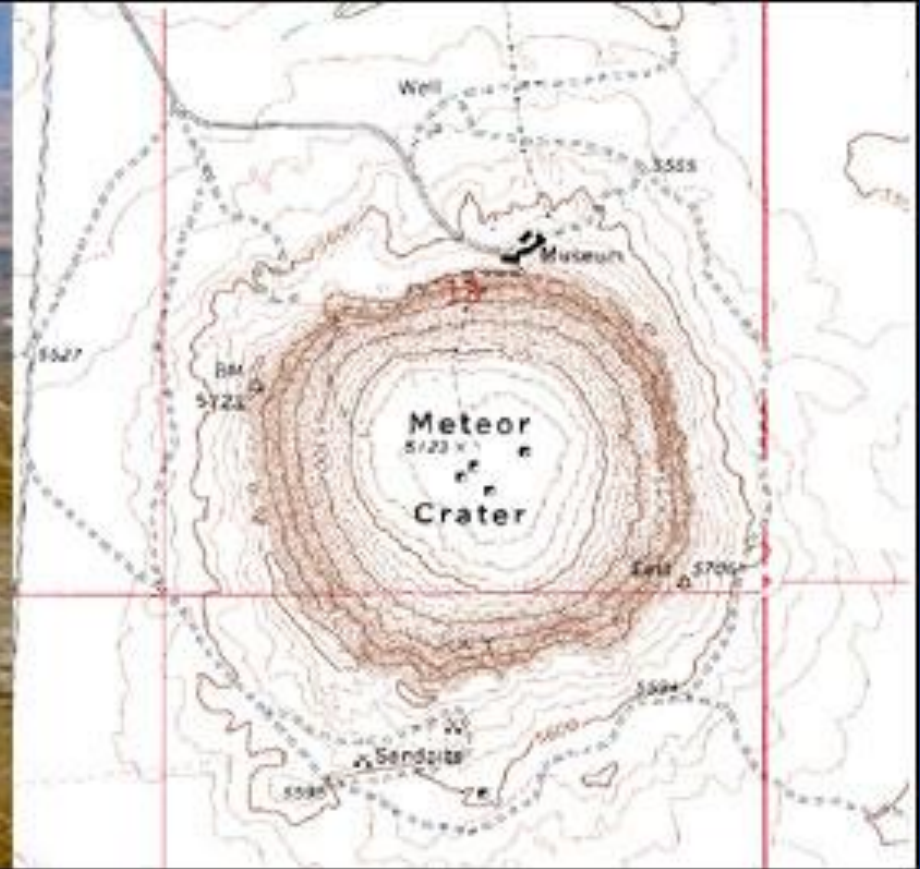
619ft



What do hachured lines show? **Areas of Depression**

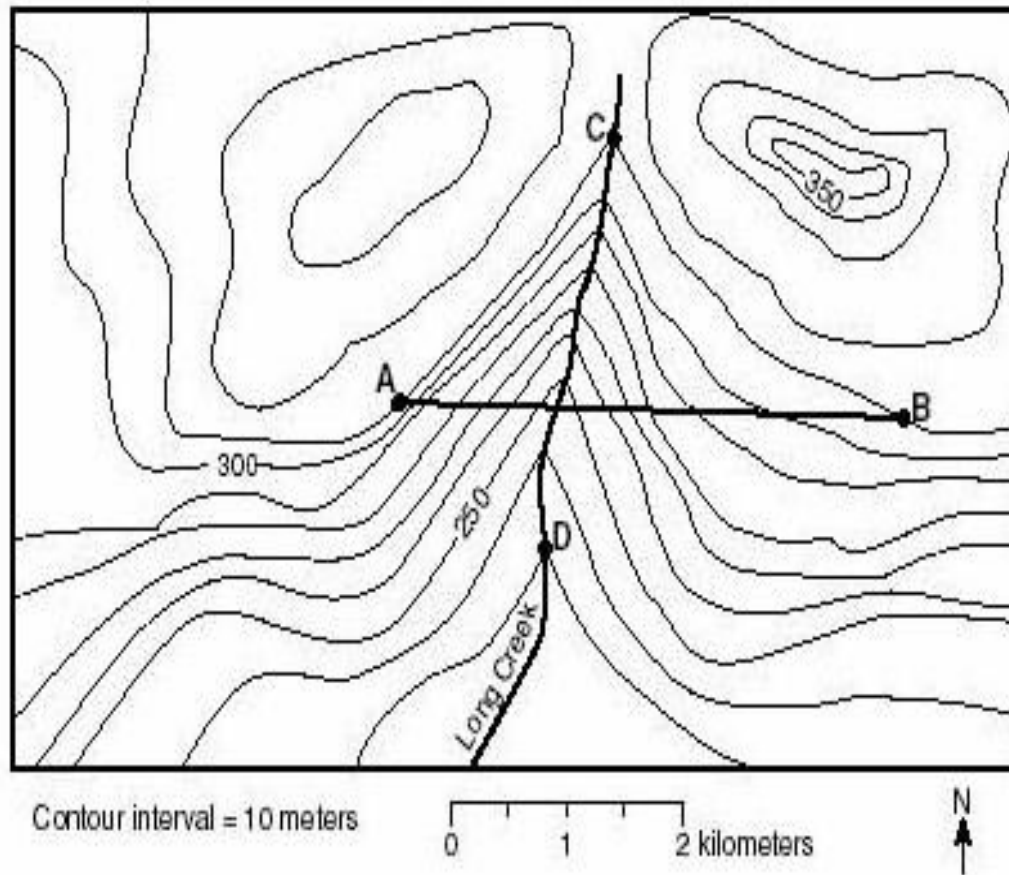
What are the rules concerning hachured lines

First hachured line has the same elevation as the previous contour line, then go down by the contour interval



What you must know:

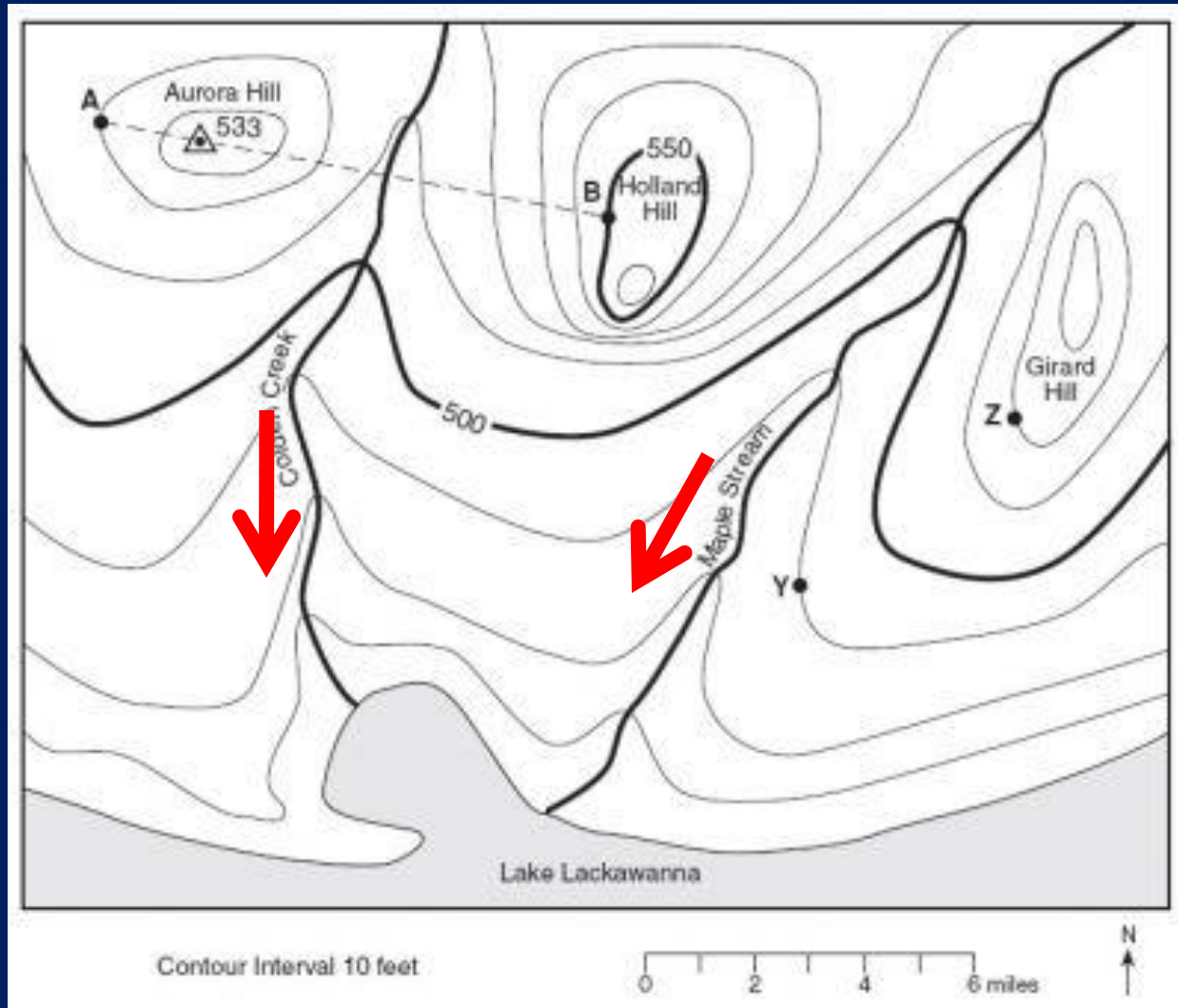
When a contour line crosses a river, stream or creek, the contour line forms a "V".
The "V" always points **upstream**.



If North is at the top of the page, what direction is Long Creek flowing? **South**

Can a river flow north? **yes**

Streams on Topographic maps

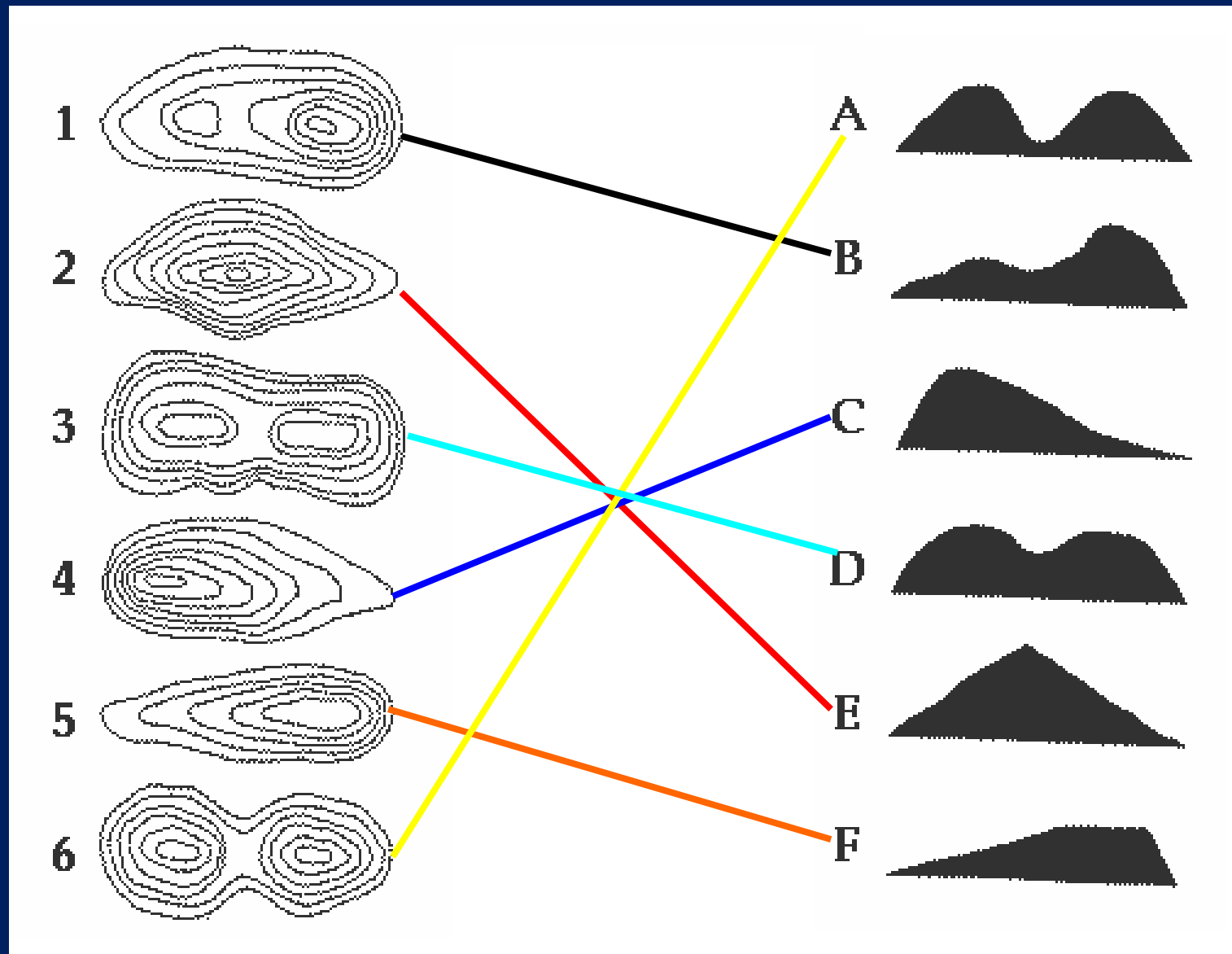


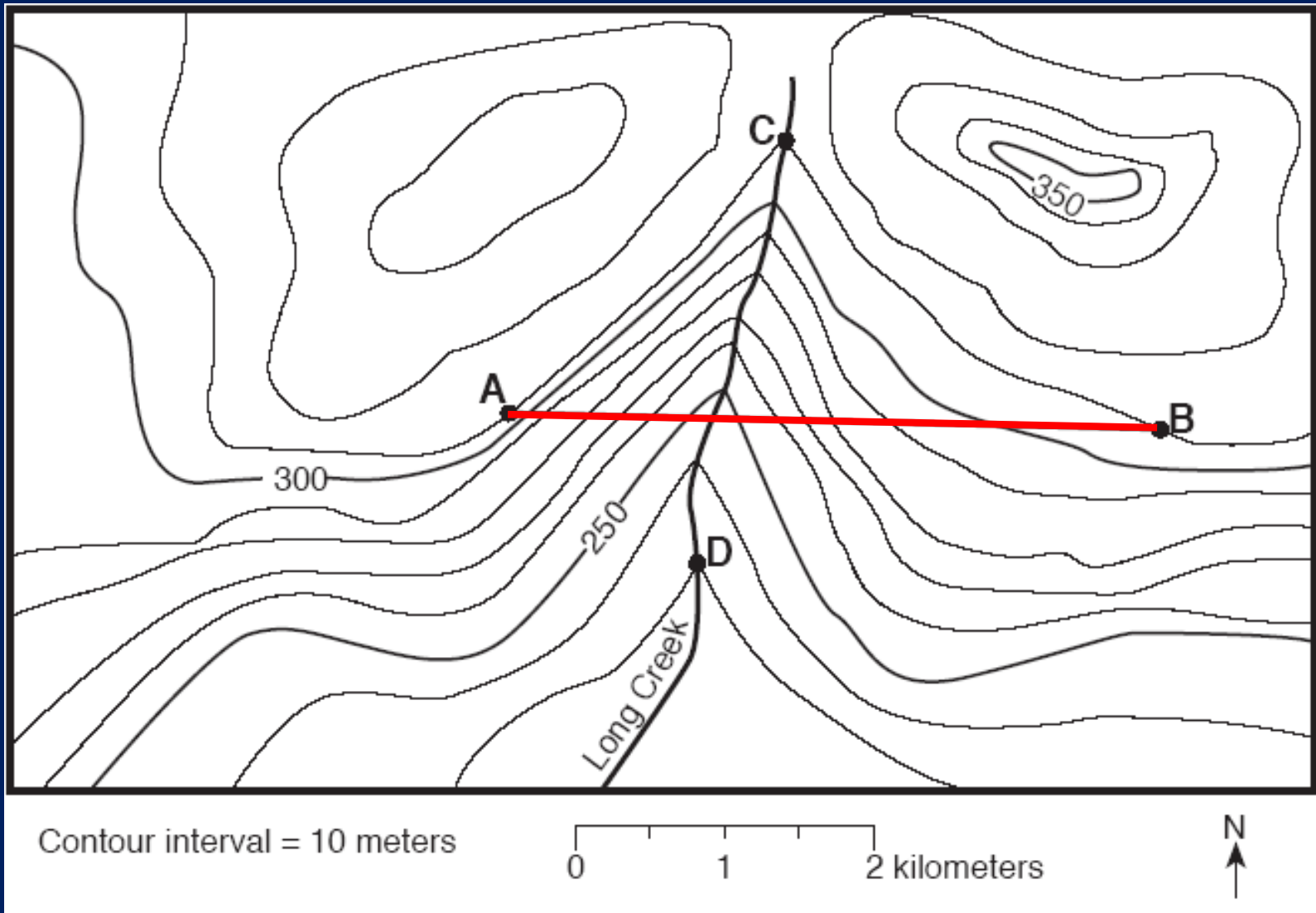
Topographic Profile

- A profile is a....

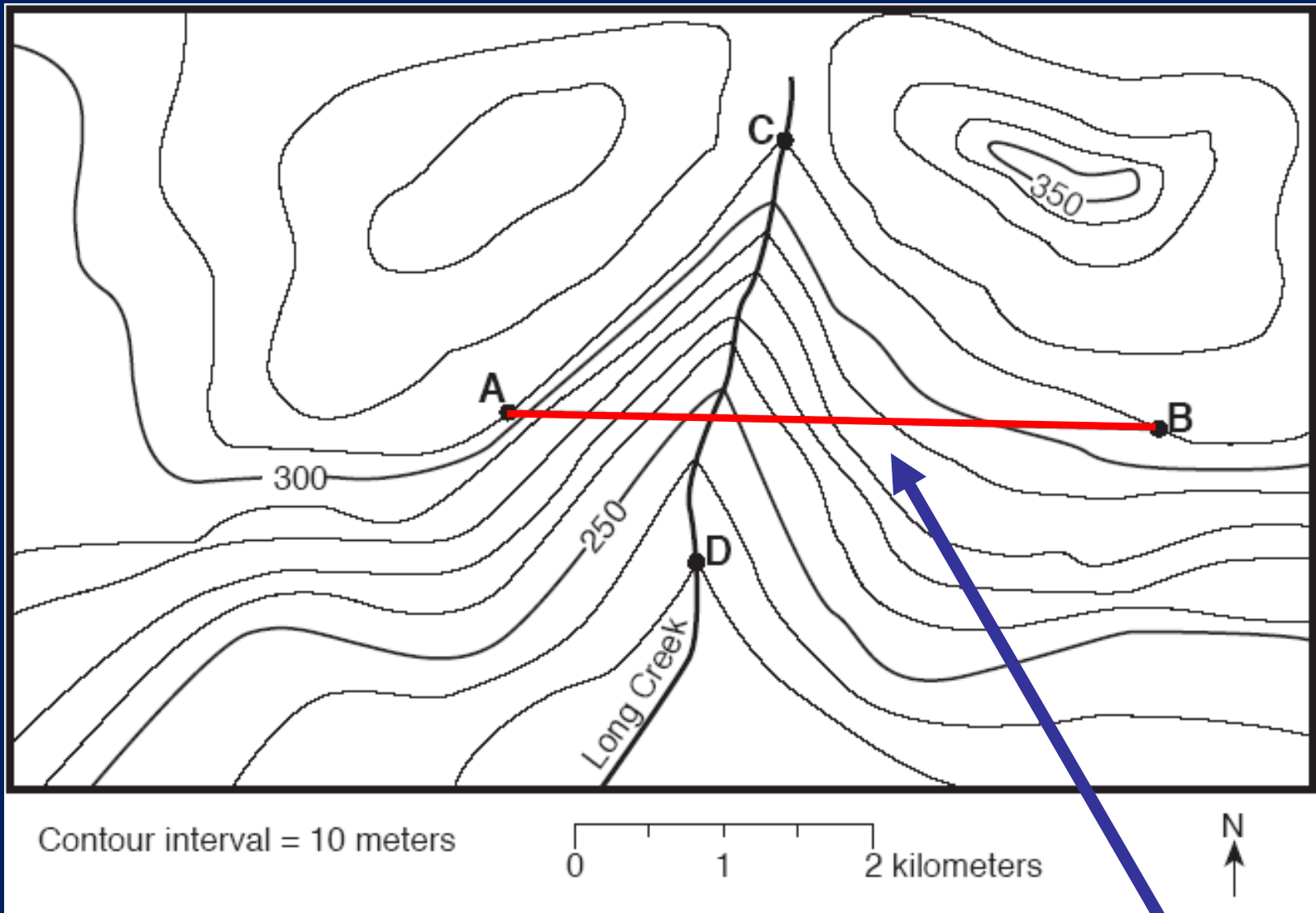
Side view of an area's landscape

Please match the contour map on the left with the profile on the right.

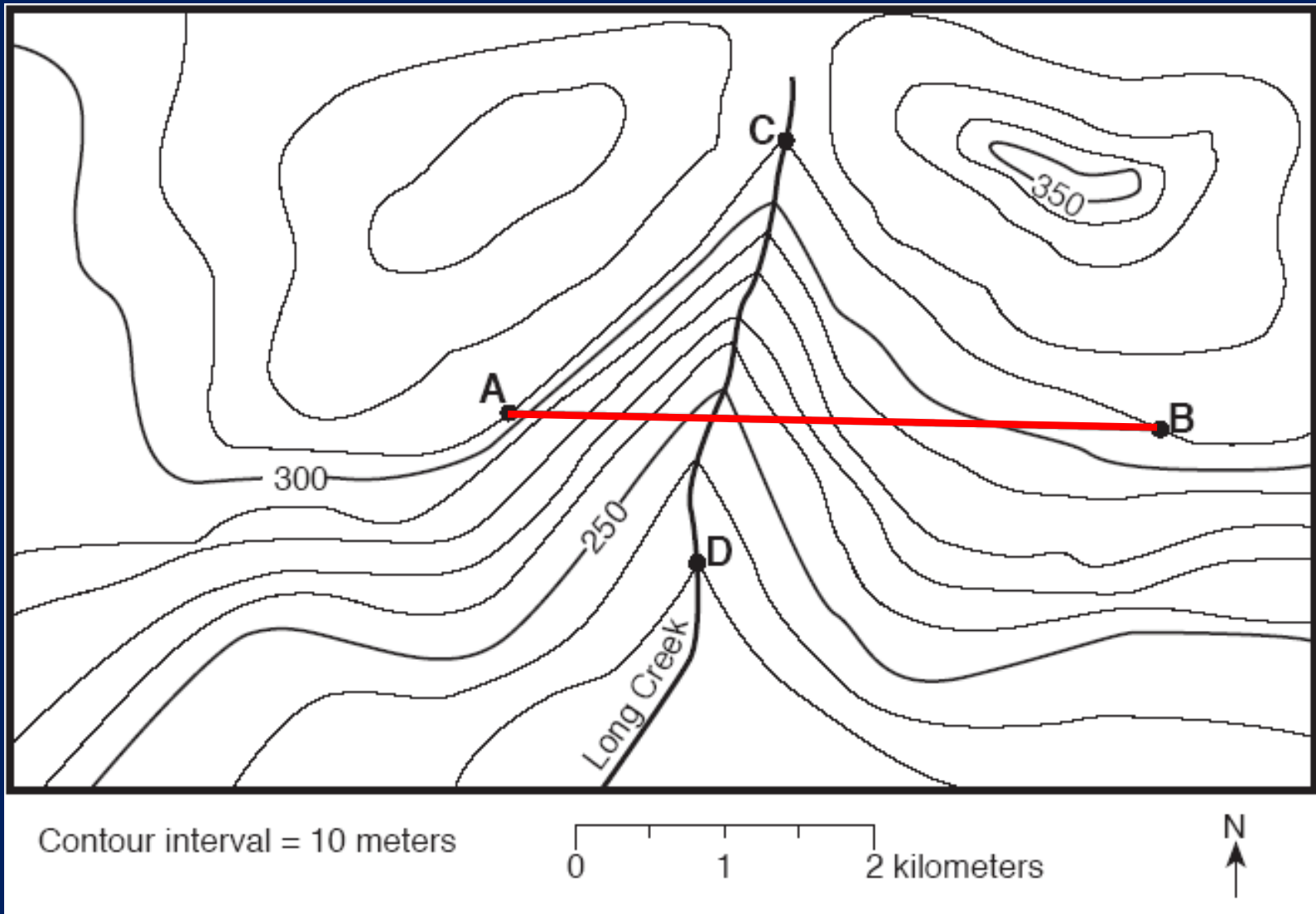




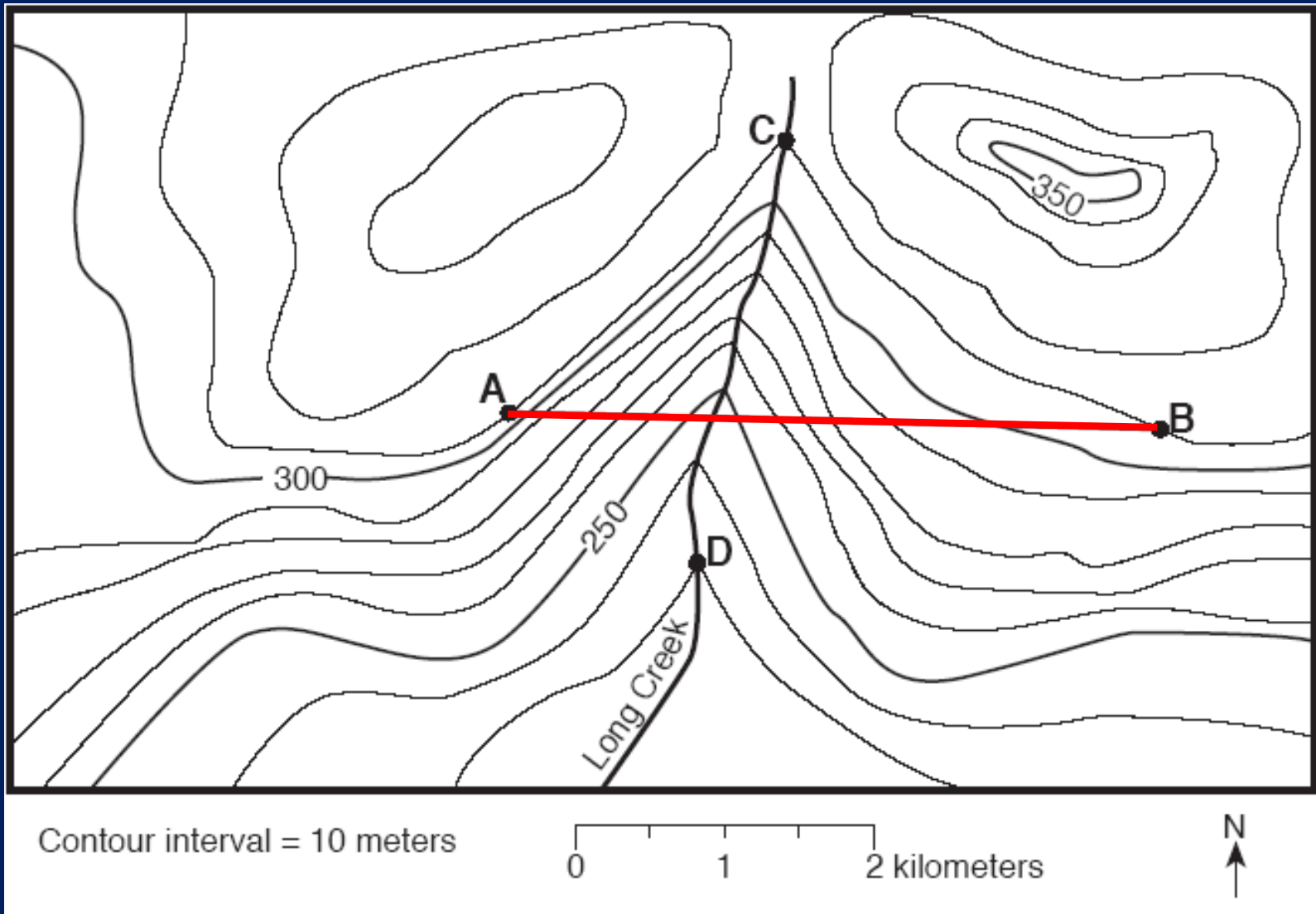
**Drawing a Topographic Profile
(page 17 in notes packet)**



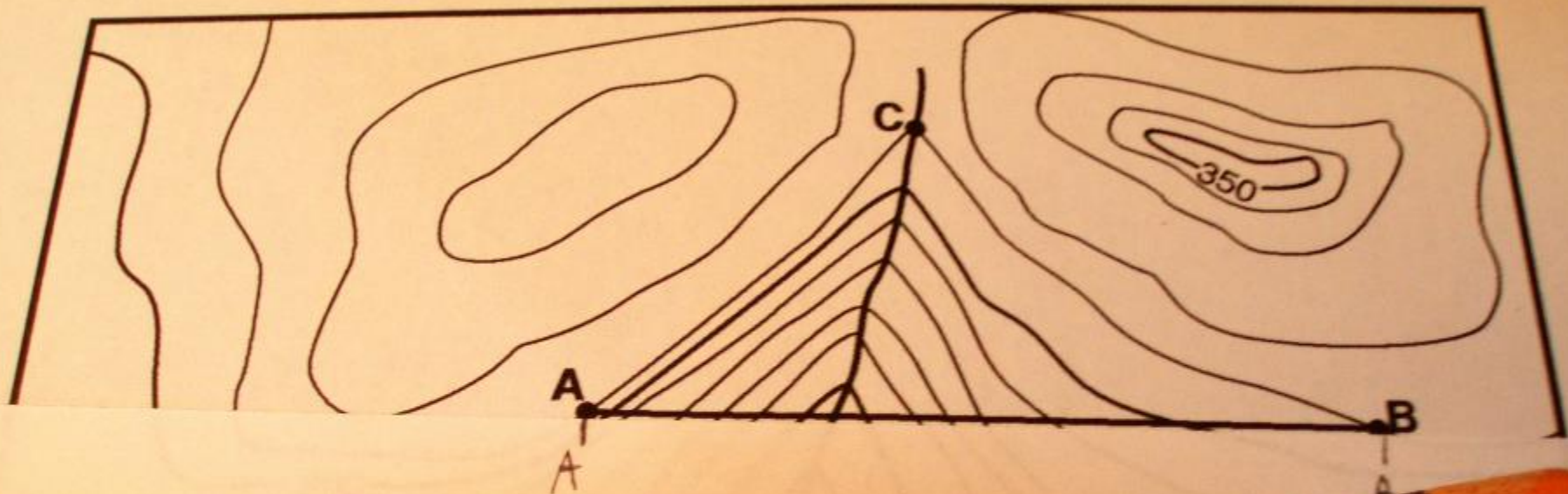
Notice line AB

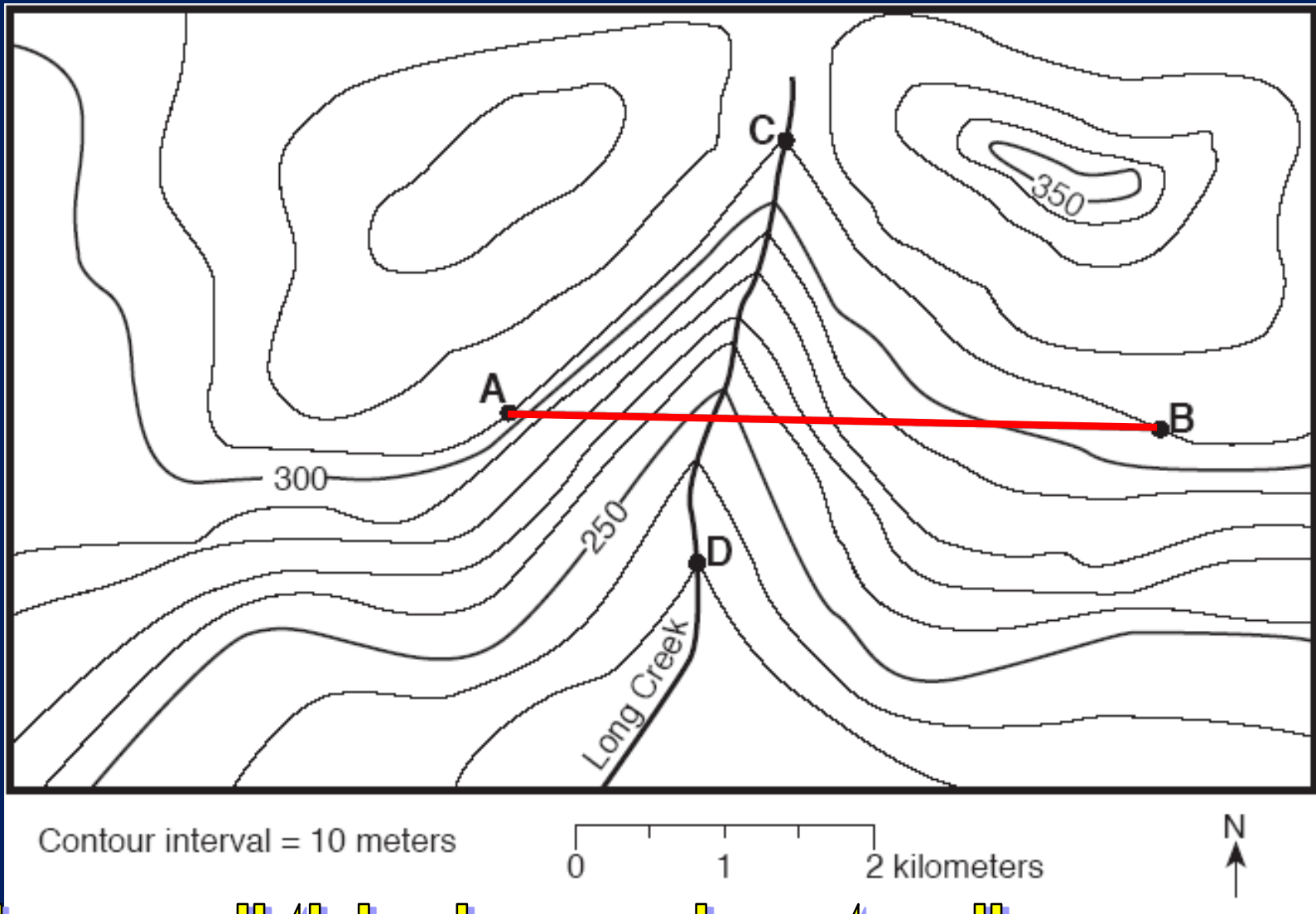


Take out a piece of scrap paper

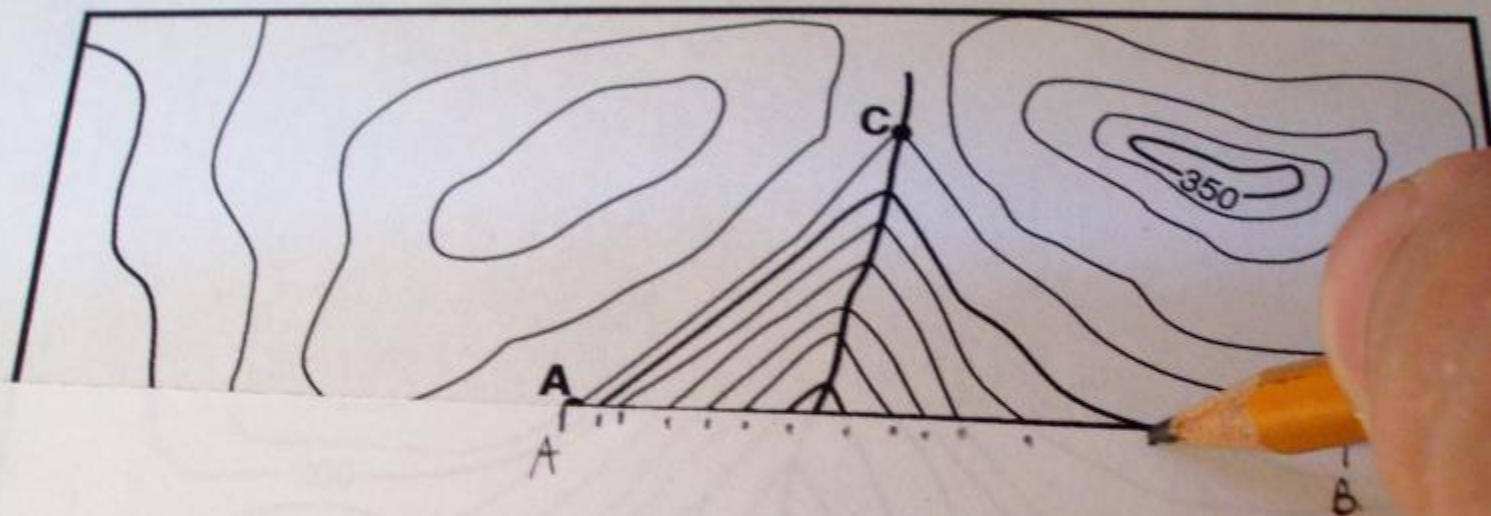


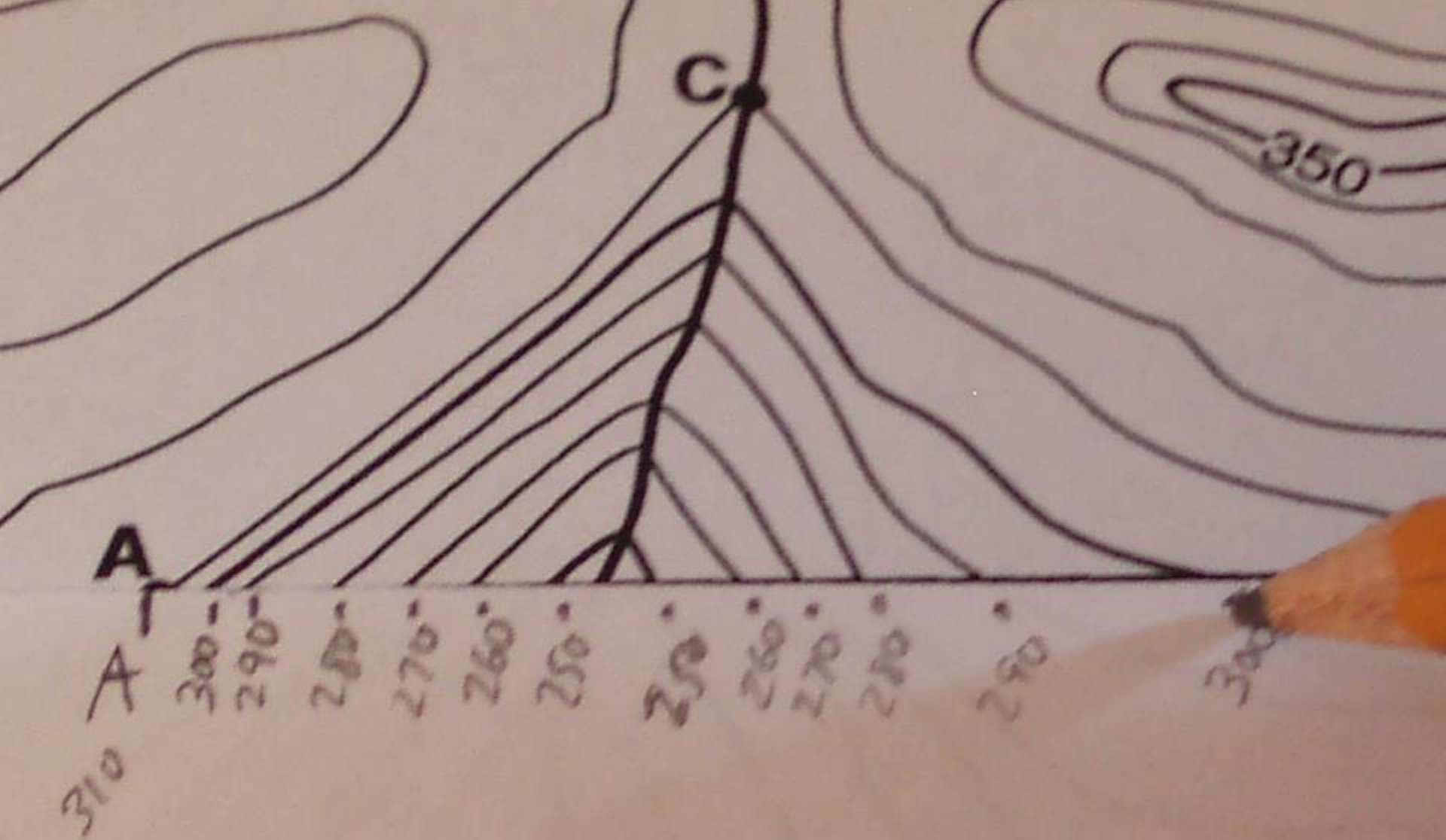
Make a small tick at A and B



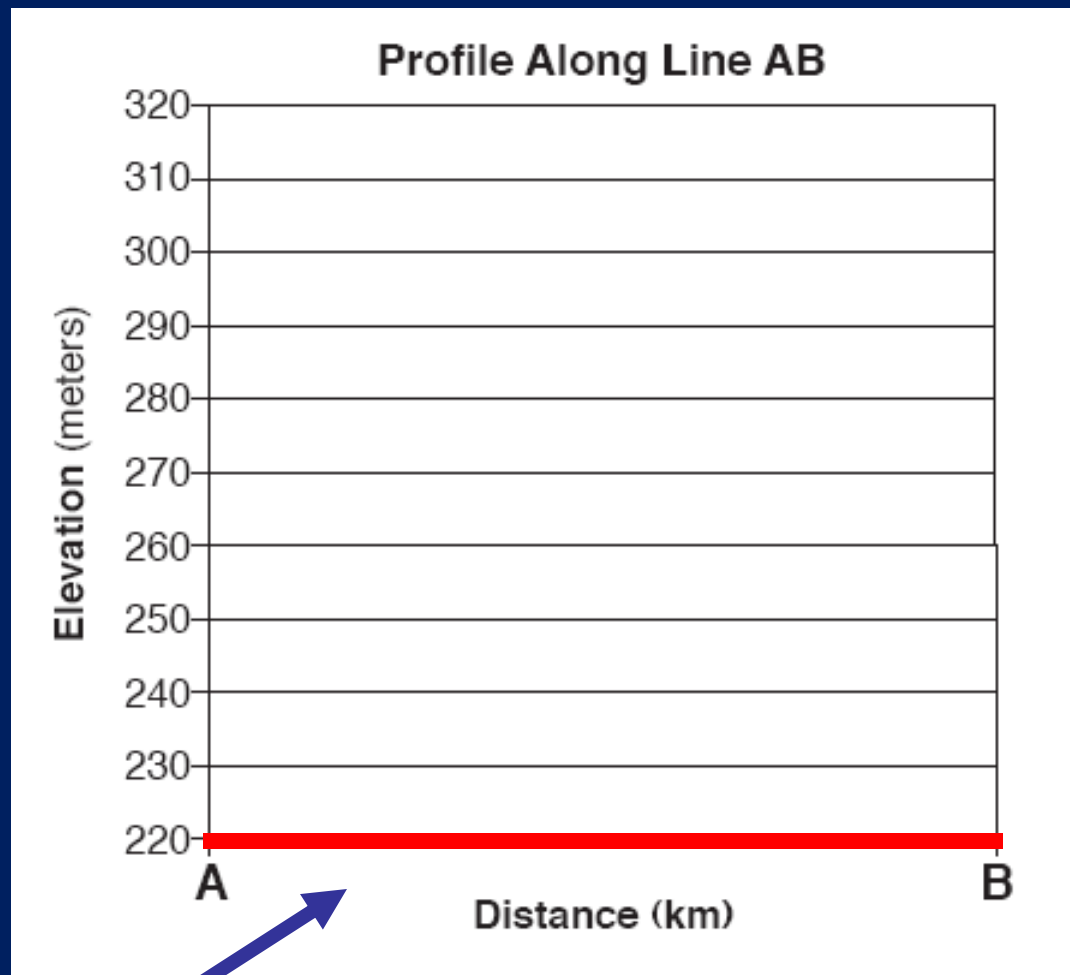


Make a small tick where each contour line crosses AB

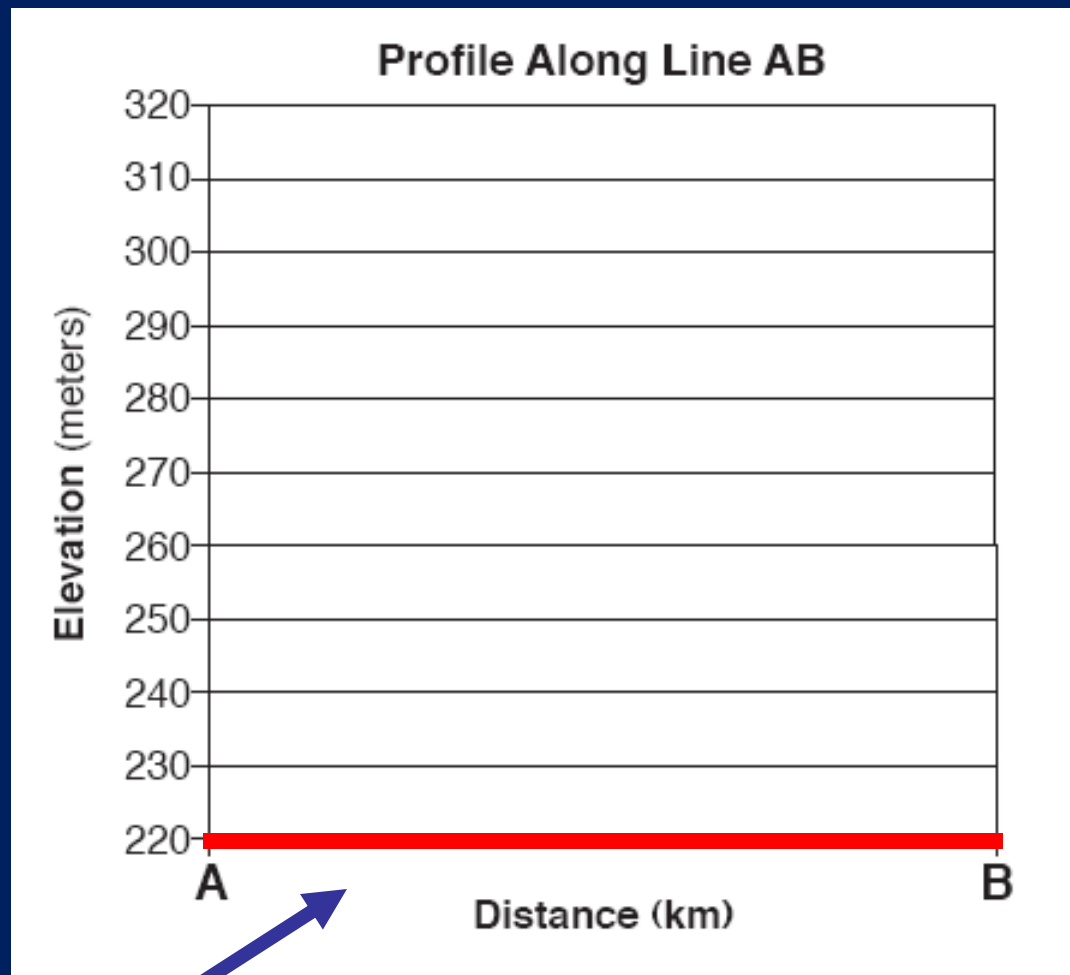




Label each tick mark with the correct value!



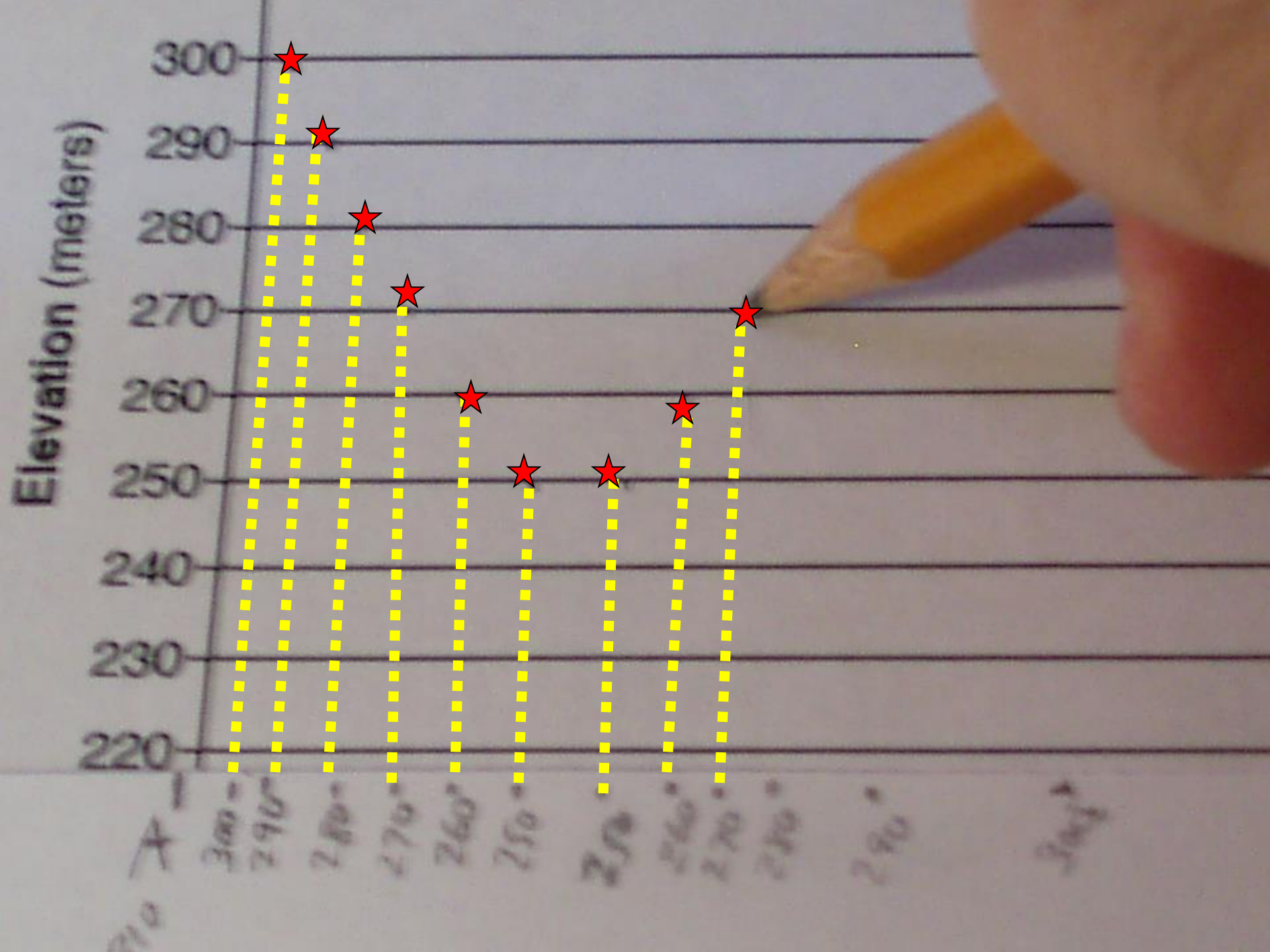
Hold your scrap paper page up to the profile.



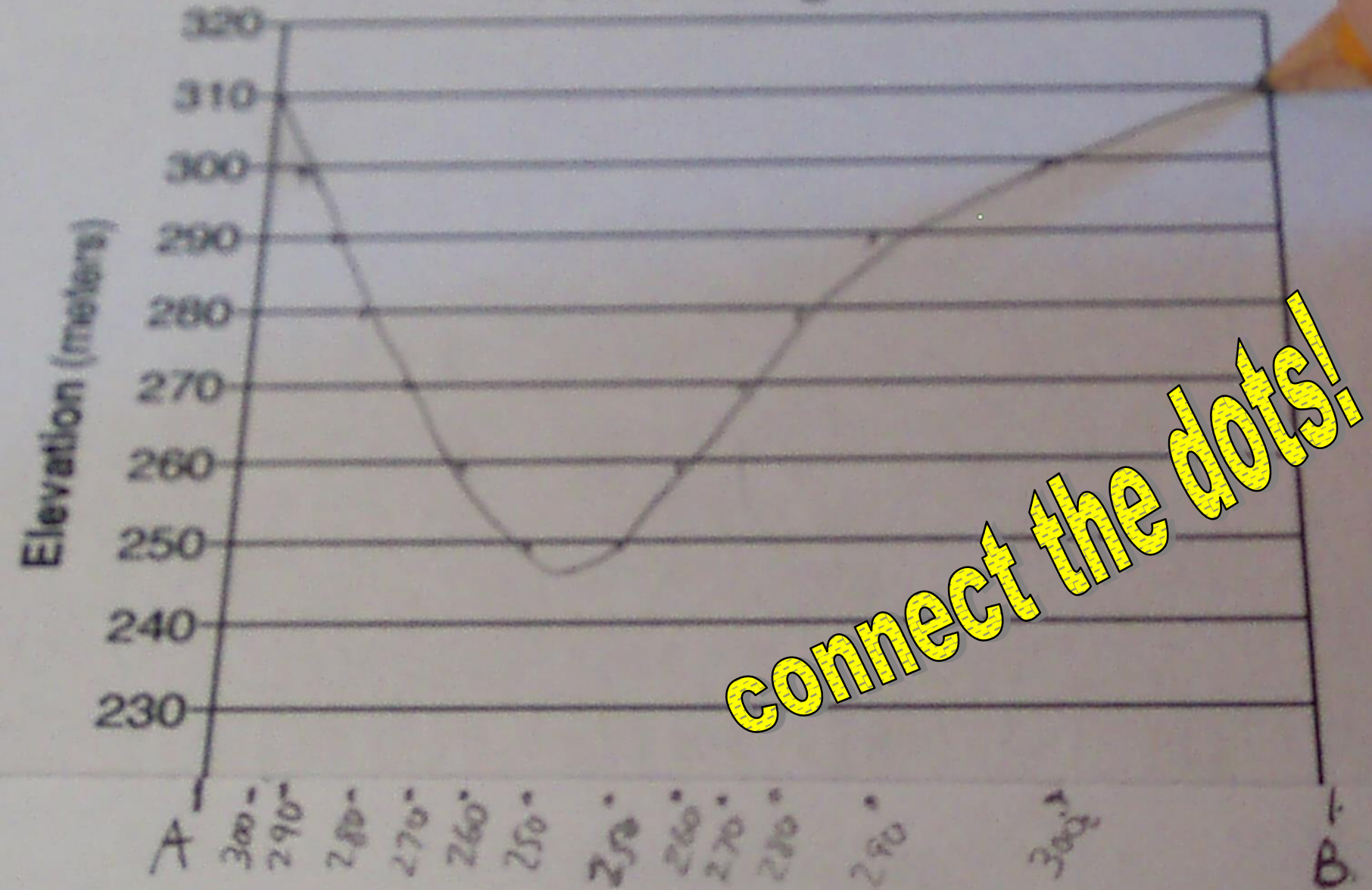
Transfer the tick marks directly onto the profile.

Profile A

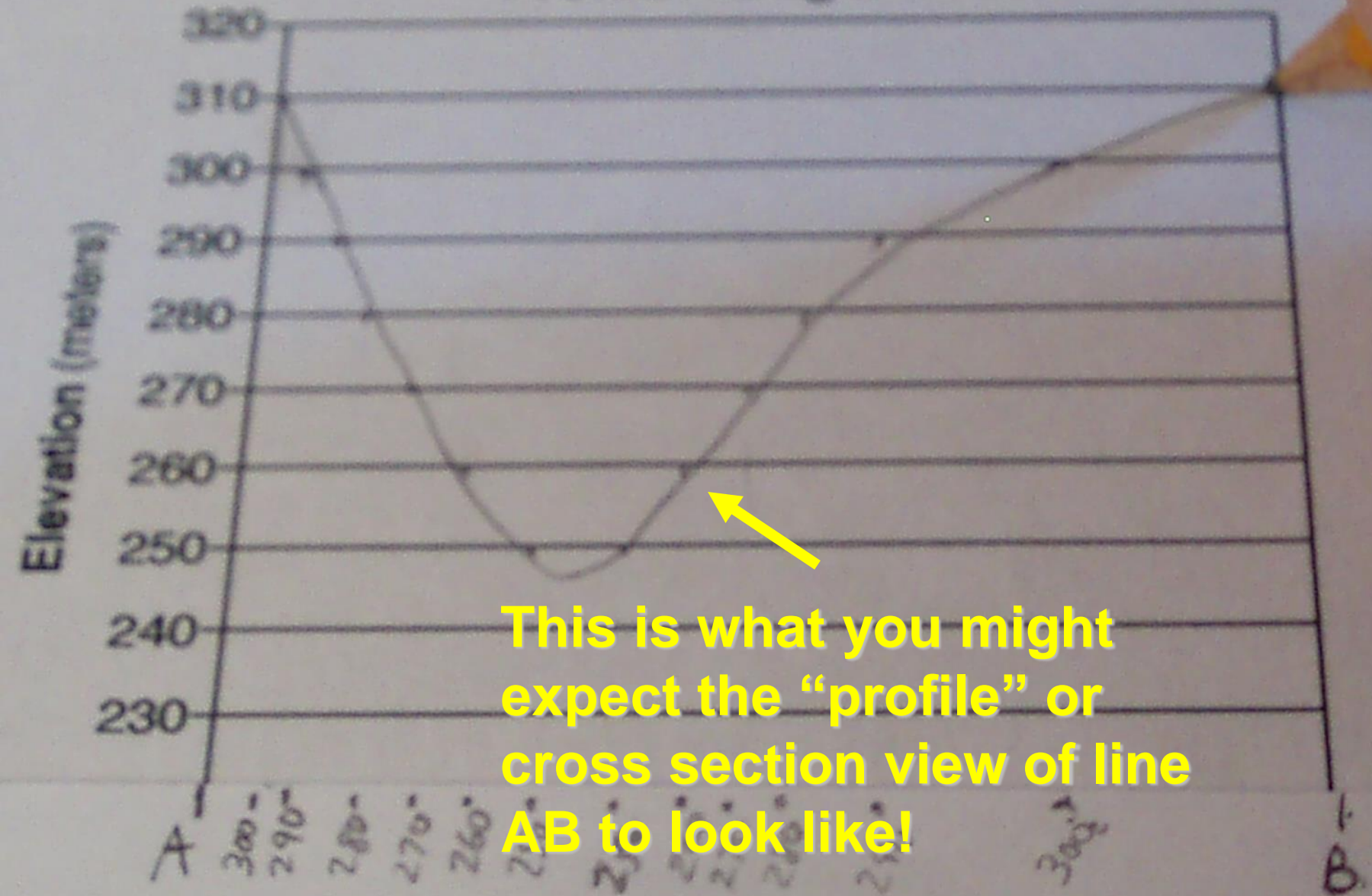


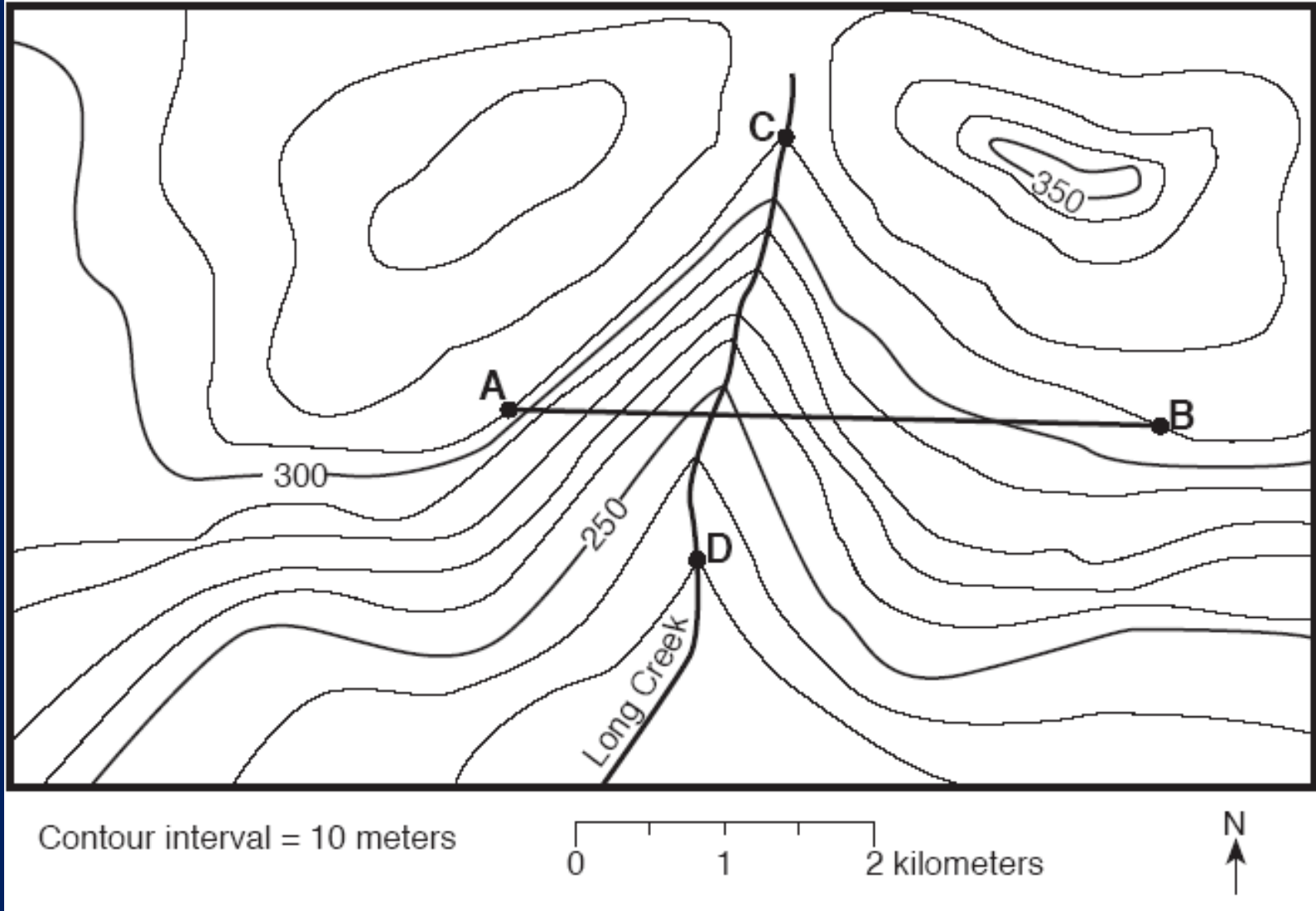


Profile Along Line AB



Profile Along Line AB





Does it make sense? SURE! There is a creek flowing through this region. Think about where it would flow on your profile. We also recognize the V shaped contour lines that indicate the direction of water flow.

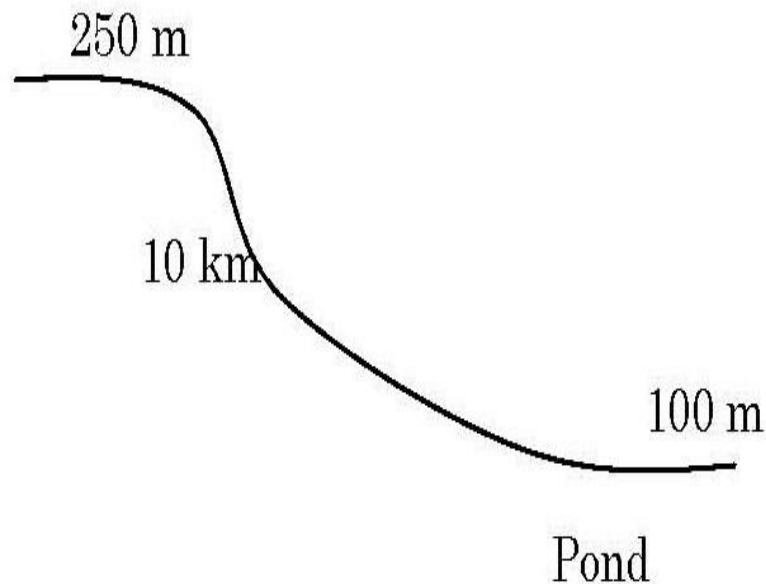
Gradient

Gradient: The rate of change from place to place within the field.

Another name for gradient is **SLOPE**

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

A stream begins at an elevation of 250 m and flows into a pond that is at an elevation of 100 m. The length of the stream is 10 km. What is the gradient?



Formula:

**Substitute
Numbers**

**Solution
(with units)**

- Complete pg 19 to 26
- Watch YouTube Videos: 2.3-2,8, ESRT 1b