Hydrogeology

Name_____
Date_____

Directions: Circle the correct answer. Each question is worth one point.

1) Which of these is the largest aquifer in America?
   a. Ogallala Aquifer
   b. Edwards Aquifer
   c. Mahomet Aquifer
   d. Kirkwood-Cohansey Aquifer
2) What percentage of water on Earth is potable?
   a. 5%
   b. Less than 1%
   c. 10%
   d. 15%
3) Which law is used to determine groundwater flow direction and velocity?
   a. Boyle's Law
   b. Boltzmann's Law
   c. Fourier's Law
   d. Darcy's Law
4) What kind of water originates from precipitation?
   a. Meteoric water
   b. Cognate water
   c. Fossil water
   d. Juvenile water
5) Which of these types of strata have porosity and a negligible permeability?
   a. Confined aquifer
   b. Unconfined aquifer
   c. Aquitard
   d. Aquiclude
6) Which of these drainage patterns occurs on an eroded dome?
   a. Dendritic drainage pattern
   b. Radial drainage pattern
   c. Rectangular drainage pattern
   d. Annular drainage pattern
7) What is the maximum contaminant level for nitrates in drinking water?
   a. 10 ppm
   b. 1 ppm
   c. 50 ppm
   d. 100 ppm
8) Which one of these rock types is not found in karst topography?
   a. Limestone
   b. Sandstone
   c. Dolomite
   d. Marble

9) Which one of these terms does not describe the zone beneath the surface that contains both water and air?
   a. Aeration zone
   b. Unsaturated zone
   c. Vadose zone
   d. Phreatic zone
10) Which of these well types are drilled into natural rock formations not prone to collapsing?
   a. Shallow well
   b. Rock well
   c. Sand well
   d. Artesian well

Directions: Write TRUE or FALSE on the line provided next to each statement. Each question is worth one point.

11) _____ A watershed is the area drained by a single river system.
12) _____ A losing stream is also called an effluent stream.
13) _____ Backsiphonage occurs when there is a partial vacuum in a water supply system.
14) _____ Artesian wells draw water from unconfined aquifers.
15) _____ Perched aquifers occur below the water table.

Directions: Answer each question. Complete sentences are not required; bulletin answers are acceptable. Each question is worth three points.

16) What are the four types of wetlands?

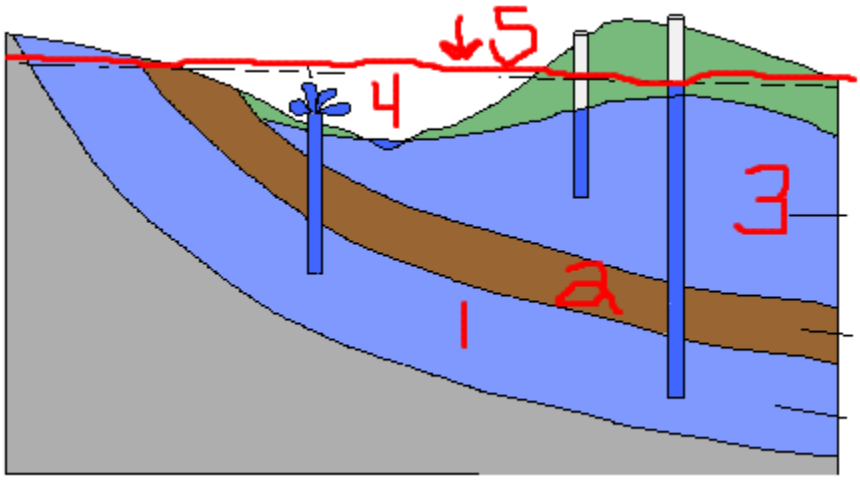
17) What is the difference between porosity and permeability?

18) What are the three components of hydraulic head?

19) What is a cone of depression, and what is its main cause?

20) List three sources of groundwater contamination.

Directions: Fill in the diagram. Each correct answer is worth one point.



1) _____
2) _____
3) _____
4) _____
5) _____

Directions: Answer each question according to the scenario provided. Each correct answer is worth three points.

A contaminant known as Trichloroethylene has been found at Well B, which is currently pumping. Pumping and static water table elevations have been provided for five wells in the same area, A, B, C, D, and E. All wells except for B are static currently.

Well	Pumping Elevation	Static Elevation
A	2500	2517
B	2551	2568
C	2499	2516
D	2565	2582
E	2547	2664

Geology and Hydrology Values Found at Well B

Depth (ft)	Lithology	K	Porosity (%)
0-4	Topsoil	2.68	52
4-46	Silt	4.02	46
46-56	Fine sand & gravel	88.40	39
56-82	Silty clay	1.34	44
82-151	Fine sand & gravel	88.40	39

151-163	Silt	4.02	46
163-255	Fine sand & gravel	88.40	39
255-280	Shale	0.00	6

1) What other wells are currently at risk? _____
2) When calculating horizontal groundwater velocity for well B, what conductivity value would you use? _____
3) When calculating horizontal groundwater velocity for well B, what porosity value would you use? _____
4) True or False: the measurement between the well with the highest water table elevation and the water table contour line is always parallel to the water table contour line. _____
5) What three values are necessary to calculate horizontal velocity? _____

Directions: Fill in the remediation techniques table. Each correct answer is worth half a point. The contaminant in question is the same one present in Well B.

Technique	In-situ/ Ex-situ	Type (Biological, Chemical, Physical, Other, or any combinations)	Cost (Low, Medium, High)	Applicable to Contaminant? (Yes, No, Not alone)	Definition
Air sparging					
Pump and Treat					
Phytoremediation					

Permeable Reactive Barrier					
Monitored Natural Attenuation					

Points: _____/62.5