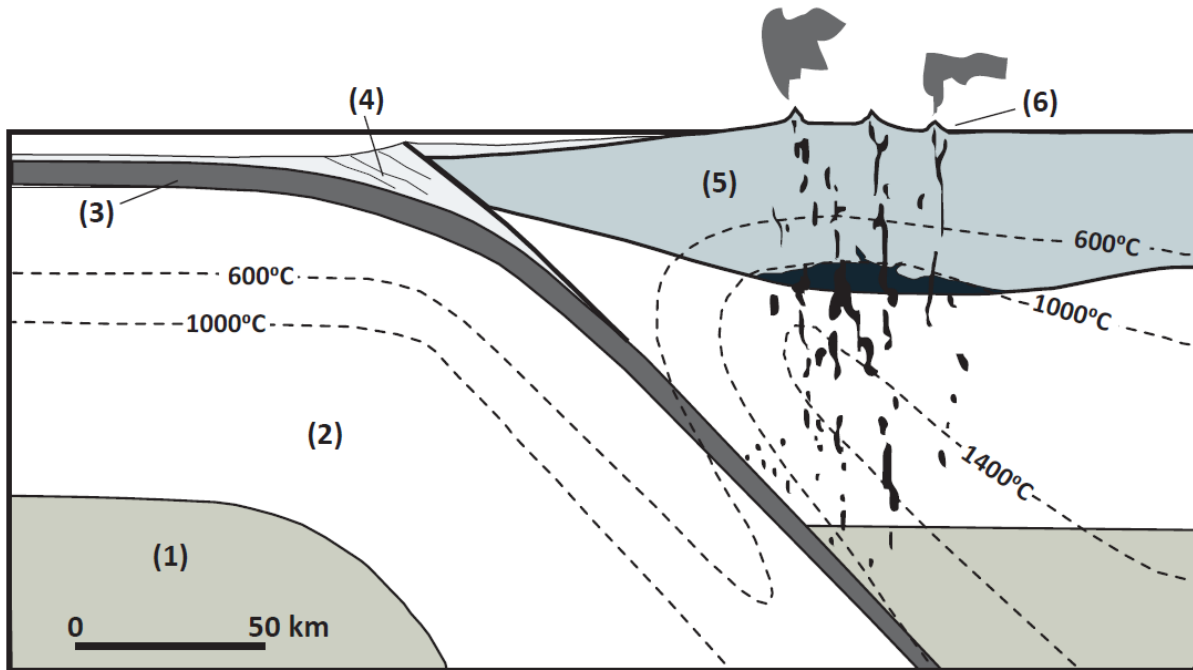


We are piloting this new senior exam for the purposes of assessment. Please complete the exam to the best of your ability. The results will be compiled and your identity will remain anonymous. We really appreciate your helping us with assessment.

What courses have you taken? (check all the courses that you have taken or are currently enrolled in)

- | | |
|--|--|
| <input type="checkbox"/> Geology 101 | <input type="checkbox"/> Geochronology and Paleontology |
| <input type="checkbox"/> Geology 103 | <input type="checkbox"/> Igneous and Metamorphic Geochemistry |
| <input type="checkbox"/> Structure | <input type="checkbox"/> Geochemistry |
| <input type="checkbox"/> Sed/Strat | <input type="checkbox"/> Glaciers and Climate Change |
| <input type="checkbox"/> Mineralogy | <input type="checkbox"/> Vertebrate Paleontology |
| <input type="checkbox"/> Petrology | <input type="checkbox"/> Regional Field Geology (indicate no.) |
| <input type="checkbox"/> Groundwater | <input type="checkbox"/> Field camp |
| <input type="checkbox"/> Geomorphology | <input type="checkbox"/> GIS |
| <input type="checkbox"/> Environmental & Engineering Geology | <input type="checkbox"/> Remote Sensing |
| <input type="checkbox"/> Volcanology | <input type="checkbox"/> Advanced GIS |



Name the plate boundary represented here _____.

Name the six parts labeled above:

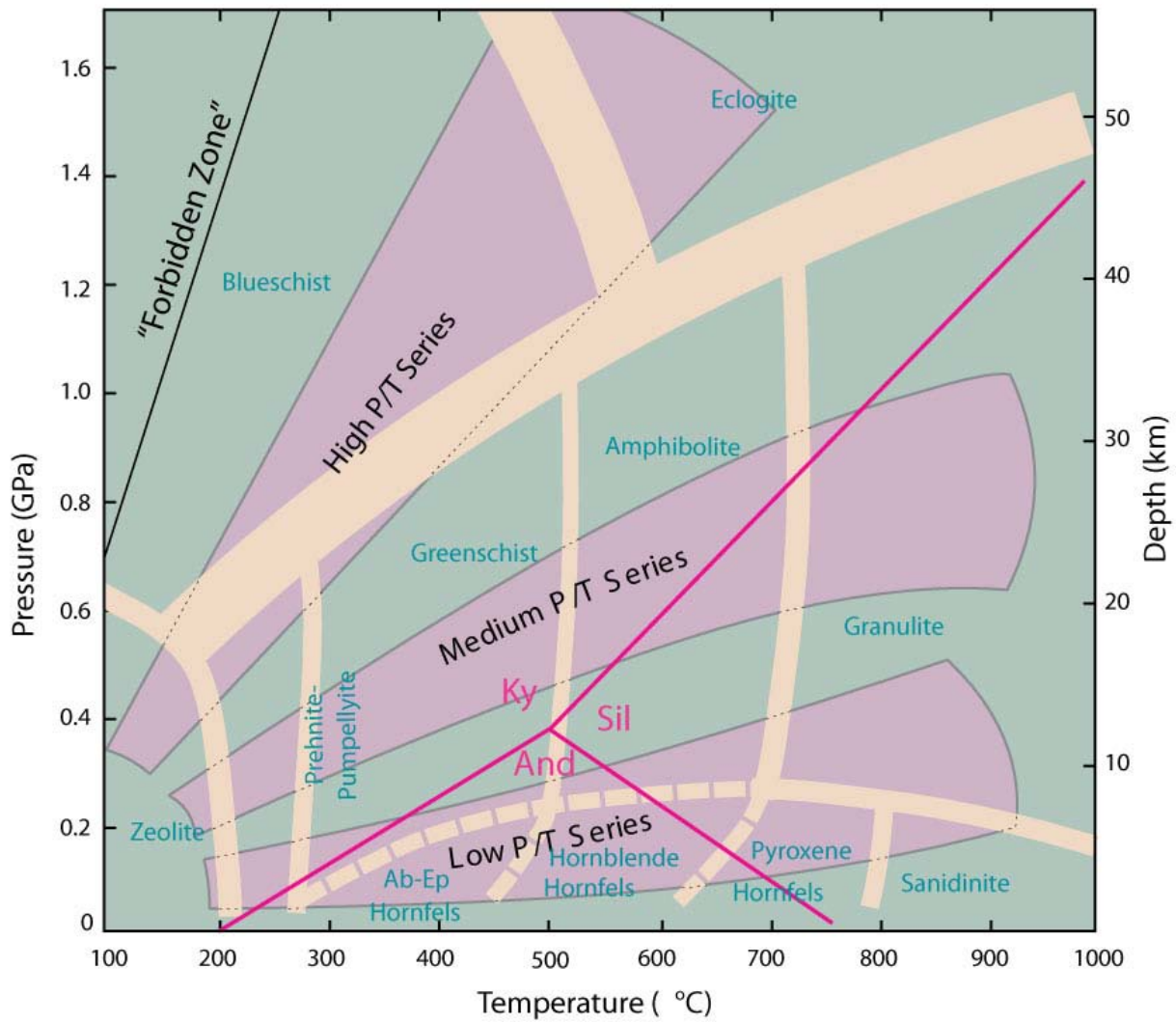
- (1) _____ (2) _____
 (3) _____ (4) _____
 (5) _____ (6) _____

Name rocks A through D and match them to the numbered locations, not all numbers will be used:

Rock Name	#location	Prominent Phenocryst Mineral
(A) _____	_____	_____
(B) _____	_____	_____
(C) _____	_____	_____
(D) _____	_____	_____

Label where earthquakes would occur with “star” symbols.

Rocks do not melt under “normal” geothermal conditions – why are magmas produced in large quantities in this setting?

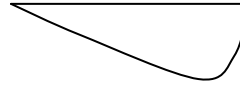


Name a geologic setting where you would find a suite of rocks that formed in conditions above.

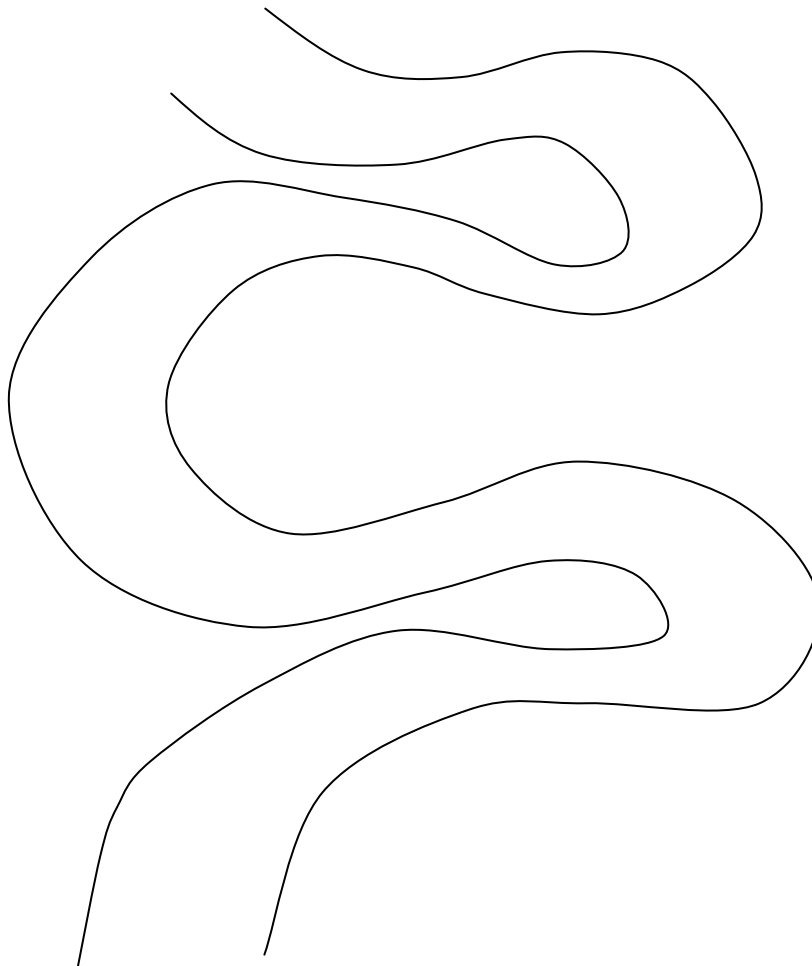
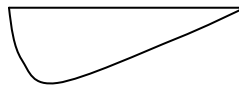
1. Low P/T: _____
2. Medium P/T: _____
3. High P/T: _____

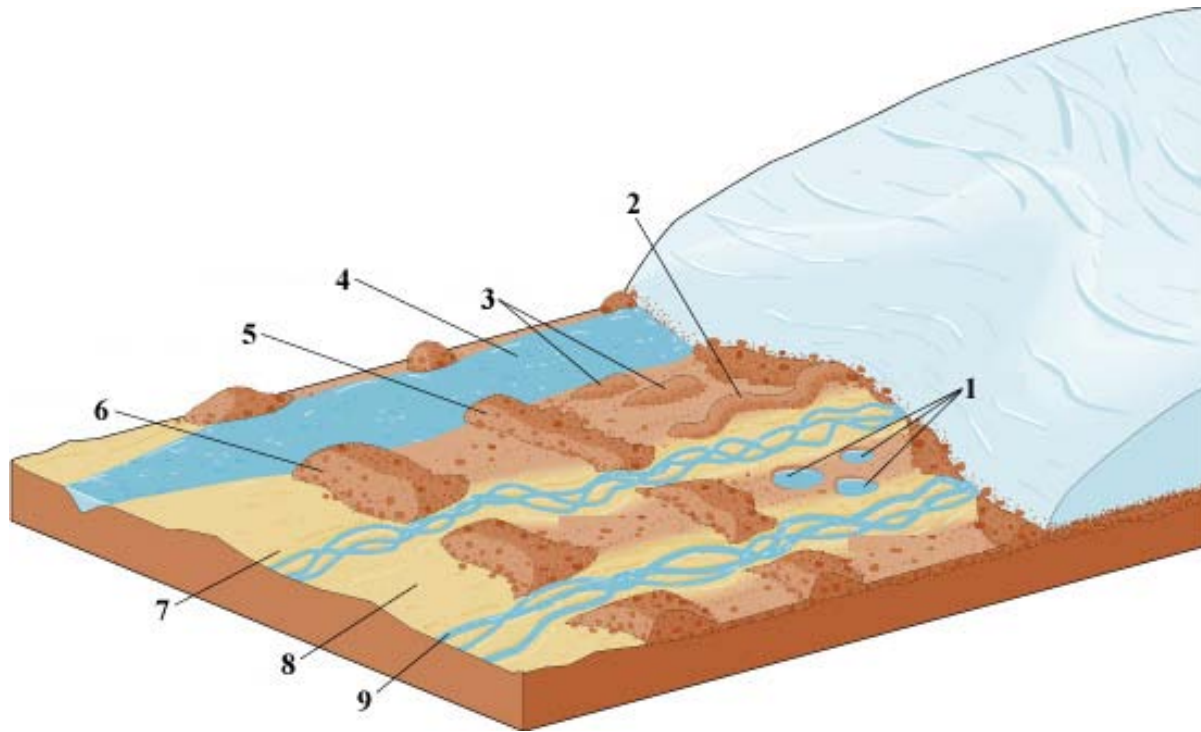
A meandering stream flowing to the south is shown in the figure below. Label the following features on the diagram:

- A. Cutbank
- B. Point Bar
- C. Site of future meander cut-off
- D. Site of future oxbow lake
- E. Place where the channel x-section shape would resemble



- F. Draw a new channel that would result from natural migration of the channel
- G. Place where the channel shape would resemble





Name a number that corresponds to each of the landforms listed below:

- _____ Recessional Moraine
- _____ Braided Stream
- _____ Esker
- _____ Outwash Plain
- _____ Drumlin

What are the characteristics of each of the following glacial deposit types?

Outwash deposits:

Glacial till:

Lake deposits:

1. When recessional moraine ridges were deposited in Michigan, the forward motion of the ice was _____ (circle answer below) by the melting (ablation) of ice from the terminus of the ice sheet.
 - A. Greater than
 - B. Balanced by
 - C. Less than

2. The last glacial maximum, when there was approximately a mile thick ice sheet covering Michigan, occurred _____ years ago.

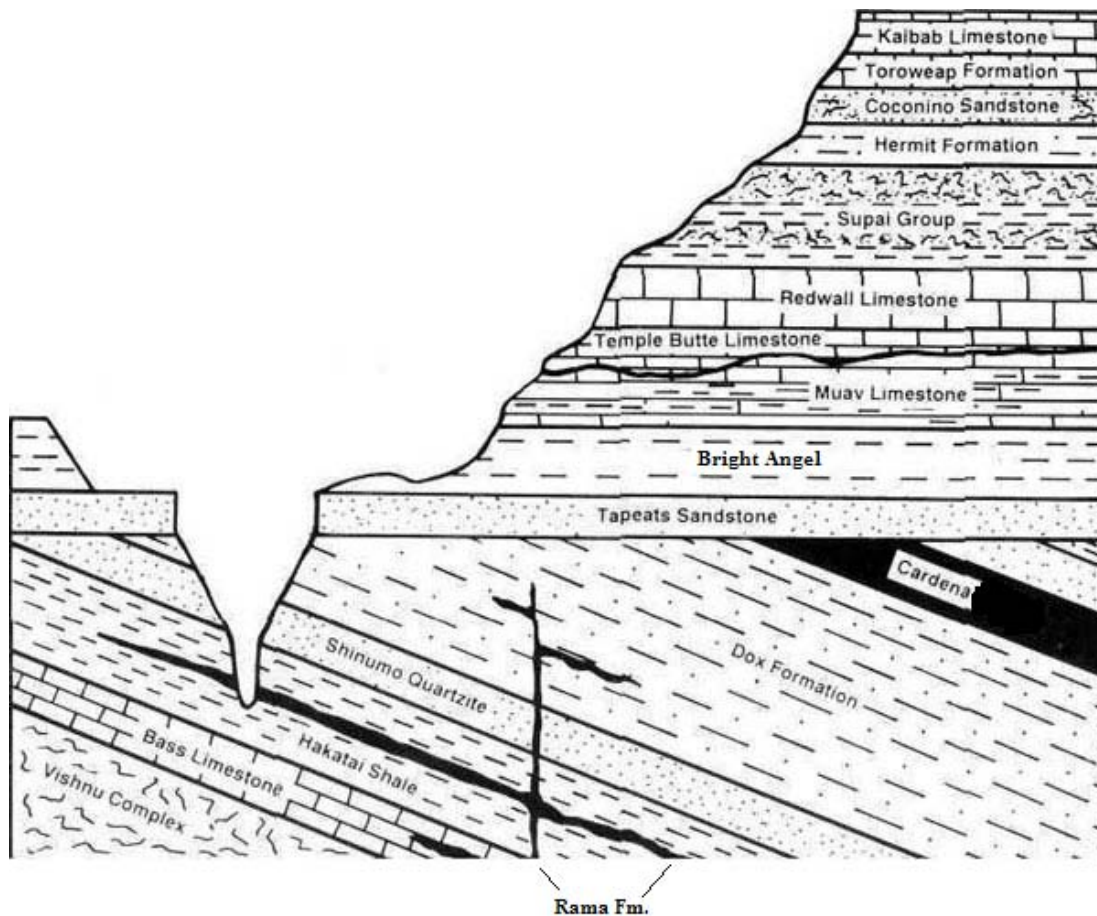
3. At that time sea level was 400 feet lower/higher (circle one) than it is today.

4. At that time atmospheric CO₂ levels were about 200 ppm lower/higher (circle one) than it is today.

5. We know about CO₂ levels based on analyzing (circle one):
 - A. Microfossils in marine sediments
 - B. Coral Reef
 - C. Gas bubbles in ice cores

6. For the last 1 million years, glacial-interglacial (cold/warm) cycles have occurred about every (circle one);
 - A. 10,000 years
 - B. 50,000 years
 - C. 100,000 years
 - D. 250,000 years

7. Which factor is likely most responsible for the glacial-interglacial cycles of the past 1 million years
 - A. Changes in solar output
 - B. Milankovitch cycles (subtle variations of Earth's orbital parameters)
 - C. Volcanic eruptions
 - D. Tectonic uplift



Examine the cross-section of the Grand Canyon above and answer the following questions.

Unconformities

1. Three unconformities are present, which one would most likely have the greatest amount of time missing (give formations above and below)?

2. If the Muav Limestone is Cambrian and the Temple Butte is Devonian, what Periods are missing at this unconformity?

3. What kind of unconformity is present between the Shinumo/Dox/etc. and the Tapeats Sandstone.

Igneous Rocks

1. Of the samples of rock provided, which one is the most likely lithology for the (Rama) intrusion shown (give rock number and lithology)?
2. What kind of intrusion is the Rama within the Hakatai Shale?
3. What kind of intrusion is the Rama within the Shinumo Quartzite?
4. If the Cardena Formation is a lava flow and is associated with the Rama Formation, which of the rock samples provided would be the most likely lithology for this unit (give rock number and lithology)?

Geochronology

1. If the Cardena lava flows are dated at 1025 Ma and the Rama Formation is dated at 1040 Ma, what is the absolute age of the Dox Formation?
2. What Geologic Time Scale interval would that be? _____
3. If the Redwall limestone is Mississippian in age and the overlying formations represent the next two periods, what is the age (period) of the Kaibab Limestone?

Stratigraphy/Sedimentary Geology

1. Does the Cambrian sequence of the Tapeats-Bright Angel-Muav represent a transgressive or a regressive sequence?
2. If the Supai Formation represented semi-arid fluvial deposition, which of the samples provided would represent its most likely lithology (give rock number and lithology)?
3. Since the Supai is 230 m thick and was deposited over 5 million years, calculate its NSAR (Net Sediment Accumulation Rate) in m/my.

4. Since it is at the base of a marine sequence, which of the rock samples provided would most likely represent the Tapeats Sandstone (give rock number and lithology)?

What sedimentary structure(s) would you likely find in this unit?

5. If the Coconino Sandstone represents a desert deposit, which of the rock samples provided would most likely represent this formation?

What sedimentary structure would you likely find in this unit?

What sedimentary texture(s) would characterize this unit?

Paleontology

1. What would be the most likely invertebrate fossil group present in the Tapeats-Muav sequence (circle one)?
- a. Clams B. Trilobites C. corals D. ammonoids
2. What would be the most common fossils in the Redwall Limestone (circle one)?
- a. crinoids and brachiopods b. trilobites and snails c. clams and oysters
3. Terrestrial vertebrate trackways are common in the Supai and Coconino formations. These would most belong to (circle one):
- a. mammals and lizards b. dinosaurs c. amphibians and synapsid reptiles

Regional Geology

1. The Grand Canyon is part of
- a. The Rocky Mountain Foreland b. The Colorado Plateau c. The Stable Platform

2. What geologic province is located along the southern and western border of the region?

a. The Rocky Mountain Overthrust Belt

b. The Basin and Range

c. The Columbia Plateau



Examine the map of Pangaea above and answer the following questions.

1. What Period would this plate reconstruction represent?

2. Label the 5 continental masses indicated.

Collectively, these 5 southern continental masses are called what? _____

3. During which Period did this supercontinent begin to break-up? _____

4. By the end of what Period had all of the modern continental masses separated?

Bedrock Geology of the West Portion of the Southbury Quadrangle, Connecticut

1. How would you know the Pomeraug Fault existed, even if it wasn't named on the map?

2. Look at the Pomeraug Fault in the NW corner of the map. How would you know that the east side moved up relative to the west, even without the U and D?

3. What other information do you need in order to determine if this is a normal or a reverse fault?

Geologic Map, Millersburg Quadrangle, PA

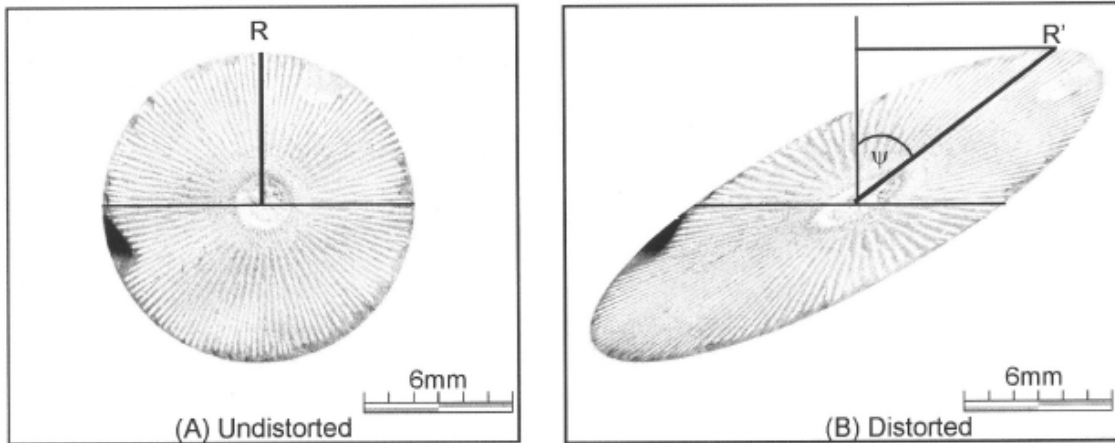
1. Look in the southwest corner of the map. If the Oriental Fault dips to the north, what kind of dip-slip fault is it?

2. a. Name the type of fold that lies immediately to the north of the Oriental fault.

b. What two lines of evidence led you to this conclusion?

c. In which direction does it plunge?

d. Between which two time periods must the folding seen on this map have occurred?



www.nagt.org/files/nagt/jge/abstracts/Girty_v50n5p559.pdf

6. The unnamed marked line on the diagram above has a stretch of 1. What does this mean for its change in length – did it get longer, shorter, or stay the same?

7. Given what you just learned about stretch, the value of the stretch for line R must be (circle the best choice):
 - a. Less than zero
 - b. Greater than zero
 - c. Greater than 1.

8. What is the stress acting on a plane 1 m² in area at a depth of 10 km, if the density of the rock above that plane is 3,000kg/m³?

Kingston RI Topographic Map

1. What is the contour interval for this map?
2. What does the fractional scale 1:24000 mean?
3. What is the latitude of the NW corner of the map? (indicate numbers and N-S-E or W)
4. What is the longitude of the SE corner of the map? (indicate numbers and N-S-E or W)
5. In one sentence, describe the general topography of Great Neck, located just NW of Worden Pond. Determine the dimensions of Great Neck, including length, width, relief, and the average slope from summit to north end.
6. The topography just north of US Route 1 could be described as hummocky. In one sentence, describe the general characteristics of this hummocky topography.