Problem #1

The aquifer beneath a circular oceanic island has a mean hydraulic conductivity of 122 ft/day. The amount of recharge is 0.00831 ft/day. The density of fresh water is 1.000 g/cm^3 and the density of the underlying saline water is 1.024 g/cm^3. If the island is 5650 ft in diameter, what is the depth to the salt-water interface in the center of the island?

Problem #2

The Houston area receives an average of 100 cm of precipitation per year. If the mean rainfall chloride concentration is 100 mg/L and the mean soil chloride concentration is 4000 mg/L, estimate the average annual net infiltration rate.

Problem #3

The following data were obtained from a pumping test where a well was pumped at a rate of 200 gallons per minute. Drawdown was measured in an observation well 250 feet away from the pumped well. The driller's log and test data are listed in Table 1.

Table 1. Drillers Log and Test Data, Problem 3

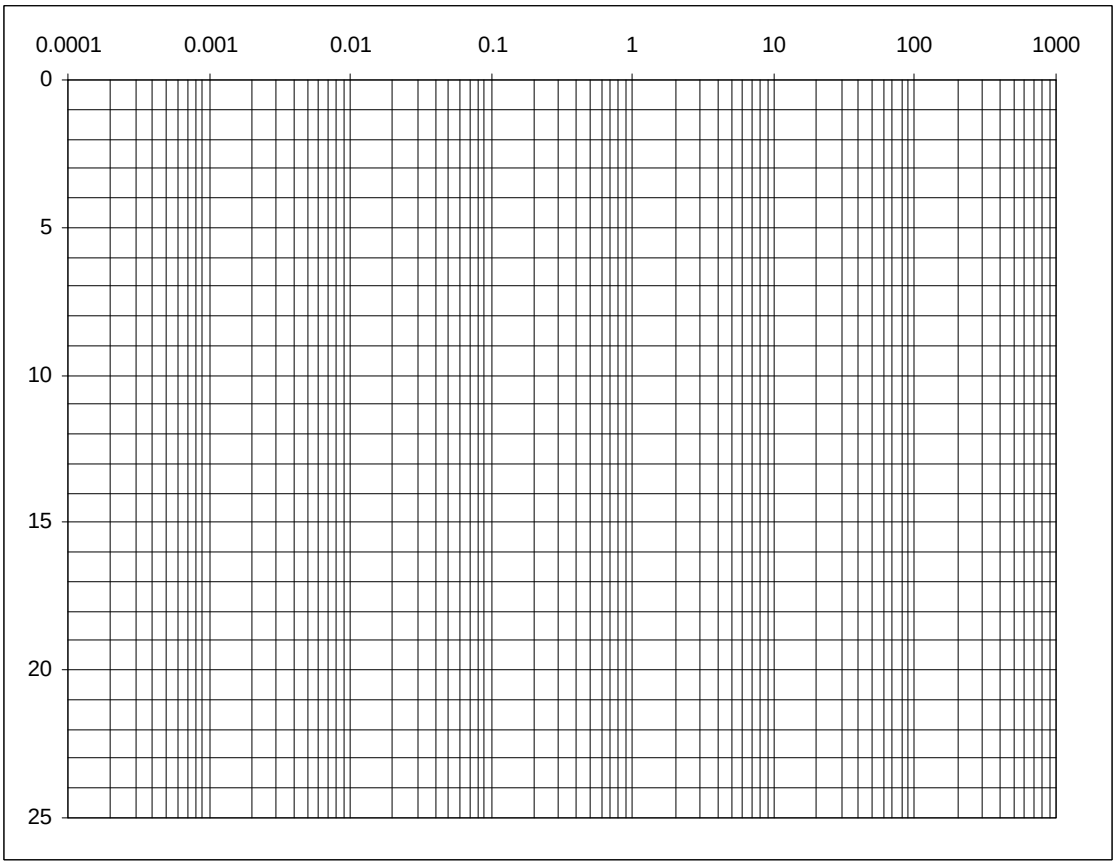
Depth	Texture	Elapsed Time (minutes)	Drawdown (feet)
0-23 feet	Glacial till, brown, clayey	1.0	0.45
23-77 feet	Dolomite, fractured	2.0	0.74
77-182 feet	Shale, black, dense	4.0	1.04
182-282 feet	Sandstone,well-cemented, coarse	7.0	1.28
282-291 feet	Shale, gray , limy	10.0	1.45
		21.0	1.79
		40.0	2.17
		70.0	2.41
		100.0	2.67
		200.0	2.96
		300.0	3.11
		400.0	3.25
		600.0	3.41
		800.0	3.50
		1000.0	3.60
		1440.0	3.81

A steel casing was cemented to a depth of 182 feet and the well was screened from 182 feet to its total depth of 291 feet.

a) Draw a schematic diagram of the aquifer system described by the driller's log. Indicate the relative positions of the pumping and observation well.
b) Do the data suggest a leaky aquifer?
c) Compute the value of storativity and transmissivity for the aquifer system.

Graph paper is provided on the next page to help in the analysis. You may re-label the scales as needed to fit the problem.

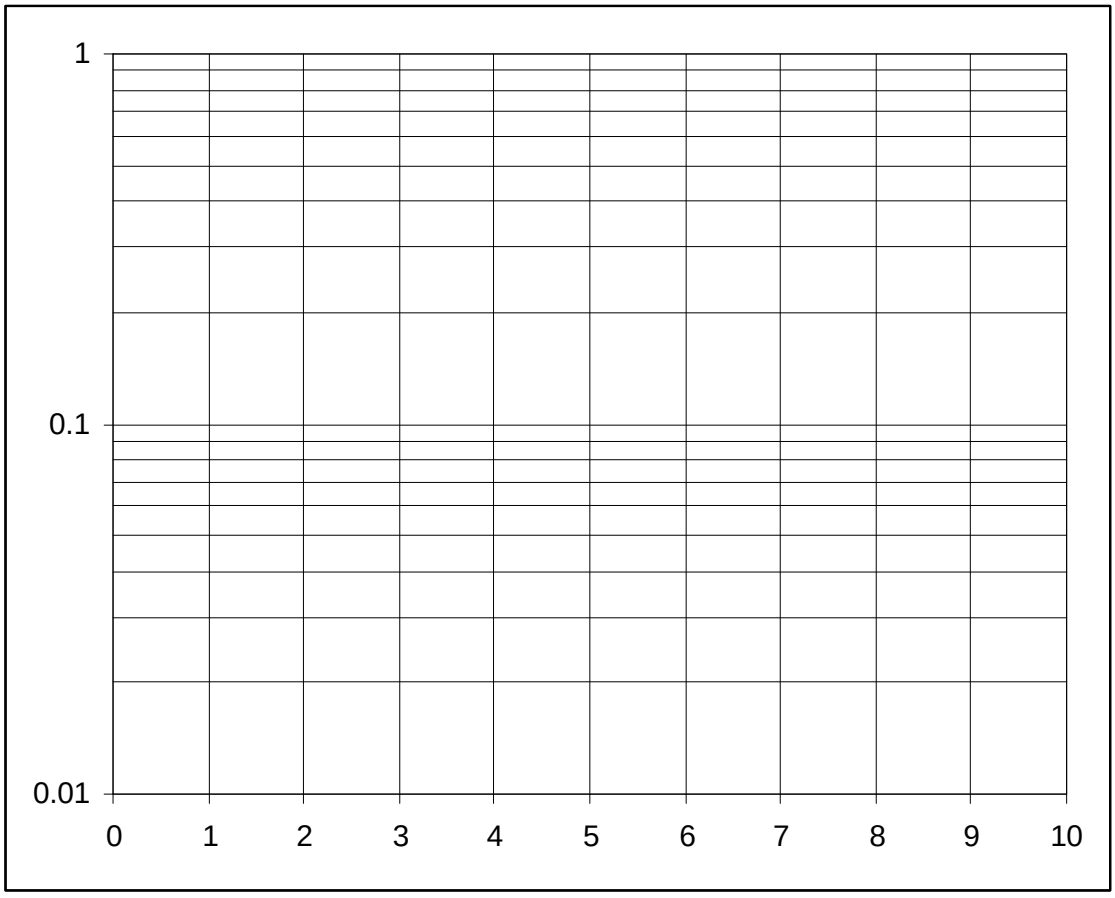
Problem#3 (Continued)



Problem #4

A slug test is performed by lowering a metal slug into a piezometer that is screened in a coarse sand. The inside diameter of both the well screen and the well casing is 2 in. The well screen is 10 feet in length. A pressure transducer was used to record the water level every second for 10 seconds. The following data were obtained when the slug was rapidly pulled from the piezometer.

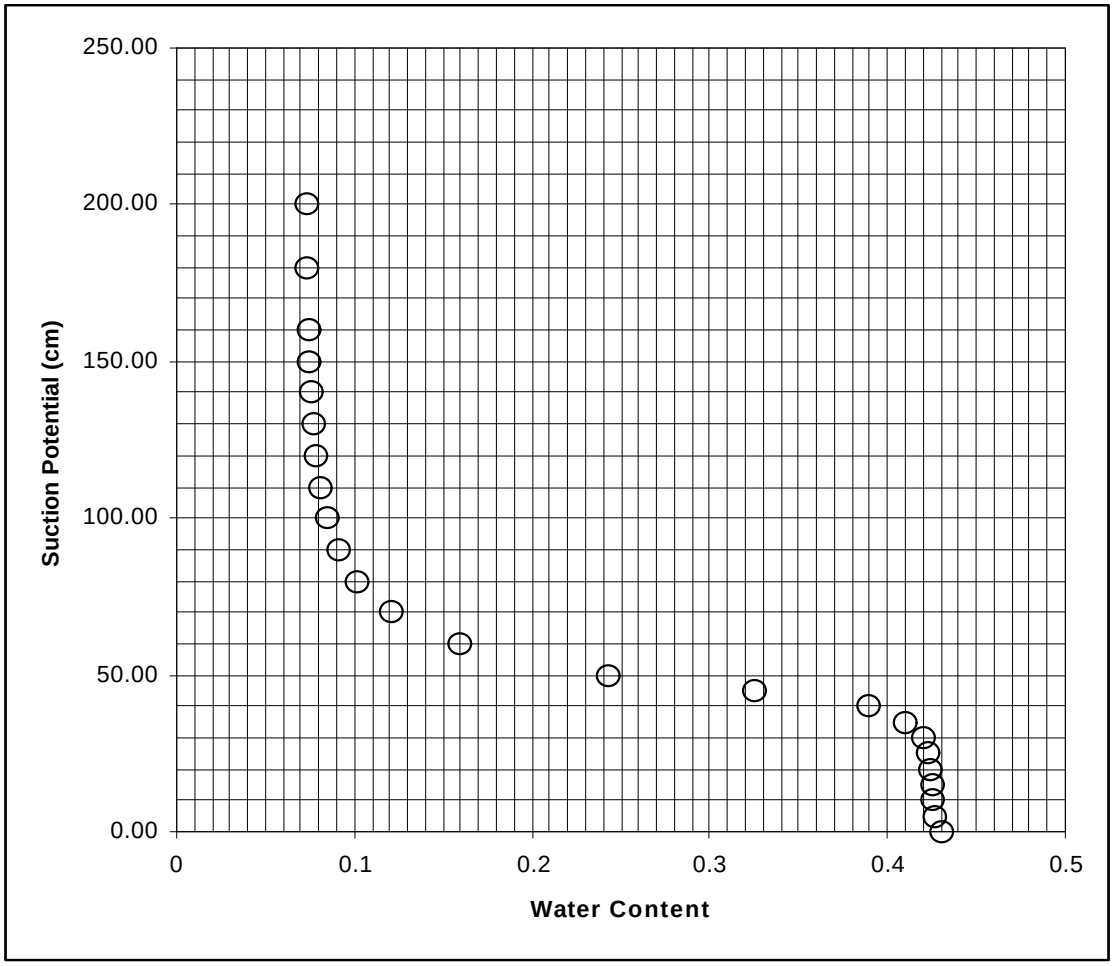
Time (seconds)	Depth to Water (ft)	Change in water level h (ft)	h/h_o
Static level	13.99		
0.00	14.87	0.88	1.000
1.00	14.59	0.60	0.682
2.00	14.37	0.38	0.432
3.00	14.20	0.21	0.239
4.00	14.11	0.12	0.136
5.00	14.05	0.06	0.068
6.00	14.03	0.04	0.045
7.00	14.01	0.02	0.023
8.00	14.00	0.01	0.011
9.00	13.99	0.00	0.000



Problem 4 (Continued)

Problem #5

A fine sand soil has the following soil-water characteristic curve. From this curve estimate the soil porosity, n, irreducible water content, q_{wr}, the irreducible saturation, S_{wr}, and the bubbling pressure, Ψ_b.



If you can, also estimate the Brooks and Corey exponent, l, for this soil.

Problem #5 (Continued)

Problem #6

A comprehensive materials supplier for pump and motors is

a) W.L. Grainger Co.
b) Ben Meadows Co.
c) Home Depot Inc.
d) Worldwide Pants Inc.

During a dewatering project field inspection a citizen approaches you and tells you that you are drilling on their (not your client's) land. How would you handle the situation (brief essay)?

You are going to make a field inspection during a project and collect samples. Someone suggests the following list of equipment in addition to the dedicated sampling equipment. Decide which equipment you would take, and which you would leave behind. Explain your choices (brief essay).

a) Bolt cutters
b) Cellular telephone
c) Toilet paper
d) First aid kit
e) Ice chest
f) Map
g) Raingear