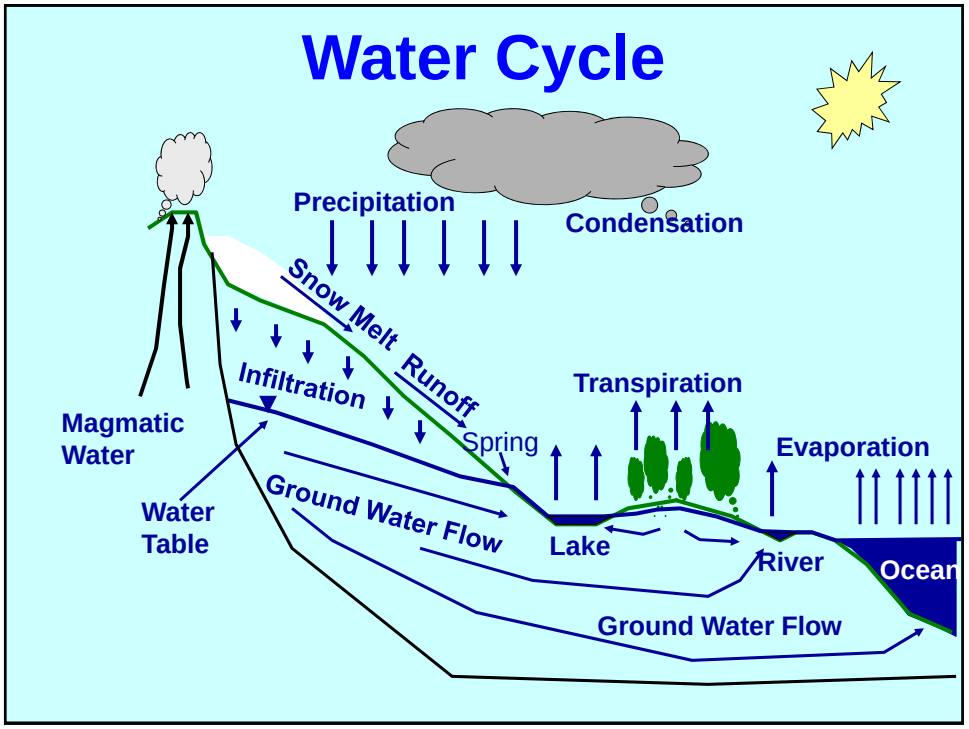
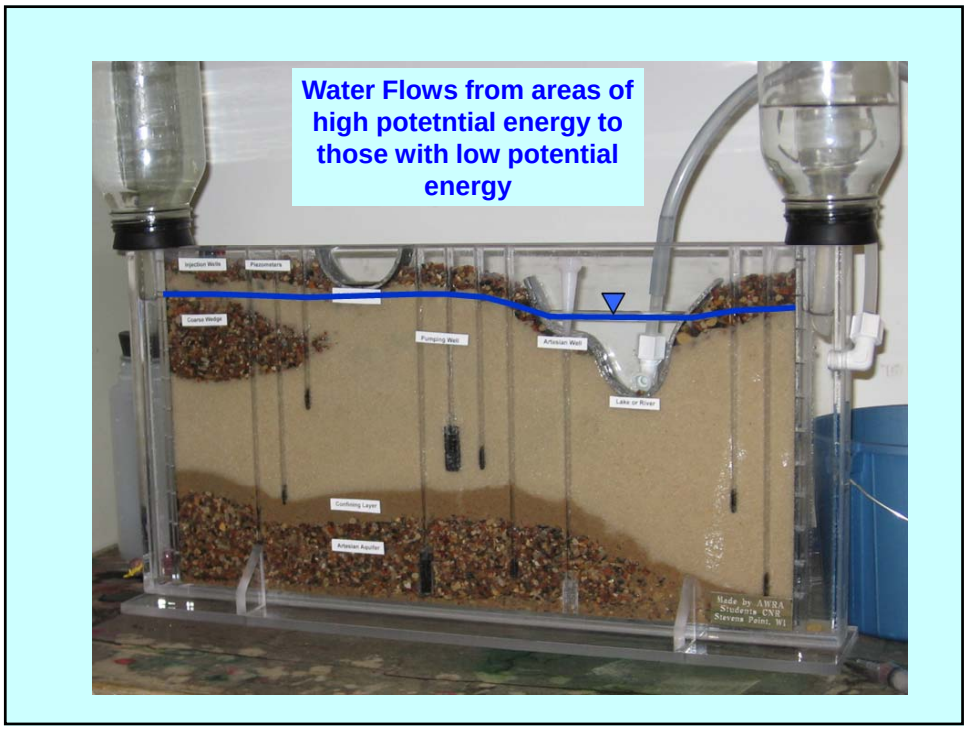

Water Cycle
Precipitation
Condensation
Snow Melt Runoff
Infiltration
Transpiration
Magmatic Water
Spring
Evaporation
Water Table
Ground Water Flow
Lake
River
Ocean
Ground Water Flow

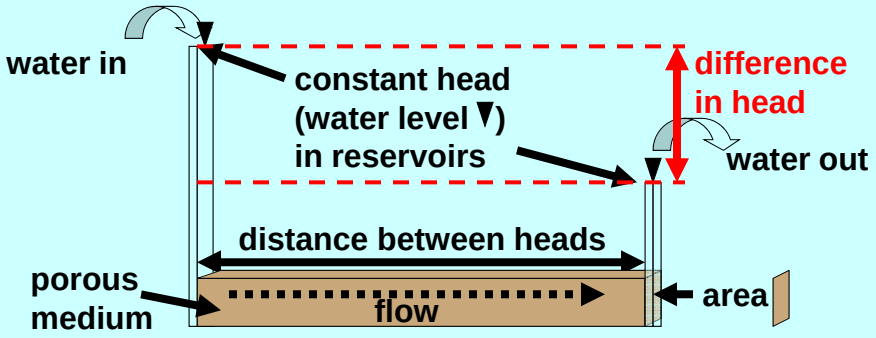

Water Flows from areas of high potetntial energy to those with low potential energy

DARCY's LAW

Discharge (i.e. Volumetric Flow Rate) is
directly proportional to AREA and HEAD DIFFERENCE
inversely proportional to distance between heads
constant of proportionality is hydraulic conductivity, K : LT^{-1}

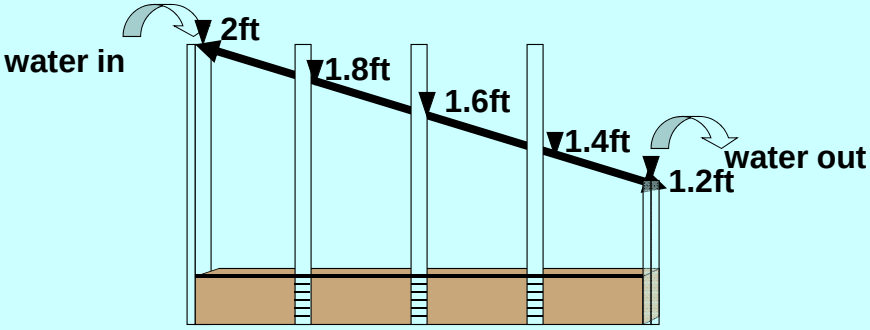
$$Q = K \frac{\text{Head Difference}}{\text{Distance between Heads}} \text{Area} = KiA$$

Q=volumetric discharge : L^3T^{-1} i=gradient : LL^{-1} A=Area : L^2

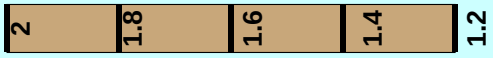


More on DARCY's LAW later

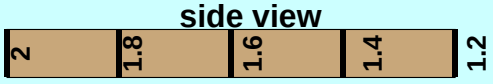
If the sand is uniform the head will decline linearly
Standpipes open in the sand would show this



We could contour the lines of equal head
top view



side view



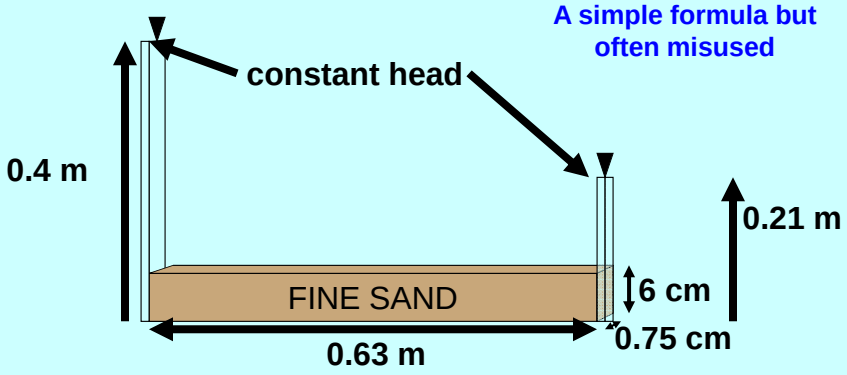
We will talk more about this later, but let's make a simple estimate now

$$Q = K \frac{\text{Head Difference}}{\text{Distance between Heads}} \text{ Area} = KiA$$

Q = volumetric discharge : L^3T^{-1} i = gradient : LL^{-1}

constant of proportionality is hydraulic conductivity, K : LT^{-1}

A simple formula but often misused



$$Q = K \frac{\text{Head Difference}}{\text{Distance between Heads}} \text{ Area}$$

http://en.wikipedia.org/wiki/Hydraulic_conductivity#Ranges_of_values_for_natural_materials