

nicholas chao invitational (intermediate)

name + team #: _____

section 1: multiple choice (20 pts)

1) Who classified a system of stream order we use today? (1 pt)

- a. Leopold
- b. Strahler
- c. Witherspoon
- d. Potter

2) Nick C River has no tributaries; what is Nick C River's Strahler order? (1 pt)

- a. 1
- b. 2
- c. 3
- d. 4

3) Nick C River and another stream with the same order flow into Nguyen River. What is Nguyen River's Strahler order? (1 pt)

- a. 1
- b. 2
- c. 3
- d. 4

4) Nguyen River and Griffin creek are both tributaries of DN River; if DN River's order is 2, what does Griffin creek's order have to be? (1 pt)

- a. 0
- b. 1
- c. 2
- d. 3

5) Assume that all of the aforementioned streams are in the midwest. As you get on a plane to escape this dreaded place, what is the most common drainage pattern you fly over? (1 pt)

- a. Radial
- b. Contorted
- c. Dendritic
- d. Centripetal

6) A channel can become braided if (choose best answer) (1 pt):

- a. The sediment load is low and the stream has low discharge
- b. The sediment load is high and the stream has high discharge
- c. The sediment load is low and the stream has high discharge
- d. The sediment load is high and the stream has low discharge

7) What are the four processes that help streams reach dynamic equilibrium? (1 pt)

- a. degradation, aggradation, widening, planform change
- b. erosion, transportation, deposition, weathering
- c. climate, slope, geology, altitude
- d. hydraulic action, corrosion, corrosion, attrition

8) Which of the aforementioned processes do humans try to “fix”? (1 pt)

- a. slope
- b. transportation
- c. corrosion
- d. planform change

9) What two waterfalls are in Niagara? (1 pt)

- a. American Falls and Angel Falls
- b. Angel Falls and Canadian Horseshoe falls
- c. Cumberland Falls and American Falls
- d. American Falls and Canadian Horseshoe falls

10) What are the best conditions for an aquifer? (1 pt)

- a. Low permeability, low porosity
- b. Low permeability, high porosity
- c. High permeability, low porosity
- d. High permeability, high porosity

11) Which of the following would be a good aquifer material? (1 pt)

- a. granite
- b. schist
- c. sandstone
- d. wood

12) Which of the following sorts sediment clast sizes from lowest to highest? (1 pt)

- a. pebble, sand, silt, clay
- b. pebble, silt, sand, clay
- c. clay, sand, silt, pebble
- d. clay, silt, sand, pebble

13) Oxbow lakes are formed from (1 pt):

- a. volcanic activity
- b. cutoff meanders
- c. tectonic activity
- d. glacial activity

14) In waterfall formation, the pool created by the erosion of soft rock is known as (1 pt):

- a. waterfall
- b. wetlands
- c. plunge pool
- d. forebay

15) Knickpoints are directly influenced by all of the following EXCEPT (1 pt):

- a. tectonic activity
- b. glacial activity
- c. humidity
- d. lithology

16) A knickpoint that occurs at the head of a channel is called a (1 pt):

- a. headcut
- b. delta
- c. moraine
- d. esker

17) Groundwater flows from: (1 pt)

- a. recharge areas to discharge areas
- b. discharge areas to recharge areas

18) Groundwater moves _____ from recharge areas to discharge zones. (1 pt)

- a. quickly
- b. slowly

19) Which of the following is not a Karst feature? (1 pt)

- a. polje
- b. ponor
- c. influent stream
- d. cenote
- e. all of the above are karst features

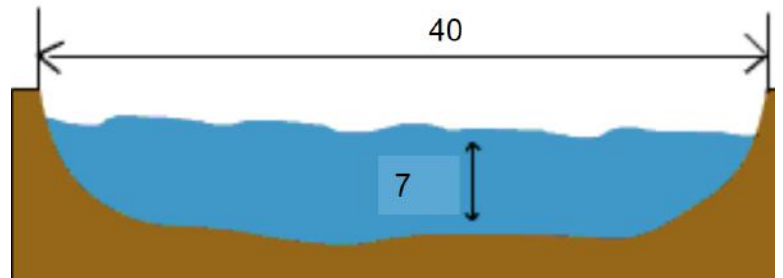
20) Which of the following is not a point source pollutant? (1 pt)

- a. smokestacks from the bomb factory
- b. animal waste from the nick farm
- c. urban runoff from losertown
- d. oil spill from the nick factory

section 2: math (10 pts)

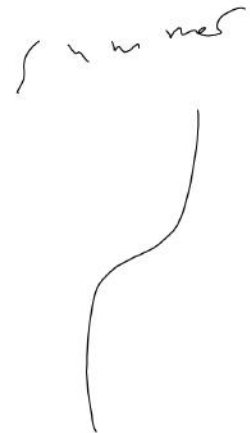
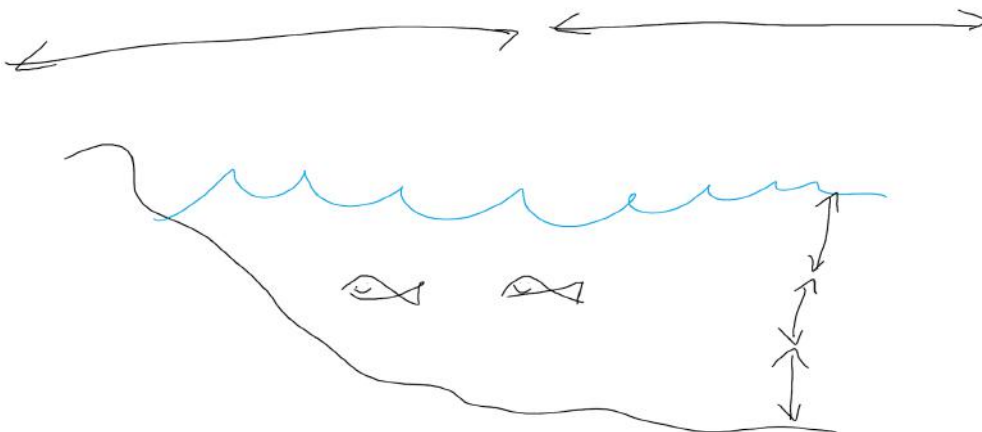
1) *measurements are in ft, each worth 2 pts*

- a. calculate the area of the stream cross section
- b. calculate the wetted perimeter
- c. calculate the hydraulic mean depth
- d. calculate the hydraulic radius
- e. given that the velocity is 10 ft per second, calculate the discharge

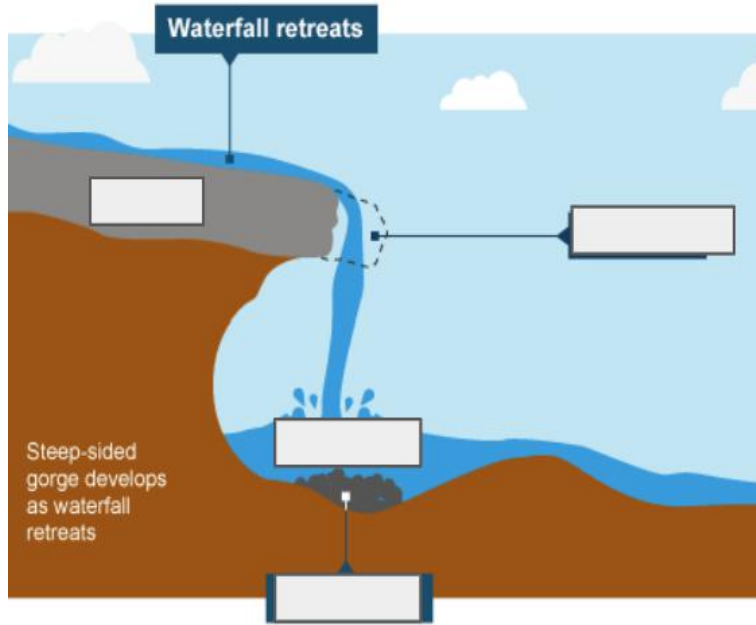
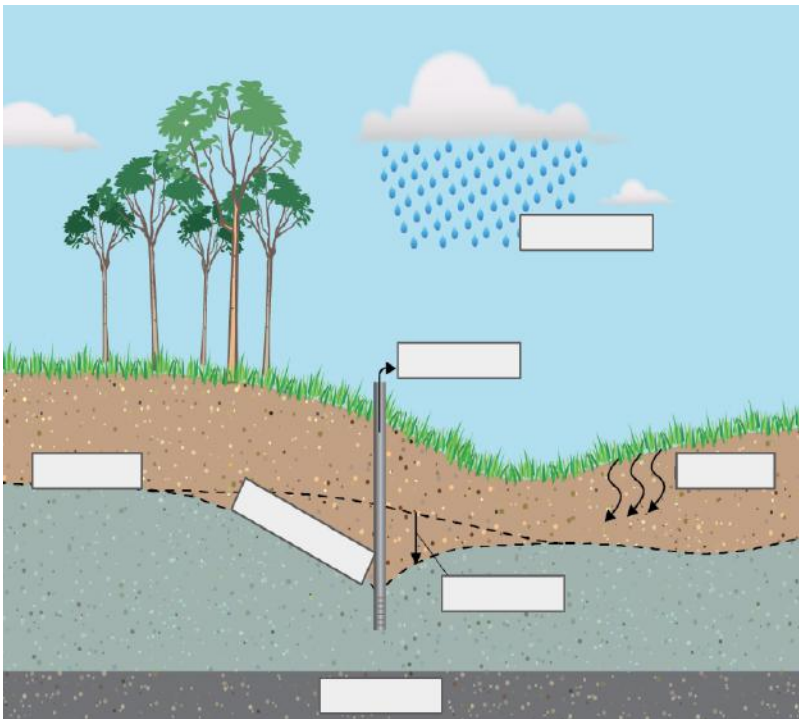
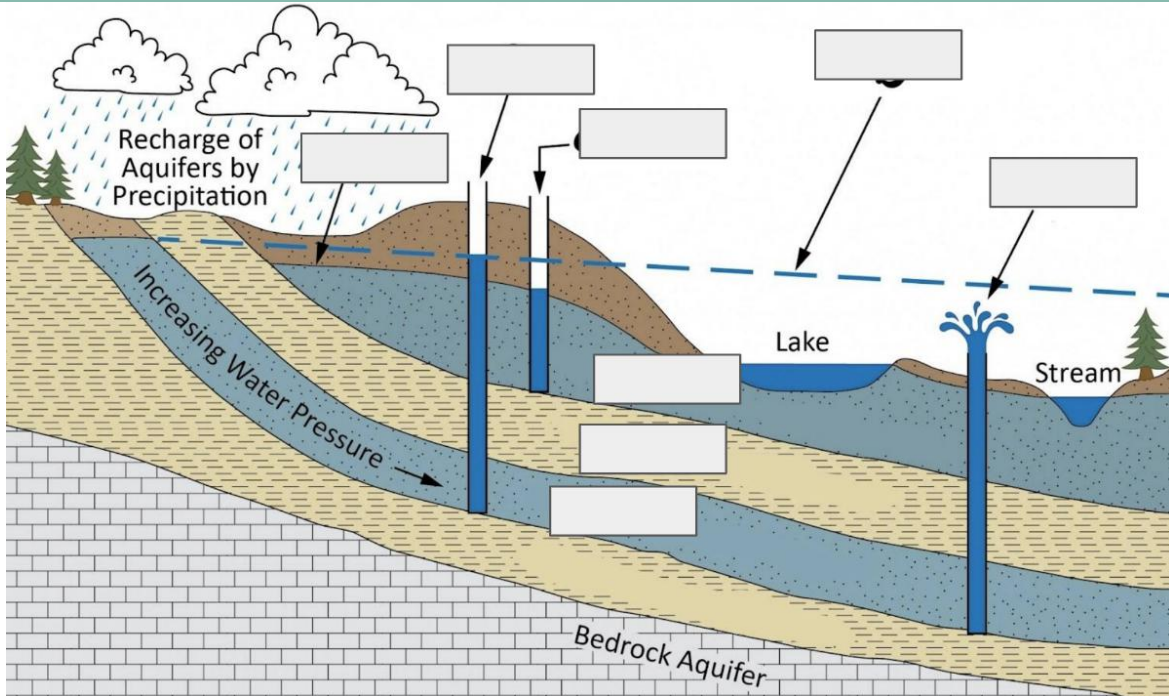
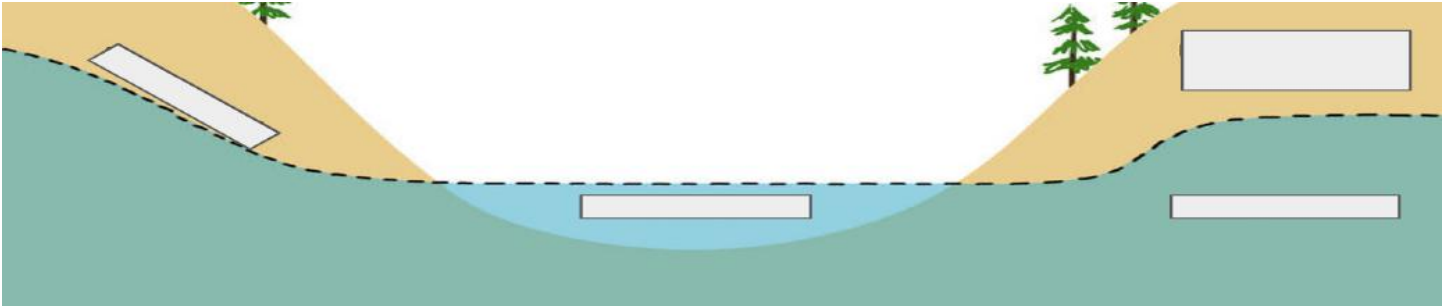


pay attention to units !!

section 3: diagram labeling (28 pts)

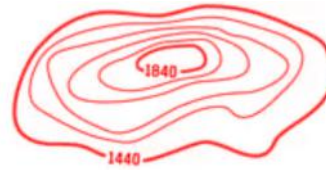


(above) label two of the limnologic lake zones and the temperature zones



section 4: topo jaja (7pts)

1) What is the contour interval in the map to the right?



2) Which of the two maps on the right shows a steeper topography?

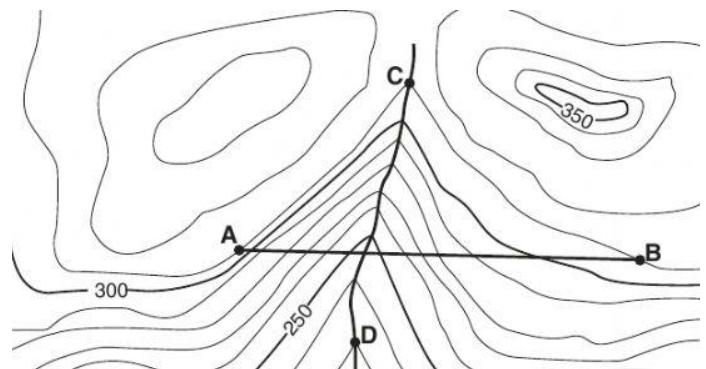


3) Which of the two maps on the right would be better for farming?

4) Say the contour interval is 50 ft; Nathan says that on the map, Stewie's elevation has to be 1490 ft. Is he correct? Why or why not?

5) In the map at the bottom below, the contour lines are forming a "V" shape. We can assume that there is a _____ here.

6) What elevation is point A?



section 5: short answer (22 pts)

1) describe the differences between braided and anastomosing channels (3pts):

2) during which season(s) does lake turnover occur in dimictic lakes and why? (2pts)

3) what river system is lake mead a part of and why is it drying up? why is this important? (5 pts)

4) describe the formation of oxbow lakes (3 pts):

5) contrast lake overturn and lake turnover (3 pts):

6) the Kansas River flows into the Missouri River and therefore has, in comparison, a smaller drainage area. Would you expect the effect of climatic conditions to be greater on the Kansas River or Missouri River? Which River would have a wider range in quality? (2 pts)

7) kansas' water supply mainly comes from underground wells and has a hardness average of 299 ppm. Would this water be considered hard? If so, what minerals would you expect to be present? (2 pts)

8) compare and contrast bogs and fens (2pts):

tiebreakers:



(refer to image above) what are these structures called? what is their intended purpose? use as much detail as you can in your answer (3 pts):

write a brief overview of the wastewater treatment process (8 pts):