

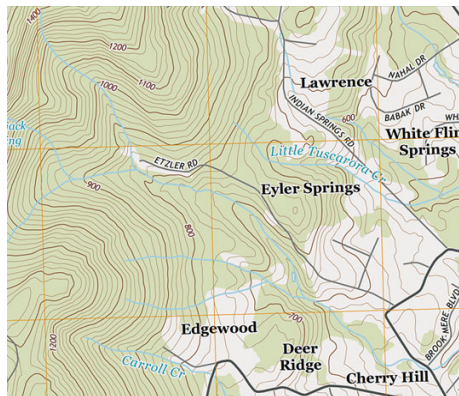
# Dynamic Planet Freshwater Exam (With Key)

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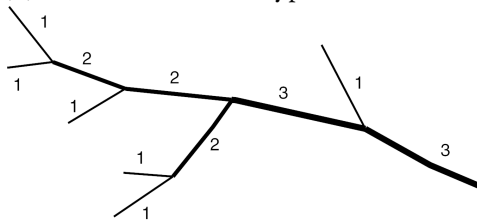
Please use this for practice resources for Dynamic Planet's Freshwater topic! Contact me if you have any questions or if you found a mistake. The practice test is created based on common questions I've seen from past tests. All questions here are short responses; I did not include any multiple choice in this test. Blue font indicates the answer to the question that precedes. Test is 80 points total.

## Drainage and Maps (10 pts)

Use the topographic map below for #1-#2. Assume units for elevation are feet.



- (1) Use the map above. State the contour interval.  
 $(900-800)/5 = 20$  feet
- (2) Use the map above. What direction is Carroll Creek flowing to, and how do you know?  
Southeast. We know by examining which direction the V-shaped contour lines on the stream points to. Streams always flow in opposite directions to where the V-shaped lines point to.
- (1) Below shows which type of stream ordering method?



Strahler Ordering

- (1) Which stream ordering method requires one to add stream orders at each confluence?  
Shreve Ordering
- (2) How are perennial streams represented on topographic maps? How about intermittent streams?  
Perennial streams are represented by a solid blue line, while intermittent streams are represented with a blue line that's both solid and dashed.
- (3) What is the most common drainage pattern formed? State how they formed and their topography.  
Dendritic drainage pattern. They are formed when a river channel follows the terrain often found in mountainous areas. They develop in regions underlain by homogeneous material.

## River Valley Forms and Streams (10 pts)

7. (1) What is an anabranching channel?  
Anabranching channels separates from its main stream and flows several kilometers before rejoining it.
8. (1) What is the difference between a tributary and a distributary?  
Tributary: a stream that flows to a larger stream or other body of water. Distributary: stream that flows away from the main stream and does not rejoin it.
9. (2) Describe how an oxbow lake forms.  
An oxbow lake forms after a meander is cut off with erosion, and the cutoff is sealed with deposition from a meandering stream.
10. (3) Define and state the difference between perennial, intermittent, and ephemeral streams.  
Perennial streams flow all-year. Intermittent streams only flow in certain times of the year. Ephemeral streams flow only after a precipitation event.
11. (3) Define and state several examples of a knickpoint. You may include how it has formed.  
A knickpoint is where there is sudden change in gradient. Examples: lake, waterfall. Knickpoints can form with influence of tectonics, such as uplift along a fault.

### Lakes (17 pts)

12. (2) What is an endorheic lake? What is an exorheic lake?  
Endorheic lakes have no outflow to an external body of water. Exorheic lakes have outflow to external bodies of water.
13. (3) Define each and state the difference between oligotrophic and eutrophic lakes.  
Oligotrophic lakes: low nutrient levels, clear waters, little productivity with little to no algae. Eutrophic: high nutrient levels, high productivity levels. Abundant plant growths.
14. (12) Name 6 types of lakes, describe their formation, and give a real life example of each type.
  - a) Aeolian lake. Formed by wind actions. Ex: Moses lake in Washington.
  - b) Meteorite lake. Formed by impact of crater. Ex: Lonar lake in India
  - c) Glacial lake. Formed from retreating glaciers and when they melt in the depressions in the land, forming a lake. Ex: Great Lakes.
  - d) Solution lakes. Formed by dissolution of bedrock. Ex: parts of Florida and Croatia's Dalmatian coast.
  - e) Anthropogenic lakes. Formed from direct/indirect results of human activities. Ex: damming of rivers.
  - f) Oxbow lakes. Formed from erosion and deposition on a meander on a meandering stream. Ex: Lake Chicot in Arkansas

### Landforms (11 pts)

15. (TB-1) A collapsed pingo is known as what? Ognip
16. (1) What are small islands between braided channels called? Eyots
17. (1) Name a primary process that creates natural levees. Deposition
18. (1) What is saltation? A transport method where pebbles/load bounce along the bottom of the bed.
19. (3) Name three types of deltas and state what shape they look like. Arcuate- fan shaped, Bird's Foot- bird's foot shaped, Cuspate- tooth shaped
20. (5) Define a pingo and state how it has formed. Describe the 2 types and how they differ.  
A pingo is a dome-shaped mound consisting of a layer of soil over a large core of ice, occurring in permafrost areas. It forms when the year-round presence of water thaws the permafrost. The freezing front advances inward, placing the encapsulated "lens" of water under pressure. The thin layer of permafrost above the

lens is pushed upward and the pingo begins to grow. The pingo is fully formed and stops growing when it is frozen solid.

2 types: hydraulic (open-system) and hydrostatic (closed-system). The difference is that hydraulic pingos' water come from a water source outside the system, while hydrostatic pingos' water come from water within the area where the pingo formed.

### Groundwater (10 pts)

21. (1) How are unconfined aquifers recharged?  
Unconfined aquifers recharge by rain or stream water infiltrating directly through the overlying soil.
22. (1) How are confined aquifers recharged?  
Confined aquifers recharge where the aquifer materials are exposed at the surface (outcrop).
23. (1) The groundwater elevation at point A and B are 15 feet and 10 feet, respectively. Find the hydraulic gradient if the straight line distance is 20 meters.  
 $(15-10)/20 = \frac{1}{4}$  feet/meter
24. (1) Describe one way saltwater intrusion may happen.  
Happens when too much freshwater is pumped from the aquifer system.
25. (2) What two qualities make a good aquifer?  
High porosity and high permeability.
26. (2) Describe the relationship between infiltration and water table level.  
As water infiltrates in groundwater, the water table level rises.
27. (2) How is the zone of aeration different from the zone of saturation?  
The pores of the zone of saturation are saturated with water, and the pore spaces in the zone of aeration are filled with air.

### Karst (10 pts)

28. (1) In one sentence, explain how karst forms.  
Karst forms when landscape underlain by limestone has been eroded by dissolution.
29. (1) State a Karst chemical equation.  
 $\text{CO}_2 + \text{H}_2\text{O} \rightarrow \text{H}_2\text{CO}_3$  (carbonic acid)
30. (2) Karst is likely to form in an area with a lack/abundance of rainfall where bedrock consists of limestone/granite.
31. (6) Name three karst features and how they have formed.
  - a) Caves: formed by the dissolution of limestone. Rainwater picks up  $\text{CO}_2$  from the air and as it percolates through the soil, which turns into a weak acid. This slowly dissolves the limestone along the joints, some of which become enlarged enough to form caves.
  - b) Speleothems: formed as the result of precipitation from flowing or dripping groundwater.
  - c) Sinkhole: formed when water washes sediment down into cracks and voids in karst bedrock.

### Pollution (12 pts)

32. (3) Define and describe the difference between point and nonpoint source pollution.  
Point source pollution is from a single identifiable source of pollution, while nonpoint source pollution is unable to be traced from single identifiable sources of pollution.
33. (3) Explain how an abundance of nitrogen and phosphorus may bring harm to an ecosystem in a lake.  
An abundance of nitrogen and phosphorus may lead to eutrophication of a lake. The lake will experience increased algae growth, which decreases the oxygen fish and other aquatic organisms need to

survive. Fish and other aquatic organisms may eventually die, which harms the biodiversity of the lake ecosystem.

34. (6) Give 3 examples of each point and nonpoint source pollution (6 total).

Point source: industrial discharge pipe, sewage treatment plants, factory smokestack.

Nonpoint source: fertilizer/agricultural runoff, leaking sewage systems, acid rain

Thanks for viewing this! I hope this helped.