# Station 1- Dynamic Planet 2012- Phoenix Invitational

## Water Cycle:

1. The study of water is called _____.

2. _____ is the study of fresh water or saline water contained within continental boundaries.

3. In which feature do we find the greatest distribution of Earth's fresh water?

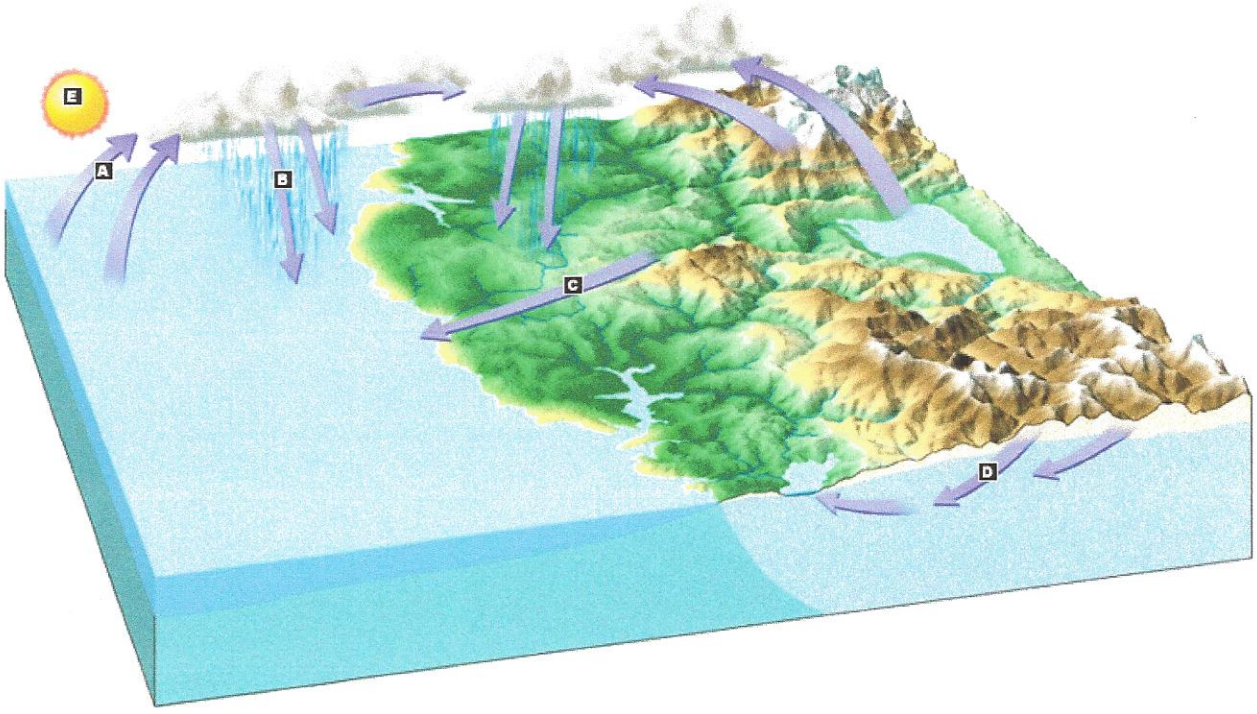
   a. rivers
   b. soil moisture
   c. lakes and reservoirs
   d. groundwater
   e. ice sheets and glaciers

4. Which of the above locations has the fastest rate of water exchange?

5. What is the source of energy powering the water cycle?

**Matching:** Match the following water cycle steps with the appropriate definition or description.

| | |
|---|---|
| 6. transpiration | a. condensed water vapor that falls to Earth |
| 7. evaporation | b. flow of water from ground surface into ground |
| 8. condensation | c. water flowing over surface into lakes and streams |
| 9. sublimation | d. release of water vapor into the atmosphere by plants |
| 10. precipitation | e. conversion of liquid water into water vapor |
| 11. infiltration | f. direct change of snow or ice to water vapor |
| 12. runoff | g. creates clouds and fog |




Identify the process at each lettered location

13. at A
14. at B
15. at C
16. at D

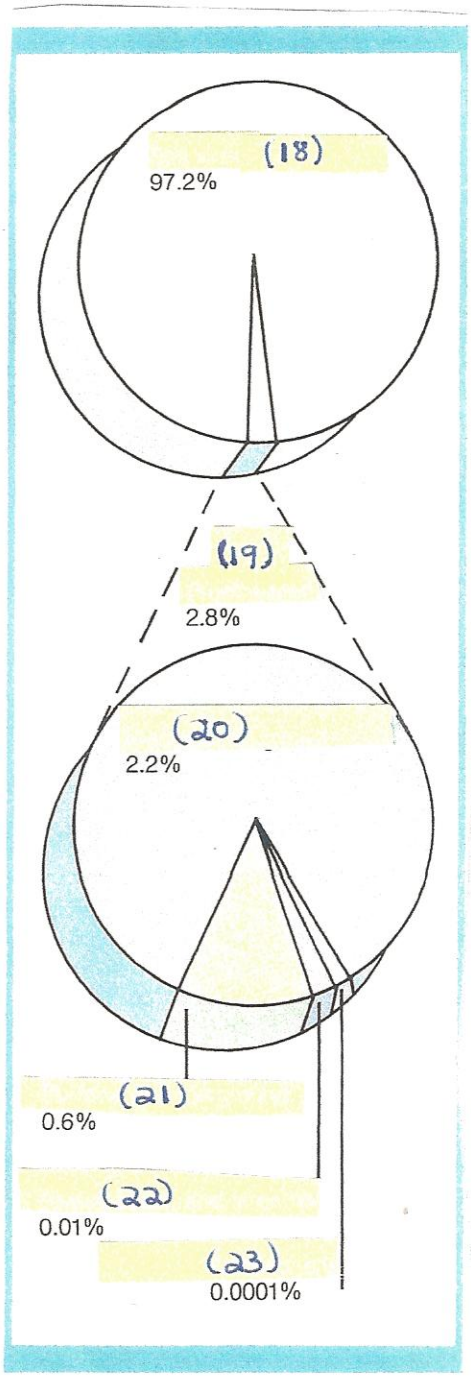
17. Which soil conditions result in the greatest amount of runoff?

    a. low permeability and gentle slope
    b. low permeability and steep slope
    c. high permeability and gentle slope
    d. high permeability and steep slope

Using the word bank below, label the following pie graphs showing the distribution of Earth's water.

***Word Bank:*** *atmosphere* *surface or underground* *rivers, lakes, and streams*

*saltwater* *freshwater* *icecaps and galciers*

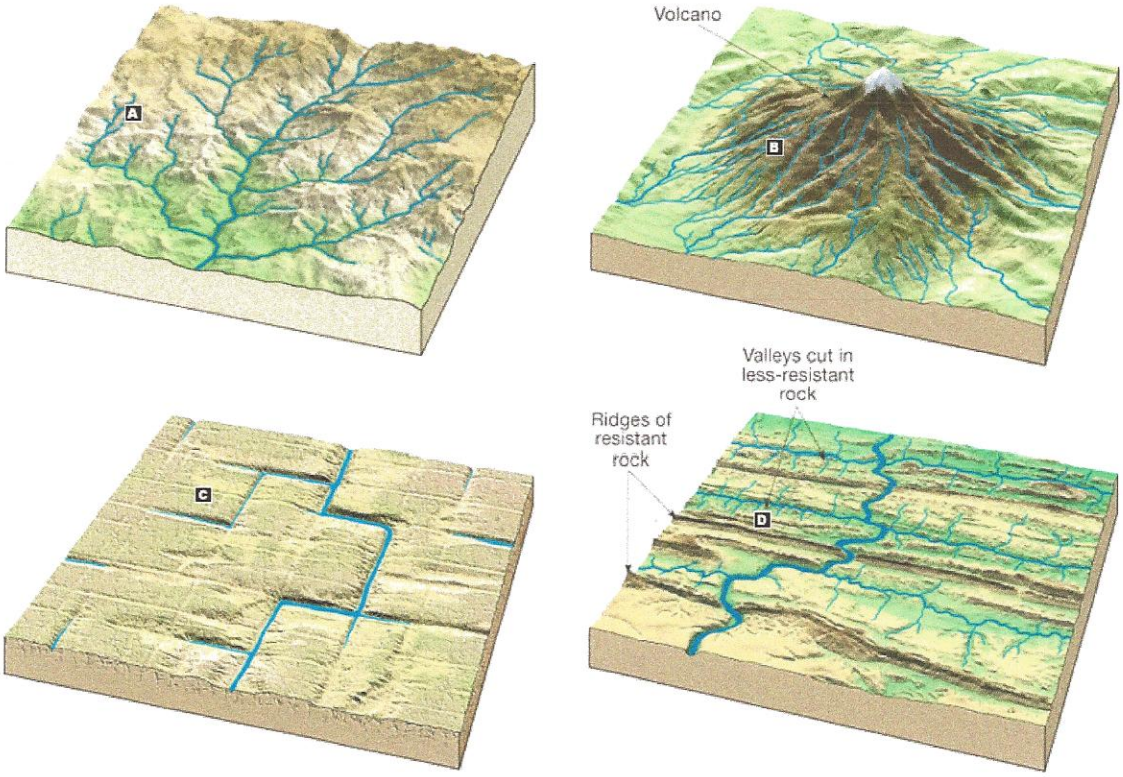


## Station 2- Dynamic Planet Phoenix Invitational 2012
## Steamflow and Drainage

1. We depend on running water for
   a. energy
   b. transportation
   c. irrigation
   d. most of our drinking supplies
   e. a, b and c
   f. all of the above

2. The drainage basin of one stream is separated from the drainage basin of another stream by an imaginary line called a
   a. overland
   b. drainage pattern
   c. water gap
   d. separation
   e. divide

3.




Identify and name the drainage patterns in the diagrams above.

A= _____

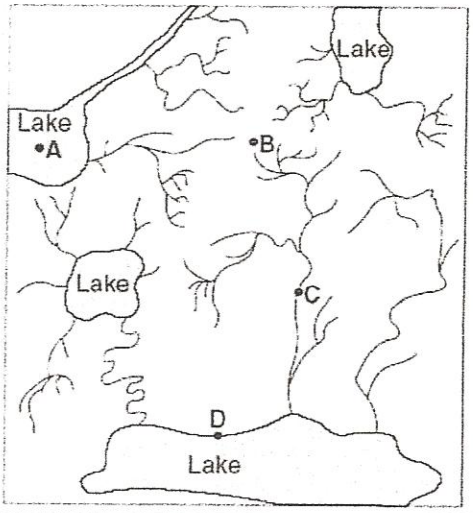
B= _____

C= _____

D= _____

4. If a river starts at an elevation of 7500 m and travels 500 km downstream to a lake that is at an elevation of 900 m, what is the stream's gradient.

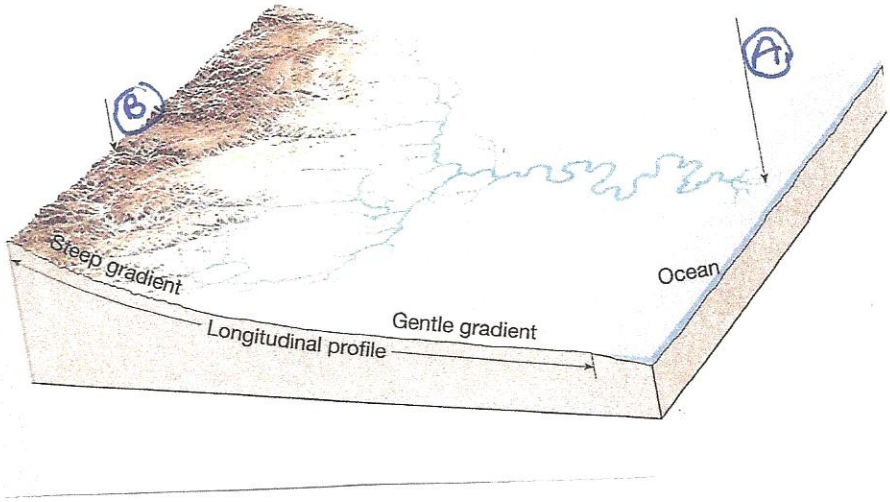
5. The map below shows the stream drainage patterns for a region of Earth's surface. Points A, B, C and D are locations in the region.




The highest elevation most likely exists at point

a. A
b. B
c. C
d. D

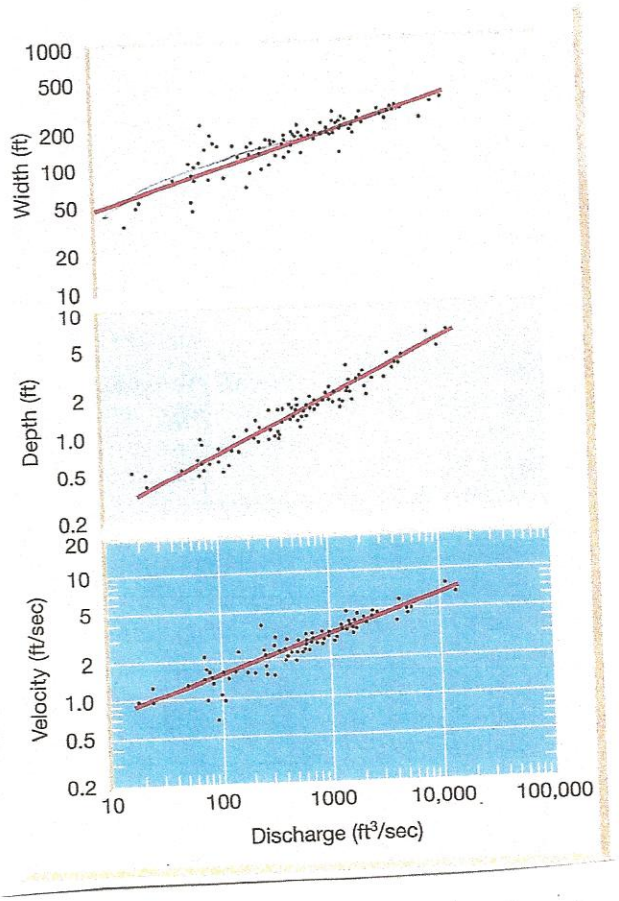
On the following diagram, locate the head or headwaters and mouth.



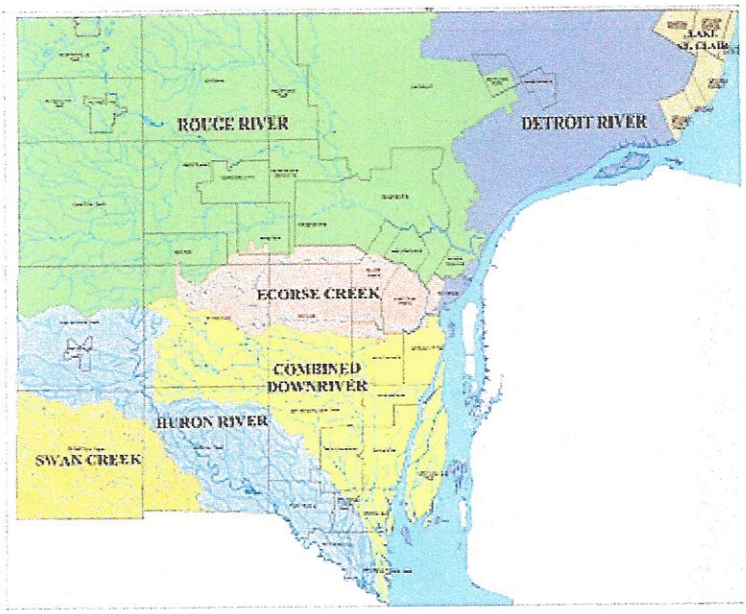

6. mouth: _____
7. head:_____
8. At which location would you expect discharge to be greatest, mouth or head.

Study the following graphs of the effects of discharge change on the Powder River in Locate ,Montana.

9. When discharge of a river increases, what happens to the width of the river.



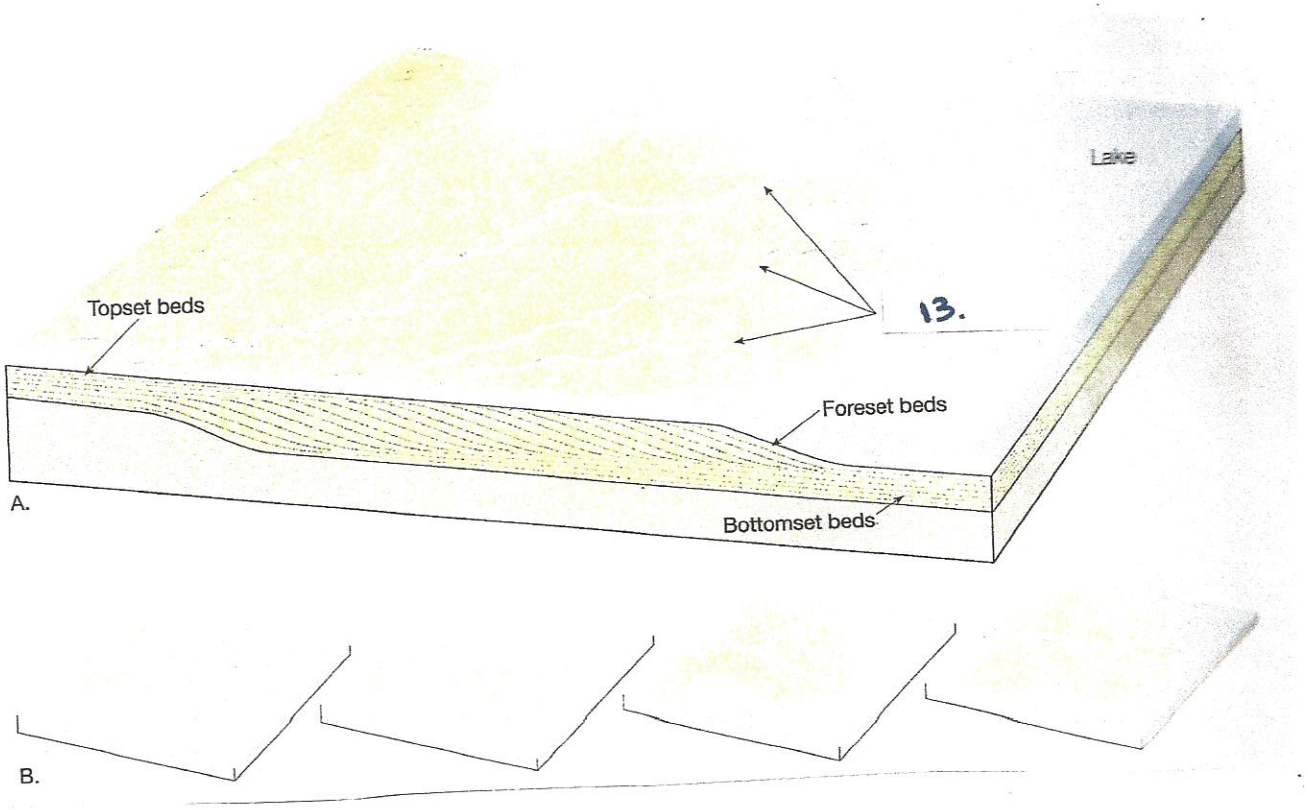

10. The following is a map of Wayne County, Michigan. Showing what?



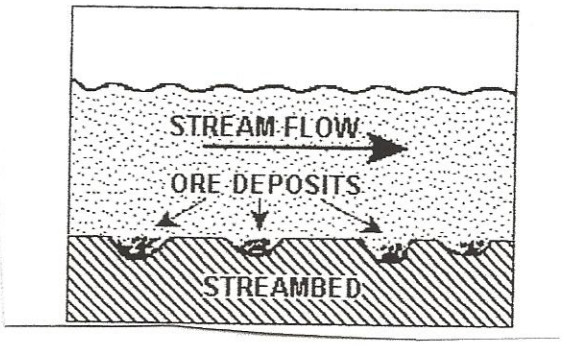

11. When the channel of a river is straight, the highest velocities occur where?

Refer to picture below to answer questions 12-14.

12. The following set of pictures shows the development of what feature.
13. What is the name of the feature the 3 arrows point to.
14. When are topset beds most likely to form.
15. In which "bed" location are you most likely to find finer silts and clays settling out.



16. The diagram shows mineral iron ore sediments deposited along depressions on the bottom of a stream.

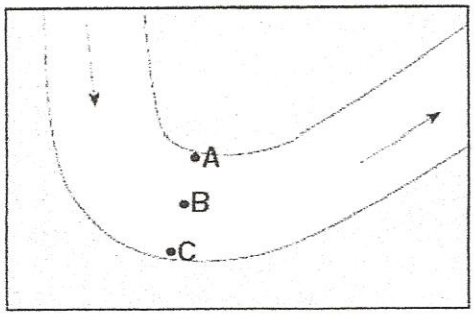



The deposits accumulated because the

a. stream velocity increased
b. stream volume increased
c. ore particles are smaller than other sediments
d. ore particles are more dense than other sediments

17.

The map below shows the bend of a large meandering stream. The arrows show the direction of stream flow. Letters *A*, *B*, and *C* are positions on the streambed where erosion and deposition data was collected.




Which table best represents the locations where erosion and deposition are dominant and where equilibrium exists between the two processes?

a)

| | Erosion | Equilibrium | Deposition |
|---|---|---|---|
| A | | ✓ | |
| B | | | ✓ |
| C | ✓ | | |

c)

| | Erosion | Equilibrium | Deposition |
|---|---|---|---|
| A | ✓ | | |
| B | | ✓ | |
| C | | | ✓ |

b)

| | Erosion | Equilibrium | Deposition |
|---|---|---|---|
| A | | | ✓ |
| B | ✓ | | |
| C | | ✓ | |

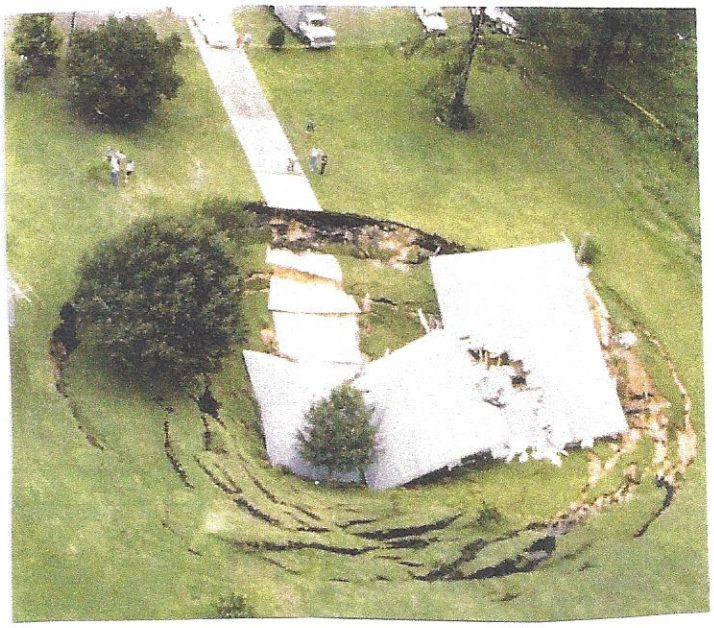
d)

| | Erosion | Equilibrium | Deposition |
|---|---|---|---|
| A | | | ✓ |
| B | | ✓ | |
| C | ✓ | | |

# Station 3- Dynamic Planet Phoenix Invitational 2012

## Groundwater and Karst

1. Name 2 common spelothms and distinguish between them.
2. The main agent or acid causing Karst Topography is _____.
3. Look at the photograph below. What type of feature is this?



4. For a rock layer to function as an aquifer, it must
   a. have a small zone of aeration
   b. have pores that are poorly connected
   c. have a large soil content
   d. be part of an artesian formation
5. The zone of aeration and the zone of saturation meet at a boundary called the
   a. recharge zone
   b. water table
   c. well
   d. artisian spring

**Matching**

| | |
|---|---|
| 6. Discharge | a. ability to transmit fluid |
| 7. effluent | b. entry of water into groundwater system |
| 8. influent | c. exit of water from groundwater system |
| 9. permeability | d. fluid holding capacity |
| 10. porosity | e. streams that gain water from the ground |
| 11. recharge | f. streams that lose water to the ground |

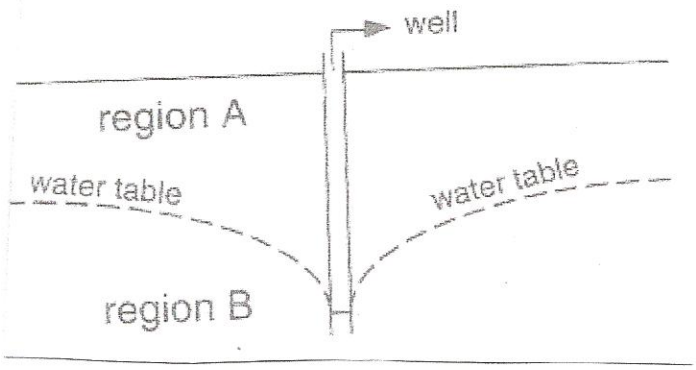
12. What holds up a perched water table?
    a. a sinkhole
    b. an aquiclude
    c. an aquifer
    d. the capillary fringe
    e. cone of depression
13. Which problem is not caused by groundwater withdrawal?
    a. chemical contamination
    b. drying up of springs
    c. drying up of wells
    d. salt-water incursion
    e. subsidence

14. The best groundwater reservoirs have
    a. low permeability, low porosity
    b. low permeability, high porosity
    c. high permeability, low porosity
    d. high permeability, high porosity

15. Hard water contains large amounts of
    a. lead
    b. sodium
    c. calcium
    d. silicon

The boundary between the saturated zone and unsaturated zone is called the
a. water table
b. aquitard
c. aquifer
d. porosity

16. Which of the following about the water table is false.
    a. the water table changes when discharge is not balanced by recharge
    b. the water table is generally flat
    c. the water table is above the land surface in lakes
    d. the water table is depressed near high volume pumping wells




17. In the diagram above, region A is the
    a. discharge zone
    b. recharge zone
    c. saturated zone
    d. unsaturated zone

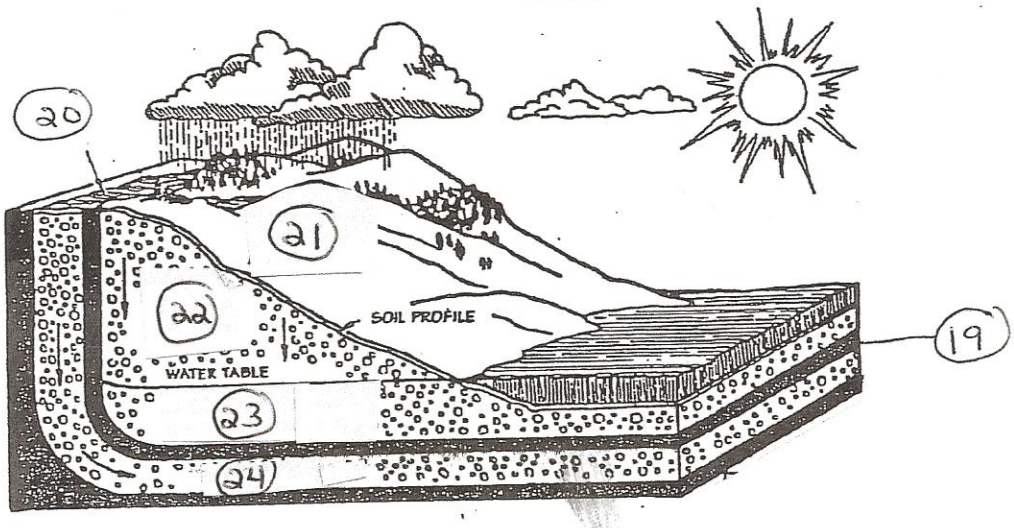
18. In the diagram above, region B is the
    a. discharge zone
    b. recharge zone
    c. saturated zone
    d. unsaturated zone

**Use the following word bank to label the diagram below: (not all terms will be used)**

*Zone of aeration* *unconfined aquifer* *confined aquifer*

*recharge for confined aquifer* *recharge for unconfined aquifer*

*impermeable rock layer*




GROUND WATER SYSTEM
(SIMPLIFIED)

# Station 4- Dynamic Planet—Phoenix Invitational 2012

## Miscellaneous

1. True or False: A 100 year flood occurs only once every hundred years.

2. List one method of flood control utilized by humans.

3. The following table represents average indoor water consumption in the U.S.

| Use | Percentage of Total Daily Use |
|---|---|
| Showers | 16.8% |
| Clothes Washers | 21.7% |
| Dishwashers | 1.4% |
| Toilets | 26.7% |
| Baths | 1.7% |
| Leaks | 13.7% |
| Faucets | 15.7% |
| Other Domestic Uses | 2.2% |

If the average person uses 69 gallons per day. How many gallons are flushed down the toilet?

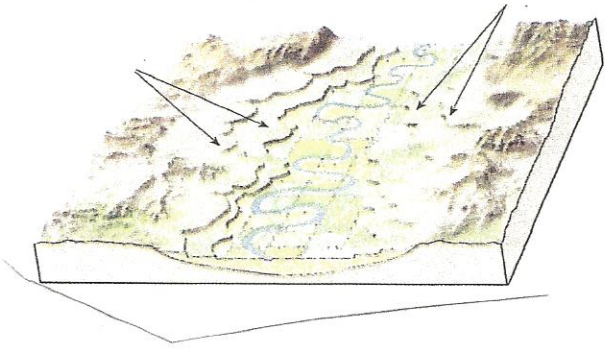
4. What is the name and location of the largest Aquifer in the United States?

5. The materials in a stream's water are collectively called the stream's
   a. discharge
   b. watershed
   c. gradient
   d. load

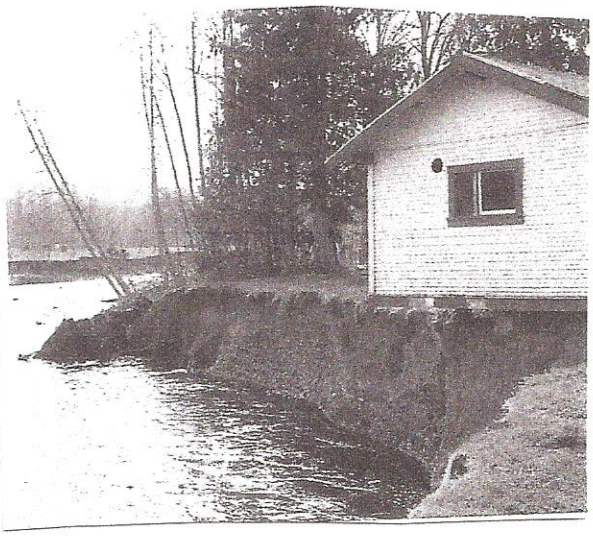
6. At sewage treatment plants, disinfecting the water occurs in the
   a. settling tank
   b. aeration tank
   c. chlorinator
   d. sludge tank

7. Explain using pictures and words how an oxbow lake forms.
8. What will eventually happen to an oxbow lake?
9. What feature of a ~~meandering stream~~ is shown in the picture below.

Flood plain

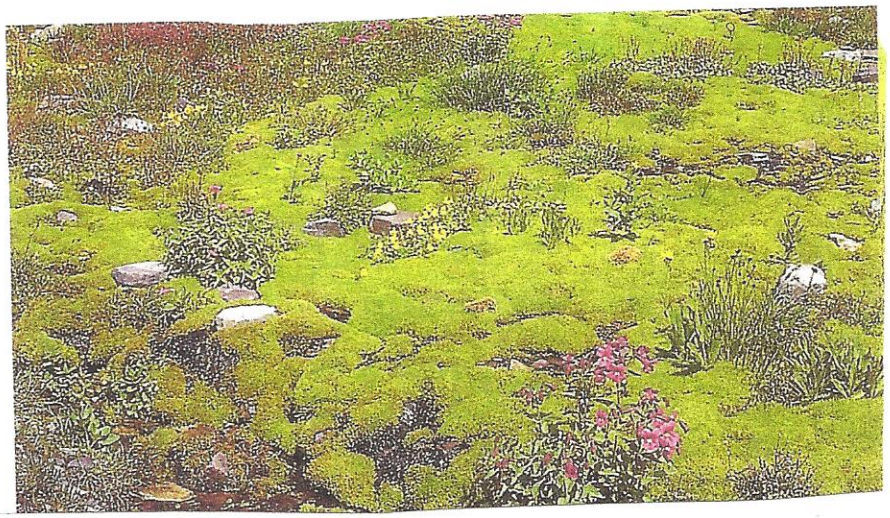


10. Identify the river feature shown below.



11. List the three common types of freshwater wetlands identified in the pictures below.

a)



b)

c)

**Matching lake vocabulary.**

_____12. oligotrophic lake

_____13. endorheic lake

_____14. ephemeral lake

_____15. crater lake

_____16. kettle lake

_____17. meromictic lake

_____18. Eutrophic lake

_____19. fjord lake

a. a lake in a glacially eroded valley that has been eroded below sea level.
b. a lake which forms in a volcanic caldera.
c. a "well nourished" lake
d. a seasonal lake that exists as a body of water during only part of the year.
e. a lake which has layers of water that do not intermix.
f. a lake which has no significant outflow.
g. a lake characterized by low nutrient concentrations and low plant growth
h. a lake with origins in a melted glacier

20. At what temperature (celcius) is freshwater most dense?_____

21. Name the device used to test for eutrophication.

22, 23, 24. List 3 main factors that regulate the trophic state of a lake.

**Dynamic Planet 2012 Phoenix Invitational** **Team Number**_____

**Station 1** **School**_____

**Names**_____

1. _____
2. _____
3. _____
4. _____ (letter only)
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____ Total_____/23
15. _____
16. _____
17. _____
18. _____
19. _____
20. _____
21. _____
22. _____
23. _____

**Station 2 Dynamic Planet** **Team Number_____**

1. _____
2. _____
3. a._____
   b._____
   c._____
   d._____
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Total _____/20

**Dynamic Planet 2012 Station 3** **Team Number_____**

1. _____

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24. _____

**Station 4 Dynamic Planet** **Team Number_____**

1._____ Total _____/26

2. _____

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11.a. _____

b. _____

c. _____

12. _____ 13. _____

14. _____ 15. _____

16._____ 17._____

18._____ 19._____

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22 _____

23._____

24._____