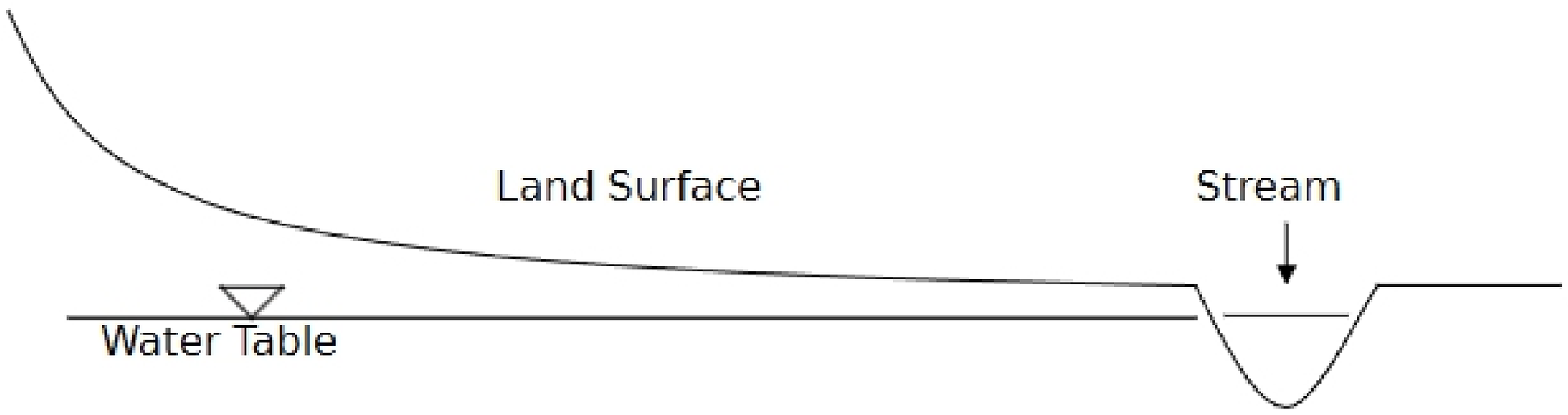
Dr. Casey **Name: _____**
Exam 3
Spring 2003 **Signature: _____**
Chem. 104

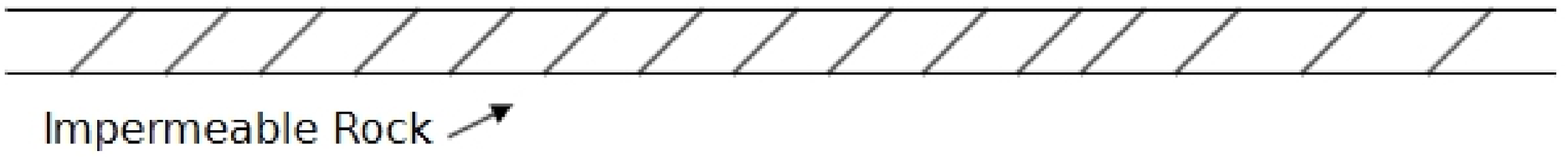
Honor Statement: By signing this exam, you indicate that you have neither given nor received aid from any unauthorized source.

Answer each question in the space provided. If you need more space, use the back of the sheet. All work must be shown to receive partial credit. You have until the regularly scheduled end of class to complete the exam. Good luck!

1. *Identify or draw* the following features on the diagram below:

aerated (unsaturated) zone
confined aquifer
arrow indicating recharge
confining layer
unconfined aquifer
arrow indicating site and direction of discharge





2. If clean water were always available and inexpensive, we would not be as concerned as we are about water quality. Discuss the strategies that are used to obtain clean water in major metropolitan areas such as Los Angeles and New York City. Which of these strategies are usually not employed? Why?

The strategies that we discussed in class are:

a. Clean currently available water to meet desired uses
b. Move clean water from another area
c. Use less water

3. There are several consequences of the overuse of groundwater.
    a. Define what overuse of groundwater is.

    b. Explain in detail how overuse of groundwater relates to **2 of the 3** situations below.
        i. Drinking water availability
        ii. Subsidence of the ground
        iii. Saltwater intrusion

4. Water has several important properties that are relatively unusual for its small size. Explain the following circumstances based on the water property given.

a. Water is an unusually good solvent. What are the implications for surface and groundwater contamination?

b. Solid water (ice) floats on top of liquid water. How does this affect the survival of aquatic species in cold climates?

5. Drinking water wells often withdraw water from confined aquifers. Irrigation wells often withdraw water from either unconfined or confined aquifers. Explain why this is reasonable in terms of potential for aquifer contamination and desired uses for different water resources.

6. A nitrogen fertilizer in the form of NH_3 is applied to an aerobic soil with crops. What other forms of nitrogen could occur in the soil as a result of chemical transformations? Which forms do you expect to be major components, and which will be present in only small levels?