

1. Well Data and Groundwater Contour Maps. Examine Figure 1 location map showing a hypothetical well field and a generalized well log. The wells are set in an unconsolidated sand-gravel bed, underlain by clay layer. Table 1 below lists the wells, surface elevation, riser stick-up (above ground surface), depth-to-water, and total depth of the well screen. The bore holes were drilled to the base of the sand-gravel layer, and screen set at TD of well (i.e. well TD = depth to top of underlying clay layer)
 - A. Examine the well data in Table 1 and Monitoring Well Location Map on Figure 1. Fill in Table Below.

Table 1. Well Data - Hydrology practice problem (March 2016)

ID	Surf_elev_ft	stickUP_ft	DTW_ft	Elev_top_casing_ft	SWL_Elev_ft	TD_ft	Well_column_ft	T ft ² /day
MW-1	172	1.3	68.2			118		
MW-2	158	2	55.5			115		
MW-5	154	1.2	58			110		
MW-6	157	2.1	56.1			115		
MW-7	163	1.8	67.5			110		
MW-8	165	1.9	63.7			115		
MW-9	154	2.1	55.3			115		
MW-10	159	1.6	58.8			115		
MW-11	156	1.5	62.4			110		
MW-12	168	0	64.4			116		
MW-13	172	0	69.8			116		
MW-14	174	1.8	77			110		
MW-15	163	2.1	64.5			112		
MW-16	153	2	59.2			110		

AVG. T =

- B. Label monitoring wells with SWL, and draw groundwater contour map using a 1 ft contour interval.
- C. Determine the hydraulic gradient (ft/ft) between the Children Farm Home and Chemical Plant. Which direction is groundwater flow? Show all of your math work.
- D. Does this scenario represent a confined or unconfined aquifer? Artesian or non-artesian? Water table or potentiometric surface under artesian pressure?
- E. Note the groundwater contour patterns. What hydrogeologic phenomena is likely represented at MW-11?
- F. Given the hydraulic data listed on your contour map, calculate the transmissivity (ft²/day) for each well, and determine an average. Fill in the last column in Table 1 above. (Hint: use K from Figure 1, convert to ft/day, and calculate T in ft²/day). Show all of your math work.
- G. Using Darcy’s Law, calculate the approximate average annual groundwater discharge from the aquifer across line X-Y. Show all of your math work; answer in units of MGal/year.

Figure 1. ES476 Hydrology - Well Field Problem / Aquifer Analysis

